



man pages section 1M: System Administration Commands

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Preface

Both novice users and those familiar with the SunOS operating system can use online man pages to obtain information about the system and its features. A man page is intended to answer concisely the question “What does it do?” The man pages in general comprise a reference manual. They are not intended to be a tutorial.

Overview

The following contains a brief description of each man page section and the information it references:

- Section 1 describes, in alphabetical order, commands available with the operating system.
- Section 1M describes, in alphabetical order, commands that are used chiefly for system maintenance and administration purposes.
- Section 2 describes all of the system calls. Most of these calls have one or more error returns. An error condition is indicated by an otherwise impossible returned value.
- Section 3 describes functions found in various libraries, other than those functions that directly invoke UNIX system primitives, which are described in Section 2.
- Section 4 outlines the formats of various files. The C structure declarations for the file formats are given where applicable.
- Section 5 contains miscellaneous documentation such as character-set tables.
- Section 6 contains available games and demos.
- Section 7 describes various special files that refer to specific hardware peripherals and device drivers. STREAMS software drivers, modules and the STREAMS-generic set of system calls are also described.

- Section 9 provides reference information needed to write device drivers in the kernel environment. It describes two device driver interface specifications: the Device Driver Interface (DDI) and the Driver/Kernel Interface (DKI).
- Section 9E describes the DDI/DKI, DDI-only, and DKI-only entry-point routines a developer can include in a device driver.
- Section 9F describes the kernel functions available for use by device drivers.
- Section 9S describes the data structures used by drivers to share information between the driver and the kernel.

Below is a generic format for man pages. The man pages of each manual section generally follow this order, but include only needed headings. For example, if there are no bugs to report, there is no BUGS section. See the `intro` pages for more information and detail about each section, and `man(1)` for more information about man pages in general.

NAME	This section gives the names of the commands or functions documented, followed by a brief description of what they do.								
SYNOPSIS	This section shows the syntax of commands or functions. When a command or file does not exist in the standard path, its full path name is shown. Options and arguments are alphabetized, with single letter arguments first, and options with arguments next, unless a different argument order is required. The following special characters are used in this section: <table> <tr> <td>[]</td><td>Brackets. The option or argument enclosed in these brackets is optional. If the brackets are omitted, the argument must be specified.</td></tr> <tr> <td>. . .</td><td>Ellipses. Several values can be provided for the previous argument, or the previous argument can be specified multiple times, for example, "filename . . .".</td></tr> <tr> <td> </td><td>Separator. Only one of the arguments separated by this character can be specified at a time.</td></tr> <tr> <td>{ }</td><td>Braces. The options and/or arguments enclosed within braces are interdependent, such that everything enclosed must be treated as a unit.</td></tr> </table>	[]	Brackets. The option or argument enclosed in these brackets is optional. If the brackets are omitted, the argument must be specified.	. . .	Ellipses. Several values can be provided for the previous argument, or the previous argument can be specified multiple times, for example, "filename . . .".		Separator. Only one of the arguments separated by this character can be specified at a time.	{ }	Braces. The options and/or arguments enclosed within braces are interdependent, such that everything enclosed must be treated as a unit.
[]	Brackets. The option or argument enclosed in these brackets is optional. If the brackets are omitted, the argument must be specified.								
. . .	Ellipses. Several values can be provided for the previous argument, or the previous argument can be specified multiple times, for example, "filename . . .".								
	Separator. Only one of the arguments separated by this character can be specified at a time.								
{ }	Braces. The options and/or arguments enclosed within braces are interdependent, such that everything enclosed must be treated as a unit.								

PROTOCOL	This section occurs only in subsection 3R to indicate the protocol description file.
DESCRIPTION	This section defines the functionality and behavior of the service. Thus it describes concisely what the command does. It does not discuss OPTIONS or cite EXAMPLES. Interactive commands, subcommands, requests, macros, and functions are described under USAGE.
IOCTL	This section appears on pages in Section 7 only. Only the device class that supplies appropriate parameters to the <code>ioctl(2)</code> system call is called <code>ioctl</code> and generates its own heading. <code>ioctl</code> calls for a specific device are listed alphabetically (on the man page for that specific device). <code>ioctl</code> calls are used for a particular class of devices all of which have an <code>io</code> ending, such as <code>mtio(7I)</code> .
OPTIONS	This section lists the command options with a concise summary of what each option does. The options are listed literally and in the order they appear in the SYNOPSIS section. Possible arguments to options are discussed under the option, and where appropriate, default values are supplied.
OPERANDS	This section lists the command operands and describes how they affect the actions of the command.
OUTPUT	This section describes the output – standard output, standard error, or output files – generated by the command.
RETURN VALUES	If the man page documents functions that return values, this section lists these values and describes the conditions under which they are returned. If a function can return only constant values, such as 0 or -1, these values are listed in tagged paragraphs. Otherwise, a single paragraph describes the return values of each function. Functions declared void do not return values, so they are not discussed in RETURN VALUES.
ERRORS	On failure, most functions place an error code in the global variable <code>errno</code> indicating why they failed. This section lists alphabetically all error codes a function can generate and describes the conditions that cause each error. When more than

	one condition can cause the same error, each condition is described in a separate paragraph under the error code.
USAGE	This section lists special rules, features, and commands that require in-depth explanations. The subsections listed here are used to explain built-in functionality: - Commands - Modifiers - Variables - Expressions - Input Grammar
EXAMPLES	This section provides examples of usage or of how to use a command or function. Wherever possible a complete example including command-line entry and machine response is shown. Whenever an example is given, the prompt is shown as <code>example%</code>, or if the user must be superuser, <code>example#</code>. Examples are followed by explanations, variable substitution rules, or returned values. Most examples illustrate concepts from the SYNOPSIS, DESCRIPTION, OPTIONS, and USAGE sections.
ENVIRONMENT VARIABLES	This section lists any environment variables that the command or function affects, followed by a brief description of the effect.
EXIT STATUS	This section lists the values the command returns to the calling program or shell and the conditions that cause these values to be returned. Usually, zero is returned for successful completion, and values other than zero for various error conditions.
FILES	This section lists all file names referred to by the man page, files of interest, and files created or required by commands. Each is followed by a descriptive summary or explanation.
ATTRIBUTES	This section lists characteristics of commands, utilities, and device drivers by defining the attribute type and its corresponding value. See <code>attributes(5)</code> for more information.
SEE ALSO	This section lists references to other man pages, in-house documentation, and outside publications.

DIAGNOSTICS

This section lists diagnostic messages with a brief explanation of the condition causing the error.

WARNINGS

This section lists warnings about special conditions which could seriously affect your working conditions. This is not a list of diagnostics.

NOTES

This section lists additional information that does not belong anywhere else on the page. It takes the form of an aside to the user, covering points of special interest. Critical information is never covered here.

BUGS

This section describes known bugs and, wherever possible, suggests workarounds.

Introduction

Intro(1M)

NAME	Intro – introduction to maintenance commands and application programs												
DESCRIPTION	This section describes, in alphabetical order, commands that are used chiefly for system maintenance and administration purposes. Because of command restructuring for the Virtual File System architecture, there are several instances of multiple manual pages that begin with the same name. For example, the <code>mount</code>, pages – <code>mount(1M)</code>, <code>mount_cachefs(1M)</code>, <code>mount_hsfefs(1M)</code>, <code>mount_nfs(1M)</code>, <code>mount_tmpfs(1M)</code>, and <code>mount_ufs(1M)</code>. In each such case the first of the multiple pages describes the syntax and options of the generic command, that is, those options applicable to all FSTypes (file system types). The succeeding pages describe the functionality of the FSType-specific modules of the command. These pages list the command followed by an underscore (<code>_</code>) and the FSType to which they pertain. Note that the administrator should not attempt to call these modules directly. The generic command provides a common interface to all of them. Thus the FSType-specific manual pages should not be viewed as describing distinct commands, but rather as detailing those aspects of a command that are specific to a particular FSType.												
COMMAND SYNTAX	Unless otherwise noted, commands described in this section accept options and other arguments according to the following syntax: <i>name</i> [<i>option</i> (<i>s</i>)] [<i>cmdarg</i> (<i>s</i>)] where: <table> <tr> <td><i>name</i></td><td>The name of an executable file.</td></tr> <tr> <td><i>option</i></td><td>– <i>noargletter</i>(<i>s</i>) or, – <i>argletter</i>< ><i>optarg</i> where < > is optional white space.</td></tr> <tr> <td><i>noargletter</i></td><td>A single letter representing an option without an argument.</td></tr> <tr> <td><i>argletter</i></td><td>A single letter representing an option requiring an argument.</td></tr> <tr> <td><i>optarg</i></td><td>Argument (character string) satisfying preceding <i>argletter</i>.</td></tr> <tr> <td><i>cmdarg</i></td><td>Pathname (or other command argument) <i>not</i> beginning with – or, – by itself indicating the standard input.</td></tr> </table>	<i>name</i>	The name of an executable file.	<i>option</i>	– <i>noargletter</i> (<i>s</i>) or, – <i>argletter</i> < > <i>optarg</i> where < > is optional white space.	<i>noargletter</i>	A single letter representing an option without an argument.	<i>argletter</i>	A single letter representing an option requiring an argument.	<i>optarg</i>	Argument (character string) satisfying preceding <i>argletter</i> .	<i>cmdarg</i>	Pathname (or other command argument) <i>not</i> beginning with – or, – by itself indicating the standard input.
<i>name</i>	The name of an executable file.												
<i>option</i>	– <i>noargletter</i> (<i>s</i>) or, – <i>argletter</i> < > <i>optarg</i> where < > is optional white space.												
<i>noargletter</i>	A single letter representing an option without an argument.												
<i>argletter</i>	A single letter representing an option requiring an argument.												
<i>optarg</i>	Argument (character string) satisfying preceding <i>argletter</i> .												
<i>cmdarg</i>	Pathname (or other command argument) <i>not</i> beginning with – or, – by itself indicating the standard input.												
ATTRIBUTES	See <code>attributes(5)</code> for a discussion of the attributes listed in this section.												
SEE ALSO	<code>getopt(1)</code> , <code>getopt(3C)</code> , <code>attributes(5)</code>												
DIAGNOSTICS	Upon termination, each command returns 0 for normal termination and non-zero to indicate troubles such as erroneous parameters, bad or inaccessible data, or other inability to cope with the task at hand. It is called variously “exit code,” “exit status,” or “return code,” and is described only where special conventions are involved.												
NOTES	Unfortunately, not all commands adhere to the standard syntax.												

System Administration Commands

6to4relay(1M)

NAME	6to4relay – administer configuration for 6to4 relay router communication
SYNOPSIS	<pre>/usr/sbin/6to4relay /usr/sbin/6to4relay [-e] [-a <i>addr</i>] /usr/sbin/6to4relay [-d] /usr/sbin/6to4relay [-h]</pre>
DESCRIPTION	The <code>6to4relay</code> command is used to configure 6to4 relay router communication. Relay router communication support is enabled by setting the value of a variable that stores an IPv4 address within the <code>tun</code> module. This variable is global to all tunnels and defines the policy for communication with relay routers. By default, the address is set to <code>INADDR_ANY</code> (0.0.0.0), and the kernel interprets the value to indicate that support for relay router communication is disabled. Otherwise, support is enabled, and the specified address is used as the IPv4 destination address when packets destined for native IPv6 (non-6to4) hosts are sent through the 6to4 tunnel interface. The <code>6to4relay</code> command uses a project private <code>ioctl</code> to set the variable. <code>6to4relay</code> used without any options outputs the current, in-kernel, configuration status. Use the <code>-a</code> option to send packets to a specific relay router's unicast address instead of the default anycast address. The address specified with the <code>-a</code> option does not specify the policy for receiving traffic from relay routers. The source relay router on a received packet is non-deterministic, since a different relay router may be chosen for each sending native IPv6 end-point. Configuration changes made by using the <code>6to4relay</code> are not persistent across reboot. The changes will persist in the kernel only until you take the tunnel down
OPTIONS	The <code>6to4relay</code> command supports the following options: <code>-a <i>addr</i></code> Use the specified address, <i>addr</i>. <code>-e</code> Enable support for relay router. Use <code>-a <i>addr</i></code> if it is specified. Otherwise, use the default anycast address, 192.88.99.1. <code>-d</code> Disable support for the relay router. <code>-h</code> Help
OPERANDS	The following operands are supported: <i>addr</i> A specific relay router's unicast address. <i>addr</i> must be specified as a dotted decimal representation of an IPv4 address. Otherwise, an error will occur, and the command will fail.
EXAMPLES	EXAMPLE 1 Printing the In-Kernel Configuration Status Use <code>/usr/sbin/6to4relay</code> without any options to print the in-kernel configuration status. <pre>example# /usr/sbin/6to4relay</pre>

EXAMPLE 1 Printing the In-Kernel Configuration Status (Continued)

If 6to4 relay router communication is disabled, the administrator will see the following message:

```
6to4relay: 6to4 Relay Router communication support is disabled.
```

If 6to4 router communication is enabled, the user will see this message:

```
6to4relay: 6to4 Relay Router communication support is enabled.
IPv4 destination address of Relay Router = 192.88.99.1
```

EXIT STATUS

The following exit values are returned:

0 Successful completion.

>0 An error occurred.

FILES

/usr/sbin/6to4relay The default installation root

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	Evolving

SEE ALSO

ifconfig(1M), attributes(5)

Huitema, C. *RFC 3068, An Anycast Prefix for 6to4 Relay Routers*. Network Working Group. June, 2001.

Carpenter, B. and Moore, K. *RFC 3056, Connection of IPv6 Domains via IPv4 Clouds*. Network Working Group. February, 2001.

DIAGNOSTICS

The 6to4relay reports the following messages:

```
6to4relay: input (0.0.0.0) is not a valid IPv4 unicast address
```

Example:

```
example# 6to4relay -e -a 0.0.0.0
```

Description: The address specified with the -a option must be a valid unicast address.

```
6to4relay: option requires an argument -a
```

usage:

```
6to4relay
6to4relay -e [-a <addr>]
6to4relay -d
6to4relay -h
```

6to4relay(1M)

Example:

```
example# 6to4relay -e -a
```

Description: The `-a` option requires an argument.

usage:

```
6to4relay
6to4relay -e [-a <addr>]
6to4relay -d
6to4relay -h
```

Example:

```
example# 6to4relay -e -d
```

Description: The options specified are not permitted. A usage message is output to the screen.

usage:

```
6to4relay
6to4relay -e [-a <addr>]
6to4relay -d
6to4relay -h
```

Example:

```
example# 6to4relay -a 1.2.3.4
```

Description: The `-e` option is required in conjunction with the `-a` option. A usage message is output to the screen.

```
6to4relay: ioctl (I_STR) : Invalid argument
```

Example:

```
example# 6to4relay -e -a 239.255.255.255
```

Description: The address specified with the `-a` option must not be a class d *addr*.

NAME	accept, reject – accept or reject print requests						
SYNOPSIS	accept <i>destination</i> ... reject [-r <i>reason</i>] <i>destination</i> ...						
DESCRIPTION	accept allows the queueing of print requests for the named destinations. reject prevents queueing of print requests for the named destinations. Use <code>lpstat -a</code> to check if destinations are accepting or rejecting print requests. accept and reject must be run on the print server; they have no meaning to a client system.						
OPTIONS	The following options are supported for reject: -r <i>reason</i> Assigns a reason for rejection of print requests for <i>destination</i>. Enclose <i>reason</i> in quotes if it contains blanks. <i>reason</i> is reported by <code>lpstat -a</code>. By default, <i>reason</i> is unknown reason for existing destinations, and new printer for destinations added to the system but not yet accepting requests.						
OPERANDS	The following operands are supported. <i>destination</i> The name of the destination accepting or rejecting print requests. Destination specifies the name of a printer or class of printers (see <code>lpadmin(1M)</code>). Specify <i>destination</i> using atomic name. See <code>printers.conf(4)</code> for information regarding the naming conventions for atomic names.						
EXIT STATUS	The following exit values are returned: 0 Successful completion. <i>non-zero</i> An error occurred.						
FILES	/var/spool/lp/* LP print queue.						
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:						
	<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWpcu</td></tr> <tr> <td>CSI</td><td>Enabled (see NOTES)</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWpcu	CSI	Enabled (see NOTES)
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWpcu						
CSI	Enabled (see NOTES)						
SEE ALSO	<code>enable(1)</code> , <code>lp(1)</code> , <code>lpstat(1)</code> , <code>lpadmin(1M)</code> , <code>lpsched(1M)</code> , <code>printers.conf(4)</code> , <code>attributes(5)</code>						

accept(1M)

NOTES	accept and reject affect only queueing on the print server's spooling system. Requests made from a client system remain queued in the client system's queueing mechanism until they are cancelled or accepted by the print server's spooling system. accept is CSI-enabled except for the <i>destination</i> name.

NAME	acct, acctdisk, acctdusg, accton, acctwtmp, closewtmp, utmp2wtmp – overview of accounting and miscellaneous accounting commands
SYNOPSIS	<pre> /usr/lib/acct/acctdisk /usr/lib/acct/acctdusg [-u filename] [-p filename] /usr/lib/acct/accton [filename] /usr/lib/acct/acctwtmp reason filename /usr/lib/acct/closewtmp /usr/lib/acct/utmp2wtmp </pre>
DESCRIPTION	Accounting software is structured as a set of tools (consisting of both C programs and shell procedures) that can be used to build accounting systems. <code>acctsh(1M)</code> describes the set of shell procedures built on top of the C programs. Connect time accounting is handled by various programs that write records into <code>/var/adm/wtmpx</code>, as described in <code>utmpx(4)</code>. The programs described in <code>acctcon(1M)</code> convert this file into session and charging records, which are then summarized by <code>acctmerg(1M)</code>. Process accounting is performed by the system kernel. Upon termination of a process, one record per process is written to a file (normally <code>/var/adm/pacct</code>). The programs in <code>acctprc(1M)</code> summarize this data for charging purposes; <code>acctcms(1M)</code> is used to summarize command usage. Current process data may be examined using <code>acctcom(1)</code>. Process accounting records and connect time accounting records (or any accounting records in the <code>tacct</code> format described in <code>acct(3HEAD)</code>) can be merged and summarized into total accounting records by <code>acctmerg</code> (see <code>tacct</code> format in <code>acct(3HEAD)</code>). <code>prtacct</code> (see <code>acctsh(1M)</code>) is used to format any or all accounting records. <code>acctdisk</code> reads lines that contain user ID, login name, and number of disk blocks and converts them to total accounting records that can be merged with other accounting records. <code>acctdisk</code> returns an error if the input file is corrupt or improperly formatted. <code>acctdusg</code> reads its standard input (usually from <code>find / -print</code>) and computes disk resource consumption (including indirect blocks) by login. <code>accton</code> without arguments turns process accounting off. If <i>filename</i> is given, it must be the name of an existing file, to which the kernel appends process accounting records (see <code>acct(2)</code> and <code>acct(3HEAD)</code>).

acct(1M)

	acctwtmp writes a utmpx(4) record to <i>filename</i>. The record contains the current time and a string of characters that describe the <i>reason</i>. A record type of ACCOUNTING is assigned (see utmpx(4)) <i>reason</i> must be a string of 11 or fewer characters, numbers, \$, or spaces. For example, the following are suggestions for use in reboot and shutdown procedures, respectively: <pre>acctwtmp "acctg on" /var/adm/wtmpx acctwtmp "acctg off" /var/adm/wtmpx</pre> For each user currently logged on, closewtmp puts a false DEAD_PROCESS record in the /var/adm/wtmpx file. runacct (see runacct(1M)) uses this false DEAD_PROCESS record so that the connect accounting procedures can track the time used by users logged on before runacct was invoked. For each user currently logged on, runacct uses utmp2wtmp to create an entry in the file /var/adm/wtmpx, created by runacct. Entries in /var/adm/wtmpx enable subsequent invocations of runacct to account for connect times of users currently logged in.
OPTIONS	The following options are supported: -u <i>filename</i> Places in <i>filename</i> records consisting of those filenames for which acctdusg charges no one (a potential source for finding users trying to avoid disk charges). -p <i>filename</i> Specifies a password file, <i>filename</i>. This option is not needed if the password file is /etc/passwd.
ENVIRONMENT VARIABLES	If any of the LC_* variables (LC_TYPE, LC_MESSAGES, LC_TIME, LC_COLLATE, LC_NUMERIC, and LC_MONETARY) (see environ(5)) are not set in the environment, the operational behavior of acct for each corresponding locale category is determined by the value of the LANG environment variable. If LC_ALL is set, its contents are used to override both the LANG and the other LC_* variables. If none of the above variables are set in the environment, the "C" (U.S. style) locale determines how acct behaves. LC_CTYPE Determines how acct handles characters. When LC_CTYPE is set to a valid value, acct can display and handle text and filenames containing valid characters for that locale. acct can display and handle Extended Unix Code (EUC) characters where any character can be 1, 2, or 3 bytes wide. acct can also handle EUC characters of 1, 2, or more column widths. In the "C" locale, only characters from ISO 8859-1 are valid. LC_TIME Determines how acct handles date and time formats. In the "C" locale, date and time handling follows the U.S. rules.
FILES	/etc/passwd Used for login name to user ID conversions. /usr/lib/acct Holds all accounting commands listed in sub-class 1M of this manual.

acct(1M)

/var/adm/pacct

Current process accounting file.

/var/adm/wtmpx

History of user access and administration information..

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWaccu

SEE ALSO

acctcom(1), acctcms(1M), acctcon(1M), acctmerg(1M), acctprc(1M), acctsh(1M), fwtmp(1M), runacct(1M), acct(2), acct(3HEAD), passwd(4), utmpx(4), attributes(5), environ(5)

System Administration Guide: Basic Administration

acctadm(1M)

NAME	acctadm – configure extended accounting facility																
SYNOPSIS	/usr/sbin/acctadm [-DErux] [-d <i>resource_list</i>] [-e <i>resource_list</i>] [-f <i>filename</i>] [task process flow]																
DESCRIPTION	acctadm configures various attributes of the extended accounting facility. Without arguments, acctadm displays the current status of the extended accounting facility.																
OPTIONS	The following options are supported: <table><tr><td>-d <i>resource_list</i></td><td>Disable reporting of resource usage for resource. Specify <i>resource_list</i> as a comma-separated list of resources or resource groups. This option requires an operand. See OPERANDS.</td></tr><tr><td>-D</td><td>Disable accounting of the given operand type without closing the accounting file. This option can be used to temporarily stop writing accounting records to the accounting file without closing it. To close the file use the -x option. See -x.</td></tr><tr><td>-e <i>resource_list</i></td><td>Enable reporting of resource usage for resource. Specify <i>resource_list</i> as a comma-separated list of resources or resource groups. This option requires an operand. See OPERANDS.</td></tr><tr><td>-E</td><td>Enable accounting of the given operand type without sending the accounting output to a file. This option requires an operand. See OPERANDS.</td></tr><tr><td>-f <i>filename</i></td><td>Send the accounting output for the given operand type to <i>filename</i>. If <i>filename</i> exists, its contents are lost. This option requires an operand. See OPERANDS.</td></tr><tr><td>-r</td><td>Display available resource groups. When this option is used with an operand, it displays resource groups available for a given accounting type. When no operand is specified, this option displays resource groups for all available accounting types. See OPERANDS.</td></tr><tr><td>-u</td><td>Configure accounting based on the contents of <i>/etc/acctadm.conf</i>.</td></tr><tr><td>-x</td><td>Deactivate accounting of the given operand type. This option also closes the accounting file for the given accounting type if it is currently open. This option requires an operand. See OPERANDS.</td></tr></table>	-d <i>resource_list</i>	Disable reporting of resource usage for resource. Specify <i>resource_list</i> as a comma-separated list of resources or resource groups. This option requires an operand. See OPERANDS.	-D	Disable accounting of the given operand type without closing the accounting file. This option can be used to temporarily stop writing accounting records to the accounting file without closing it. To close the file use the -x option. See -x.	-e <i>resource_list</i>	Enable reporting of resource usage for resource. Specify <i>resource_list</i> as a comma-separated list of resources or resource groups. This option requires an operand. See OPERANDS.	-E	Enable accounting of the given operand type without sending the accounting output to a file. This option requires an operand. See OPERANDS.	-f <i>filename</i>	Send the accounting output for the given operand type to <i>filename</i> . If <i>filename</i> exists, its contents are lost. This option requires an operand. See OPERANDS.	-r	Display available resource groups. When this option is used with an operand, it displays resource groups available for a given accounting type. When no operand is specified, this option displays resource groups for all available accounting types. See OPERANDS.	-u	Configure accounting based on the contents of <i>/etc/acctadm.conf</i> .	-x	Deactivate accounting of the given operand type. This option also closes the accounting file for the given accounting type if it is currently open. This option requires an operand. See OPERANDS.
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OPERANDS

The `-d`, `-D`, `-e`, `-E`, `-f`, and `-x` options require an operand.

The following operands are supported:

process	Run <code>acctadm</code> on the process accounting components of the extended accounting facility.
task	Run <code>acctadm</code> on the task accounting components of the extended accounting facility.
flow	Run <code>acctadm</code> on the IPQoS accounting components of the extended accounting facility.

The optional final parameter to `acctadm` represents whether the command should act on the process, system task or IPQoS accounting components of the extended accounting facility.

EXAMPLES**EXAMPLE 1** Displaying the Current Status

The following command displays the current status. In this example, system task accounting is active and tracking only CPU resources. Process and flow accounting are not active.

```
$ acctadm
      Task accounting: active
      Task accounting file: /var/adm/exacct/task
      Tracked task resources: extended,mstate
      Untracked task resources: host
      Process accounting: inactive
      Process accounting file: none
      Tracked process resources: none
      Untracked process resources: extended,host,mstate
      Flow accounting: inactive
      Flow accounting file: none
      Tracked flow resources: none
      Untracked flow resources: extended
```

EXAMPLE 2 Activating Basic Process Accounting

The following command activates basic process accounting:

```
$ acctadm -e basic -f /var/adm/exacct/proc process
```

EXAMPLE 3 Displaying Available Resource Groups

The following command displays available resource groups:

```
$ acctadm -r
process:
extended pid,uid,gid,cpu,time,command,TTY,projid,taskid,ancpid,
          wait-status,flag
basic    pid,uid,gid,cpu,time,command,TTY,flag
task:
extended taskid,projid,cpu,time,host,mstate,anctaskid
```

EXAMPLE 3 Displaying Available Resource Groups *(Continued)*

```

basic      taskid,projid,cpu,time
flow:
extended  saddr,daddr,sport,dport,proto,dsfield,nbytes,npkts,
action,ctime,lseen,projid,uid
basic  saddr,daddr,sport,dport,proto,nbytes,npkts,action

```

EXAMPLE 4 Displaying Resource Groups for Task Accounting

The following command displays resource groups for task accounting:

```

$ acctadm -r task
extended taskid,projid,cpu,time,host,mstate,anctaskid
basic    taskid,projid,cpu,time

```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
	The modifications to the current configuration were valid and made successfully.
1	An error occurred.
	A fatal error occurred either in obtaining or modifying the accounting configuration.
2	Invalid command line options were specified.

FILES

/etc/acctadm.conf

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

acct(2), attributes(5), ipqos(7IPP)

NOTES

Both extended accounting and regular accounting can be active.

Available resources can vary from system to system, and from platform to platform.

NAME	acctcms – command summary from process accounting records
SYNOPSIS	<code>/usr/lib/acct/acctcms [-a [-o] [-p]] [-c] [-j] [-n] [-s] [-t]</code> <i>filename...</i>
DESCRIPTION	acctcms reads one or more <i>filenames</i> , normally in the form described in acct(3HEAD). It adds all records for processes that executed identically named commands, sorts them, and writes them to the standard output, normally using an internal summary format.
OPTIONS	-a Print output in ASCII rather than in the internal summary format. The output includes command name, number of times executed, total kcore-minutes, total CPU minutes, total real minutes, mean size (in K), mean CPU minutes per invocation, "hog factor," characters transferred, and blocks read and written, as in acctcom(1). Output is normally sorted by total kcore-minutes. Use the following options only with the -a option: -o Output a (non-prime) offshift-time-only command summary. -p Output a prime-time-only command summary. When -o and -p are used together, a combination prime-time and non-prime-time report is produced. All the output summaries are total usage except number of times executed, CPU minutes, and real minutes, which are split into prime and non-prime. -c Sort by total CPU time, rather than total kcore-minutes. -j Combine all commands invoked only once under "***other". -n Sort by number of command invocations. -s Any file names encountered hereafter are already in internal summary format. -t Process all records as total accounting records. The default internal summary format splits each field into prime and non-prime-time parts. This option combines the prime and non-prime time parts into a single field that is the total of both, and provides upward compatibility with old style acctcms internal summary format records.
EXAMPLES	EXAMPLE 1 Using the acctcms command. A typical sequence for performing daily command accounting and for maintaining a running total is: <pre>example% acctcms filename ... > today example% cp total previous total example% acctcms -s today previous total > total example% acctcms -a -s today</pre>

acctcms(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWaccu

SEE ALSO acctcom(1), acct(1M), acctcon(1M), acctmerg(1M), acctprc(1M), acctsh(1M), fwtmp(1M), runacct(1M), acct(2), acct(3HEAD), utmpx(4), attributes(5)

NOTES Unpredictable output results if -t is used on new style internal summary format files, or if it is not used with old style internal summary format files.

NAME	acctcon, acctcon1, acctcon2 – connect-time accounting
SYNOPSIS	<pre> /usr/lib/acct/acctcon [-l <i>lineuse</i>] [-o <i>reboot</i>] /usr/lib/acct/acctcon1 [-p] [-t] [-l <i>lineuse</i>] [-o <i>reboot</i>] /usr/lib/acct/acctcon2 </pre>
DESCRIPTION	acctcon converts a sequence of login/logoff records to total accounting records (see the <code>tacct</code> format in <code>acct(3HEAD)</code>). The login/logoff records are read from standard input. The file <code>/var/adm/wtmpx</code> is usually the source of the login/logoff records; however, because it might contain corrupted records or system date changes, it should first be fixed using <code>wtmpfix</code>. The fixed version of file <code>/var/adm/wtmpx</code> can then be redirected to <code>acctcon</code>. The <code>tacct</code> records are written to standard output. acctcon is a combination of the programs <code>acctcon1</code> and <code>acctcon2</code>. <code>acctcon1</code> converts login/logoff records, taken from the fixed <code>/var/adm/wtmpx</code> file, to ASCII output. <code>acctcon2</code> reads the ASCII records produced by <code>acctcon1</code> and converts them to <code>tacct</code> records. <code>acctcon1</code> can be used with the <code>-l</code> and <code>-o</code> options, described below, as well as with the <code>-p</code> and <code>-t</code> options.
OPTIONS	<code>-p</code> Print input only, showing line name, login name, and time (in both numeric and date/time formats). <code>-t</code> <code>acctcon1</code> maintains a list of lines on which users are logged in. When it reaches the end of its input, it emits a session record for each line that still appears to be active. It normally assumes that its input is a current file, so that it uses the current time as the ending time for each session still in progress. The <code>-t</code> flag causes it to use, instead, the last time found in its input, thus assuring reasonable and repeatable numbers for non-current files. <code>-l <i>lineuse</i></code> <i>lineuse</i> is created to contain a summary of line usage showing line name, number of minutes used, percentage of total elapsed time used, number of sessions charged, number of logins, and number of logoffs. This file helps track line usage, identify bad lines, and find software and hardware oddities. Hangup, termination of <code>login(1)</code> and termination of the login shell each generate logoff records, so that the number of logoffs is often three to four times the number of sessions. See <code>init(1M)</code> and <code>utmpx(4)</code>. <code>-o <i>reboot</i></code> <i>reboot</i> is filled with an overall record for the accounting period, giving starting time, ending time, number of reboots, and number of date changes.
EXAMPLES	EXAMPLE 1 Using the <code>acctcon</code> command. The <code>acctcon</code> command is typically used as follows: <pre>example% acctcon -l lineuse -o reboots < tmpwtmp > ctacct</pre> The <code>acctcon1</code> and <code>acctcon2</code> commands are typically used as follows:

acctcon(1M)

EXAMPLE 1 Using the acctcon command. (Continued)

```
example% acctcon1 -l lineuse -o reboots < tmpwtmp | sort +1n +2 > ctmp
example% acctcon2 < ctmp > ctacct
```

FILES /var/adm/wtmpx History of user access and administration information

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWaccu

SEE ALSO acctcom(1), login(1), acct(1M), acctcms(1M), acctmerg(1M), acctprc(1M), acctsh(1M), fwtmp(1M), init(1M), runacct(1M), acct(2), acct(3HEAD), utmpx(4), attributes(5)

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NOTES The line usage report is confused by date changes. Use wtmpfix (see fwtmp(1M)), with the /var/adm/wtmpx file as an argument, to correct this situation.

During a single invocation of any given command, the acctcon, acctcon1, and acctcon2 commands can process a maximum of:

- 6000 distinct session
- 1000 distinct terminal lines
- 2000 distinct login names

If at some point the actual number of any one of these items exceeds the maximum, the command will not succeed.

NAME	acctmerg – merge or add total accounting files				
SYNOPSIS	/usr/lib/acct/acctmerg [-a] [-i] [-p] [-t] [-u] [-v] [<i>filename</i>] ...				
DESCRIPTION	acctmerg reads its standard input and up to nine additional files, all in the tacct format (see acct(3HEAD)) or an ASCII version thereof. It merges these inputs by adding records whose keys (normally user ID and name) are identical, and expects the inputs to be sorted on those keys.				
OPTIONS	-a Produce output in ASCII version of tacct. -i Produce input in ASCII version of tacct. -p Print input with no processing. -t Produce a single record that totals all input. -u Summarize by user ID, rather than by user ID and name. -v Produce output in verbose ASCII format, with more precise notation for floating-point numbers.				
EXAMPLES	EXAMPLE 1 Using the acctmerg command. The following sequence is useful for making "repairs" to any file kept in this format: <pre>example% acctmerg -v <filename1 >filename2</pre> Edit <i>filename2</i> as you want: <pre>example% acctmerg -i <filename2 >filename1</pre>				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWaccu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWaccu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWaccu				
SEE ALSO	acctcom(1), acct(1M), acctcms(1M), acctcon(1M), acctprc(1M), acctsh(1M), fwtmp(1M), runacct(1M), acct(2), acct(3HEAD), utmpx(4), attributes(5) <i>System Administration Guide: Basic Administration</i>				

acctprc(1M)

NAME	acctprc, acctprc1, acctprc2 – process accounting				
SYNOPSIS	<pre>/usr/lib/acct/acctprc /usr/lib/acct/acctprc1 [ctmp] /usr/lib/acct/acctprc2</pre>				
DESCRIPTION	acctprc reads the standard input, in the form described by , and converts it to total accounting records (see the tacct record in acct(3HEAD)). acctprc divides CPU time into prime time and non-prime time and determines mean memory size (in memory segment units). acctprc then summarizes the tacct records, according to user IDs, and adds login names corresponding to the user IDs. The summarized records are then written to the standard output. acctprc1 reads input in the form described by acct(3HEAD), adds login names corresponding to user IDs, then writes for each process an ASCII line giving user ID, login name, prime CPU time (tics), non-prime CPU time (tics), and mean memory size (in memory segment units). If ctmp is given, it should contain a list of login sessions sorted by user ID and login name. If this file is not supplied, it obtains login names from the password file, just as acctprc does. The information in ctmp helps it distinguish between different login names that share the same user ID. From the standard input, acctprc2 reads records in the form written by acctprc1, summarizes them according to user ID and name, then writes the sorted summaries to the standard output as total accounting records.				
EXAMPLES	EXAMPLE 1 Examples of acctprc. The acctprc command is typically used as shown below: <pre>example% acctprc < /var/adm/pacct > ptacct</pre> The acctprc1 and acctprc2s commands are typically used as shown below: <pre>example% acctprc1 ctmp </var/adm/pacct example% acctprc2 > ptacct</pre>				
FILES	/etc/passwd system password file				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWaccu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWaccu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWaccu				
SEE ALSO	acctcom(1), acct(1M), acctcms(1M), acctcon(1M), acctmerg(1M), acctsh(1M), cron(1M), fwtmp(1M), runacct(1M), acct(2), acct(3HEAD), utmpx(4), attributes(5)				

NOTES | Although it is possible for `acctprc1` to distinguish among login names that share user IDs for commands run from a command line, it is difficult for `acctprc1` to make this distinction for commands invoked in other ways. A command run from `cron(1M)` is an example of where `acctprc1` might have difficulty. A more precise conversion can be done using the `acctwtm` program in `acct(1M)`. `acctprc` does not distinguish between users with identical user IDs.

A memory segment of the mean memory size is a unit of measure for the number of bytes in a logical memory segment on a particular processor.

During a single invocation of any given command, the `acctprc`, `acctprc1`, and `acctprc2` commands can process a maximum of

- 6000 distinct sessions
- 1000 distinct terminal lines
- 2000 distinct login names

If at some point the actual number of any one of these items exceeds the maximum, the command will not succeed.

acctsh(1M)

NAME	acctsh, chargefee, ckpacct, dodisk, lastlogin, monacct, nulladm, prctmp, prdaily, prtacct, shutacct, startup, turnacct – shell procedures for accounting
SYNOPSIS	<pre> /usr/lib/acct/chargefee login-name number /usr/lib/acct/ckpacct [blocks] /usr/lib/acct/dodisk [-o] [filename...] /usr/lib/acct/lastlogin /usr/lib/acct/monacct number /usr/lib/acct/nulladm filename... /usr/lib/acct/prctmp filename /usr/lib/acct/prdaily [-c] [-l] [mdd] /usr/lib/acct/prtacct filename [' ' heading ' '] /usr/lib/acct/shutacct [' ' reason ' '] /usr/lib/acct/startup /usr/lib/acct/turnacct on off switch </pre>
DESCRIPTION	
chargefee Command	chargefee can be invoked to charge a <i>number</i> of units to <i>login-name</i> . A record is written to <i>/var/adm/fee</i> , to be merged with other accounting records by <i>runacct(1M)</i> .
ckpacct Command	ckpacct should be initiated using <i>cron(1M)</i> to periodically check the size of <i>/var/adm/pacct</i> . If the size exceeds <i>blocks</i> , 500 by default, <i>turnacct</i> will be invoked with argument <i>switch</i> . To avoid a conflict with <i>turnacct switch</i> execution in <i>runacct</i> , do not run <i>ckpacct</i> and <i>runacct</i> simultaneously. If the number of free disk blocks in the <i>/var</i> file system falls below 500, <i>ckpacct</i> will automatically turn off the collection of process accounting records via the <i>off</i> argument to <i>turnacct</i> . When at least 500 blocks are restored, the accounting will be activated again on the next invocation of <i>ckpacct</i> . This feature is sensitive to the frequency at which <i>ckpacct</i> is executed, usually by the <i>cron(1M)</i> command.
dodisk Command	<i>dodisk</i> should be invoked by <i>cron(1M)</i> to perform the disk accounting functions.
lastlogin Command	<i>lastlogin</i> is invoked by <i>runacct(1M)</i> to update <i>/var/adm/acct/sum/loginlog</i> , which shows the last date on which each person logged in.
monacct Command	<i>monacct</i> should be invoked once each month or each accounting period. <i>number</i> indicates which month or period it is. If <i>number</i> is not given, it defaults to the current month (01–12). This default is useful if <i>monacct</i> is to be executed using <i>cron(1M)</i> on the first day of each month. <i>monacct</i> creates summary files in <i>/var/adm/acct/fiscal</i> and restarts the summary files in <i>/var/adm/acct/sum</i> .

nulladm Command	nulladm creates <i>filename</i> with mode 664 and ensures that owner and group are adm. It is called by various accounting shell procedures.
prctmp Command	prctmp can be used to print the session record file (normally <i>/var/adm/acct/nite/ctmp</i> created by acctcon1 (see acctcon(1M))).
prdaily Command	prdaily is invoked by runacct(1M) to format a report of the previous day's accounting data. The report resides in <i>/var/adm/acct/sum/rprt/mddd</i> where <i>mddd</i> is the month and day of the report. The current daily accounting reports may be printed by typing prdaily. Previous days' accounting reports can be printed by using the <i>mddd</i> option and specifying the exact report date desired.
prtacct Command	prtacct can be used to format and print any total accounting (tacct)file.
shutacct Command	shutacct is invoked during a system shutdown to turn process accounting off and append a <i>reason</i> record to <i>/var/adm/wtmpx</i> .
startup Command	startup can be invoked when the system is brought to a multi-user state to turn process accounting on.
turnacct Command	turnacct is an interface to accton (see acct(1M)) to turn process accounting on or off. The switch argument moves the current <i>/var/adm/pacct</i> to the next free name in <i>/var/adm/pacct.incr</i> (where <i>incr</i> is a number starting with 0 and incrementing by one for each additional <i>pacct</i> file), then turns accounting back on again. This procedure is called by ckpacct and thus can be taken care of by the cron(1M) command and used to keep <i>pacct</i> to a reasonable size. shutacct uses turnacct to stop process accounting. startup uses turnacct to start process accounting.
OPTIONS	The following options are supported: -c This option prints a report of exceptional resource usage by command, and may be used on current day's accounting data only. -l This option prints a report of exceptional usage by login id for the specified date. Previous daily reports are cleaned up and therefore inaccessible after each invocation of monacct. -o This option uses acctdusg (see acct(1M)) to do a slower version of disk accounting by login directory. <i>filenames</i> specifies the one or more filesystem names where disk accounting will be done. If <i>filenames</i> are used, disk accounting will be done on these filesystems only. If the -o option is used, <i>filenames</i> should be mount points of mounted filesystems. If the -o option is omitted, <i>filenames</i> should be the special file names of mountable filesystems.
FILES	<i>/etc/logadm.conf</i> Configuration file for the logadm(1M) command <i>/usr/lib/acct</i> Holds all accounting commands listed in section 1M of this manual

acctsh(1M)

/usr/lib/acct/ptecms.awk
Contains the limits for exceptional usage by command name

/usr/lib/acct/ptelus.awk
Contains the limits for exceptional usage by login ID

/var/adm/acct/fiscal
Fiscal reports directory

/var/adm/acct/nite
Working directory

/var/adm/acct/sum
Summary directory that contains information for monacct

/var/adm/acct/sum/loginlog
File updated by last login

/var/adm/fee
Accumulator for fees

/var/adm/pacct
Current file for per-process accounting

/var/adm/pacctincr
Used if pacct gets large and during execution of daily accounting procedure

/var/adm/wtmpx
History of user access and administration information

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWaccu

SEE ALSO acctcom(1), acct(1M), acctcms(1M), acctcon(1M), acctmerg(1M), acctprc(1M), cron(1M), fwtmp(1M), logadm(1M), runacct(1M), acct(2), acct(3HEAD), utmpx(4), attributes(5)

NOTES See runacct(1M) for the main daily accounting shell script, which performs the accumulation of connect, process, fee, and disk accounting on a daily basis. It also creates summaries of command usage.

NAME	adbgen – generate adb script												
SYNOPSIS	<code>/usr/lib/adb/adbgen [-m <i>model</i>] <i>filename</i>.adb . . .</code>												
DESCRIPTION	adbgen makes it possible to write adb(1) scripts that do not contain hard-coded dependencies on structure member offsets. The input to adbggen is a file named <i>filename</i>.adb that contains header information, then a null line, then the name of a structure, and finally an adb script. adbggen only deals with one structure per file; all member names are assumed to be in this structure. The output of adbggen is an adb script in <i>filename</i>.adbgen operates by generating a C program which determines structure member offsets and sizes, which in turn generate the adb script. The header lines, up to the null line, are copied verbatim into the generated C program. Typically, these are <code>#include</code> statements, which include the headers containing the relevant structure declarations. The adb script part may contain any valid adb commands (see adb(1)), and may also contain adbggen requests, each enclosed in braces (<code>{ }</code>). Request types are: ■ Print a structure member. The request form is <code>{member, format}</code>. <i>member</i> is a member name of the <i>structure</i> given earlier, and <i>format</i> is any valid adb format request or any of the adbggen format specifiers (such as <code>{POINTER}</code>) listed below. For example, to print the <code>p_pid</code> field of the <i>proc</i> structure as a decimal number, you would write <code>{p_pid, d}</code>. ■ Print the appropriate adb format character for the given adbggen format specifier. This action takes the data model into consideration. The request form is <code>{format specifier}</code>. The valid adbggen format specifiers are: <table border="0"> <tr> <td><code>{POINTER}</code></td><td>pointer value in hexadecimal</td></tr> <tr> <td><code>{LONGDEC}</code></td><td>long value in decimal</td></tr> <tr> <td><code>{ULONGDEC}</code></td><td>unsigned long value in decimal</td></tr> <tr> <td><code>{ULONGHEX}</code></td><td>unsigned long value in hexadecimal</td></tr> <tr> <td><code>{LONGOCT}</code></td><td>long value in octal</td></tr> <tr> <td><code>{ULONGOCT}</code></td><td>unsigned long value in octal</td></tr> </table> ■ Reference a structure member. The request form is <code>{*member, base}</code>. <i>member</i> is the member name whose value is desired, and <i>base</i> is an adb register name which contains the base address of the structure. For example, to get the <code>p_pid</code> field of the <i>proc</i> structure, you would get the <i>proc</i> structure address in an adb register, for example <code><f</code>, and write <code>{*p_pid, <f}</code>. ■ Tell adbggen that the offset is valid. The request form is <code>{OFFSETOK}</code>. This is useful after invoking another adb script which moves the adb <i>dot</i>. ■ Get the size of the <i>structure</i>. The request form is <code>{SIZEOF}</code>. adbggen replaces this request with the size of the structure. This is useful in incrementing a pointer to step through an array of structures.	<code>{POINTER}</code>	pointer value in hexadecimal	<code>{LONGDEC}</code>	long value in decimal	<code>{ULONGDEC}</code>	unsigned long value in decimal	<code>{ULONGHEX}</code>	unsigned long value in hexadecimal	<code>{LONGOCT}</code>	long value in octal	<code>{ULONGOCT}</code>	unsigned long value in octal
<code>{POINTER}</code>	pointer value in hexadecimal												
<code>{LONGDEC}</code>	long value in decimal												
<code>{ULONGDEC}</code>	unsigned long value in decimal												
<code>{ULONGHEX}</code>	unsigned long value in hexadecimal												
<code>{LONGOCT}</code>	long value in octal												
<code>{ULONGOCT}</code>	unsigned long value in octal												

adbgen(1M)

- Calculate an arbitrary C expression. The request form is `{EXPR, expression}`. `adbgen` replaces this request with the value of the expression. This is useful when more than one structure is involved in the script.
- Get the offset to the end of the structure. The request form is `{END}`. This is useful at the end of the structure to get `adb` to align the *dot* for printing the next structure member.

`adbgen` keeps track of the movement of the `adb dot` and generates `adb` code to move forward or backward as necessary before printing any structure member in a script. `adbgen`'s model of the behavior of `adb`'s *dot* is simple: it is assumed that the first line of the script is of the form *struct_address/adb text* and that subsequent lines are of the form *+/adb text*. The `adb dot` then moves in a sane fashion. `adbgen` does not check the script to ensure that these limitations are met. `adbgen` also checks the size of the structure member against the size of the `adb` format code and warns if they are not equal.

OPTIONS The following option is supported:

`-m model` Specifies the data type model to be used by `adbgen` for the macro. This affects the outcome of the `{format specifier}` requests described under `DESCRIPTION` and the offsets and sizes of data types. *model* can be `ilp32` or `lp64`. If the `-m` option is not given, the data type model defaults to `ilp32`.

OPERANDS The following operand is supported:

filename.adb Input file that contains header information, followed by a null line, the name of the structure, and finally an `adb` script.

EXAMPLES **EXAMPLE 1** A sample `adbgen` file.

For an include file `x.h` which contained

```
struct x {
    char    *x_cp;
    char    x_c;
    int     x_i;
};
```

then, an `adbgen` file (call it `script.adb`) to print the file `x.h` would be:

```
#include "x.h"
x
./"x_cp"16t"x_c"8t"x_i"n{x_cp,{POINTER}}{x_c,C}{x_i,D}
```

After running `adbgen` as follows,

```
% /usr/lib/adb/adbgen script.adb
```

the output file `script` contains:

```
./"x_cp"16t"x_c"8t"x_i"nXC3+D
```

EXAMPLE 1 A sample adbggen file. (Continued)

For a macro generated for a 64-bit program using the lp64 data model as follows,

```
% /usr/lib/adb/adbggen/ -m lp64 script.adb
```

the output file `script` would contain:

```
./"x_cp"16t"x_c"8t"x_i"nJC3+D
```

To invoke the script, type:

```
example% adb program
x$<script
```

FILES /usr/platform/*platform-name*/lib/adb/*
platform-specific adb scripts for debugging the 32-bit kernel

/usr/platform/*platform-name*/lib/adb/sparcv9/*
platform-specific adb scripts for debugging the 64-bit SPARC V9 kernel

/usr/lib/adb/*
adb scripts for debugging the 32-bit kernel

/usr/lib/adb/sparcv9/*
adb scripts for debugging the 64-bit SPARC V9 kernel

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWesu

SEE ALSO `adb(1)`, `uname(1)`, `kadb(1M)`, `attributes(5)`

DIAGNOSTICS Warnings are given about structure member sizes not equal to adb format items and about badly formatted requests. The C compiler complains if a structure member that does not exist is referenced. It also complains about an ampersand before array names; these complaints may be ignored.

NOTES *platform-name* can be found using the `-i` option of `uname(1)`.

BUGS adb syntax is ugly; there should be a higher level interface for generating scripts.

Structure members which are bit fields cannot be handled because C will not give the address of a bit field. The address is needed to determine the offset.

addbadsec(1M)

NAME	addbadsec – map out defective disk blocks						
SYNOPSIS	addbadsec [-p] [-a <i>blkno</i> [<i>blkno</i> ...]] [-f <i>filename</i>] <i>raw_device</i>						
DESCRIPTION	addbadsec is used by the system administrator to map out bad disk blocks. Normally, these blocks are identified during surface analysis, but occasionally the disk subsystem reports unrecoverable data errors indicating a bad block. A block number reported in this way can be fed directly into addbadsec, and the block will be remapped. addbadsec will first attempt hardware remapping. This is supported on SCSI drives and takes place at the disk hardware level. If the target is an IDE drive, then software remapping is used. In order for software remapping to succeed, the partition must contain an alternate slice and there must be room in this slice to perform the mapping. It should be understood that bad blocks lead to data loss. Remapping a defective block does not repair a damaged file. If a bad block occurs to a disk-resident file system structure such as a superblock, the entire slice might have to be recovered from a backup.						
OPTIONS	The following options are supported: -a Adds the specified blocks to the hardware or software map. If more than one block number is specified, the entire list should be quoted and block numbers should be separated by white space. -f Adds the specified blocks to the hardware or software map. The bad blocks are listed, one per line, in the specified file. -p Causes addbadsec to print the current software map. The output shows the defective block and the assigned alternate. This option cannot be used to print the hardware map.						
OPERANDS	The following operand is supported: <i>raw_device</i> The address of the disk drive (see FILES).						
FILES	The raw device should be /dev/rdisk/c? [t?] d?p0. See disks(1M) for an explanation of SCSI and IDE device naming conventions.						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Architecture</td><td>x86</td></tr> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Architecture	x86	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Architecture	x86						
Availability	SUNWcsu						
SEE ALSO	disks(1M), diskscan(1M), fdisk(1M), fmthard(1M), format(1M), attributes(5)						

addbadsec(1M)

NOTES | The `format(1M)` utility is available to format, label, analyze, and repair SCSI disks. This utility is included with the `addbadsec`, `diskscan(1M)`, `fdisk(1M)`, and `fmthard(1M)` commands available for x86. To format an IDE disk, use the DOS "format" utility; however, to label, analyze, or repair IDE disks on x86 systems, use the Solaris `format(1M)` utility.

add_drv(1M)

NAME	add_drv – add a new device driver to the system	
SYNOPSIS	add_drv [-b <i>basedir</i>] [-c <i>class_name</i>] [-i ' <i>identify_name...</i> '] [-m ' <i>permission</i> ', ' <i>...</i> '] [-n] [-f] [-v] <i>device_driver</i>	
DESCRIPTION	The <code>add_drv</code> command is used to inform the system about newly installed device drivers. Each device on the system has a name associated with it. This name is represented by the <code>name</code> property for the device. Similarly, the device may also have a list of driver names associated with it. This list is represented by the <code>compatible</code> property for the device. The system determines which devices will be managed by the driver being added by examining the contents of the <code>name</code> property and the <code>compatible</code> property (if it exists) on each device. If the value in the <code>name</code> property does not match the driver being added, each entry in the <code>compatible</code> property is tried, in order, until either a match occurs or there are no more entries in the <code>compatible</code> property. In some cases, adding a new driver may require a reconfiguration boot. See the NOTES section. Aliases might require quoting (with double-quotes) if they contain numbers. See EXAMPLES.	
OPTIONS	-b <i>basedir</i> -c <i>class_name</i> -i '<i>identify_name</i>' -m '<i>permission</i>' -n -f	Installs the driver on the system with a root directory of <i>basedir</i> rather than installing on the system executing <code>add_drv</code>. This option is typically used in package post-installation scripts when the package is not being installed on the system executing the <code>pkgadd</code> command. The system using <i>basedir</i> as its root directory must reboot to complete the driver installation. The driver being added to the system exports the class <i>class_name</i>. A white-space separated list of aliases for the driver <i>device_driver</i>. Specify the file system permissions for device nodes created by the system on behalf of <i>device_driver</i>. Do not try to load and attach <i>device_driver</i>, just modify the system configuration files for the <i>device_driver</i>. Normally if a reconfiguration boot is required to complete the configuration of the driver into the system, <code>add_drv</code> will not add the driver. The force flag forces <code>add_drv</code> to add the driver even if a reconfiguration boot is required. See the -v flag.

add_drv(1M)

-v

The verbose flag causes add_drv to provide additional information regarding the success or failure of a driver's configuration into the system. See the EXAMPLES section.

EXAMPLES

EXAMPLE 1 Adding SUNW Example Driver to the System

The following example adds the SUNW,example driver to a 32-bit system, with an alias name of SUNW,alias. It assumes the driver has already been copied to /usr/kernel/drv.

```
example# add_drv -m '* 0666 bin bin','a 0644 root sys' \  
-i 'SUNW,alias' SUNW,example
```

Every minor node created by the system for the SUNW,example driver will have the permission 0666, and be owned by user bin in the group bin, except for the minor device a, which will be owned by root, group sys, and have a permission of 0644.

EXAMPLE 2 Adding Driver to the Client /export/root/sun1

The following example adds the driver to the client /export/root/sun1. The driver is installed and loaded when the client machine, sun1, is rebooted. This second example produces the same result as the first, except the changes are on the diskless client, sun1, and the client must be rebooted for the driver to be installed.

```
example# add_drv -m '* 0666 bin bin','a 0644 root sys' \  
-i 'SUNW,alias' -b /export/root/sun1 \  
SUNW,example
```

EXAMPLE 3 Adding Driver for a Device Already Managed by an Existing Driver

The following example illustrates the case where a new driver is added for a device that is already managed by an existing driver. Consider a device that is currently managed by the driver dumb_framebuffer. The name and compatible properties for this device are as follows:

```
name="display"  
compatible="whizzy_framebuffer", "dumb_framebuffer"
```

If add_drv is used to add the whizzy_framebuffer driver, the following will result.

```
example# add_drv whizzy_framebuffer  
Error: Could not install driver (whizzy_framebuffer)  
Device managed by another driver.
```

If the -v flag is specified, the following will result.

```
example# add_drv -v whizzy_framebuffer  
Error: Could not install driver (whizzy_framebuffer)  
Device managed by another driver.  
Driver installation failed because the following  
entries in /devices would be affected:
```

add_drv(1M)

EXAMPLE 3 Adding Driver for a Device Already Managed by an Existing Driver
(Continued)

```
/devices/iommu@f,e0000000/sbus@f,e0001000/display[:*]  
(Device currently managed by driver "dumb_framebuffer")
```

The following entries in /dev would be affected:

```
/dev/fbs/dumb_framebuffer0
```

If the -v and -f flags are specified, the driver will be added resulting in the following.

```
example# add_drv -vf whizzy_framebuffer
```

A reconfiguration boot must be performed to complete the installation of this driver.

The following entries in /devices will be affected:

```
/devices/iommu@f,e0000000/sbus@f,e0001000/display[:*]  
(Device currently managed by driver "dumb_framebuffer")
```

The following entries in /dev will be affected:

```
/dev/fbs/dumb_framebuffer0
```

The above example is currently only relevant to devices exporting a generic device name.

EXAMPLE 4 Use of Double Quotes in Specifying Driver Alias

The following example shows the use of double quotes in specifying a driver alias that contains numbers.

```
example# add_drv -i "pci10c5,25" smc
```

EXIT STATUS

add_drv returns 0 on success and 1 on failure.

FILES

/kernel/drv

32-bit boot device drivers

/kernel/drv/sparcv9

64-bit boot device drivers

/usr/kernel/drv

other 32-bit drivers that could potentially be shared between platforms

/usr/kernel/drv/sparcv9

other 64-bit drivers that could potentially be shared between platforms

/platform/`uname -i`/kernel/drv

32-bit platform-dependent drivers

/platform/`uname -i`/kernel/drv/sparcv9

64-bit platform-dependent drivers

add_drv(1M)

/etc/driver_aliases
driver aliases file

/etc/driver_classes
driver classes file

/etc/minor_perm
minor node permissions

/etc/name_to_major
major number binding

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO boot(1M), devlinks(1M), disks(1M), drvconfig(1M), kernel(1M), modinfo(1M), ports(1M), rem_drv(1M), tapes(1M), driver.conf(4), system(4), attributes(5), ddi_create_minor_node(9F)

Writing Device Drivers

NOTES It is possible to add a driver for a device already being managed by a different driver, where the driver being added appears in the device's `compatible` list before the current driver. In such cases, a reconfiguration boot is required (see `boot(1M)` and `kernel(1M)`). After the reconfiguration boot, device nodes in `/devices`, entries in `/dev`, and references to these files may no longer be valid (see the `-v` flag). If a reconfiguration boot would be required to complete the driver installation, `add_drv` will fail unless the `-f` option is specified. See Example 3 in the `EXAMPLES` section.

BUGS `add_drv` will accept a pathname for *device_driver*. However, the kernel does not use the pathname; it only uses the final component and searches the internal driver search path for the driver. This can lead to the kernel loading a different driver than expected.

For this reason, it is not recommended that you use `add_drv` with a pathname. See `kernel(1M)` for more information on the driver search path.

A future version of `add_drv` will not support full pathnames.

admintool(1M)

NAME	admintool – system administration with a graphical user interface													
SYNOPSIS	/usr/bin/admintool													
DESCRIPTION	admintool is a graphical user interface that enables you to accomplish several system administration tasks on a local system. Membership in the sysadmin group (gid 14) is used to restrict access to administrative tasks. Members of the sysadmin group can use admintool to create, delete, and modify local system files. Non-members have read-only permissions (where applicable). Help is available by using the Help button. admintool is not the tool for a distributed environment. It is used for local adminstration.													
USAGE	admintool allows you to do the following tasks: <table><tr><td>Manage users</td><td>Use admintool to add, delete, or modify user accounts. admintool makes the appropriate changes to the system’s /etc/passwd file (see passwd(4)).</td></tr><tr><td>Manage groups</td><td>Use admintool to add, delete, or modify groups. admintool makes the appropriate changes to the system’s /etc/group file (see group(4)).</td></tr><tr><td>Manage hosts</td><td>Use admintool to add, delete, or modify hosts. admintool makes the appropriate changes to the system’s /etc/hosts file (see hosts(4)).</td></tr><tr><td>Manage printers</td><td>Use admintool to add or delete access to a printer, or to modify a system’s printer access. admintool makes the appropriate changes to the system’s /etc/lp directory.</td></tr><tr><td>Manage serial port services</td><td>Use admintool to enable or disable serial port services. admintool sets up the software services necessary to use a modem or terminal attached to a system’s serial port.</td></tr><tr><td>Manage software</td><td>Use admintool to add or remove software. admintool adds software from a product CD or on a hard disk to an installed system, or removes software from an installed system.</td></tr></table>		Manage users	Use admintool to add, delete, or modify user accounts. admintool makes the appropriate changes to the system’s /etc/passwd file (see passwd(4)).	Manage groups	Use admintool to add, delete, or modify groups. admintool makes the appropriate changes to the system’s /etc/group file (see group(4)).	Manage hosts	Use admintool to add, delete, or modify hosts. admintool makes the appropriate changes to the system’s /etc/hosts file (see hosts(4)).	Manage printers	Use admintool to add or delete access to a printer, or to modify a system’s printer access. admintool makes the appropriate changes to the system’s /etc/lp directory.	Manage serial port services	Use admintool to enable or disable serial port services. admintool sets up the software services necessary to use a modem or terminal attached to a system’s serial port.	Manage software	Use admintool to add or remove software. admintool adds software from a product CD or on a hard disk to an installed system, or removes software from an installed system.
Manage users	Use admintool to add, delete, or modify user accounts. admintool makes the appropriate changes to the system’s /etc/passwd file (see passwd(4)).													
Manage groups	Use admintool to add, delete, or modify groups. admintool makes the appropriate changes to the system’s /etc/group file (see group(4)).													
Manage hosts	Use admintool to add, delete, or modify hosts. admintool makes the appropriate changes to the system’s /etc/hosts file (see hosts(4)).													
Manage printers	Use admintool to add or delete access to a printer, or to modify a system’s printer access. admintool makes the appropriate changes to the system’s /etc/lp directory.													
Manage serial port services	Use admintool to enable or disable serial port services. admintool sets up the software services necessary to use a modem or terminal attached to a system’s serial port.													
Manage software	Use admintool to add or remove software. admintool adds software from a product CD or on a hard disk to an installed system, or removes software from an installed system.													
EXIT STATUS	admintool terminates with exit status 0.													
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:													
	ATTRIBUTE TYPE	ATTRIBUTE VALUE												
	Availability	SUNWadmap												

SEE ALSO group(4), hosts(4), passwd(4), attributes(5)

Solaris Advanced User's Guide

WARNINGS If you use `admintool` to add a host, your local system and your site uses a network name service such as NIS or NIS+, `admintool` host operations may not have the desired effect. This is because information in the network name service will take precedence over the information in the local `/etc/hosts` file, which is where `admintool` updates information.

NOTES `admintool` modifies files on the local system, i.e., the system on which you are running `admintool`. `admintool` does not modify or update global networked databases such as NIS or NIS+.

afbconfig(1M)

NAME	afbconfig, SUNWafb_config – configure the AFB Graphics Accelerator
SYNOPSIS	<pre> /usr/sbin/afbconfig [-dev <i>device-filename</i>] [-res <i>video-mode</i> [now try] [noconfirm nocheck]] [-file machine system] [-deflinear true false] [-defoverlay true false] [-overlayorder first last] [-expvis enable disable] [-sov enable disable] [-maxwinds <i>n</i>] [-extovl enable disable] [-g <i>gamma-correction-value</i>] [-gfile <i>gamma-correction-file</i>] [-propt] [-prconf] [-defaults] /usr/sbin/afbconfig [-propt] [-prconf] /usr/sbin/afbconfig [-help] [-res ?] </pre>
DESCRIPTION	afbconfig configures the AFB Graphics Accelerator and some of the X11 window system defaults for AFB. The following form of afbconfig stores the specified options in the OWconfig file: <pre> /usr/sbin/afbconfig [-dev<i>device-filename</i>] [-res <i>video-mode</i> [now try] [noconfirm nocheck]] [-file machine system] [-deflinear true false] [-defoverlay true false] [-overlayorderfirst last] [-expvisenable disable] [-sov enable disable] [-maxwinds<i>n</i>] [-extovl enable disable] [-g<i>gamma-correction-value</i>] [-gfile<i>gamma-correction-file</i>] [-propt] [-prconf] [-defaults] </pre> The options are used to initialize the AFB device the next time the window system is run on that device. Updating options in the OWconfig file provides persistence of these options across window system sessions and system reboots. The following forms of the afbconfig command invoke only the -prconf, -propt, -help, and -res ? options. None of these options update the OWconfig file. <pre> /usr/sbin/afbconfig [-propt] [-prconf] /usr/sbin/afbconfig [-help] [-res ?] </pre> Additionally, the following invocation of afbconfig ignores all other options: <pre> /usr/sbin/afbconfig [-help] [-res ?] </pre> You can only specify options for one AFB device at a time. Specifying options for multiple AFB devices requires multiple invocations of the afbconfig command. Only AFB-specific options can be specified through afbconfig. The normal window system options for specifying default depth, visual class and so forth are still specified as device modifiers on the openwin command line. You can also specify the OWconfig file that is to be updated. By default, the machine-specific file in the /etc/openwin directory tree is updated. The -file option can be used to specify an alternate file to use. For example, the system-global OWconfig file in the /usr/openwin directory tree can be updated instead.

	Both of these standard OWconfig files can only be written by root. Consequently, the afbconfig program, which is owned by the root user, always runs with <code>setuid</code> root permission.																								
Option Defaults	For a given invocation of afbconfig command line if an option does not appear on the command line, the corresponding OWconfig option is not updated; it retains its previous value. When the window system is run, if an AFB option has never been specified by way of afbconfig, a default value is used. The option defaults are as follows: <table> <tr><td>-dev</td><td>/dev/fbs/afb0</td></tr> <tr><td>-file</td><td>machine</td></tr> <tr><td>-res</td><td>none</td></tr> <tr><td>-deflinear</td><td>false</td></tr> <tr><td>-defoverlay</td><td>false</td></tr> <tr><td>-linearorder</td><td>last</td></tr> <tr><td>-overlayorder</td><td>last</td></tr> <tr><td>-expvis</td><td>enabled</td></tr> <tr><td>-sov</td><td>enabled</td></tr> <tr><td>-maxwids</td><td>32</td></tr> <tr><td>-extovl</td><td>enabled</td></tr> <tr><td>-g</td><td>2.22</td></tr> </table> The default for the <code>-res</code> option of <code>none</code> means that when the window system is run the screen resolution is the video mode currently programmed in the device. This provides compatibility for users who are used to specifying the device resolution through the PROM. On some devices (for example, GX) this is the only way of specifying the video mode. This means that the PROM ultimately determines the default AFB video mode.	-dev	/dev/fbs/afb0	-file	machine	-res	none	-deflinear	false	-defoverlay	false	-linearorder	last	-overlayorder	last	-expvis	enabled	-sov	enabled	-maxwids	32	-extovl	enabled	-g	2.22
-dev	/dev/fbs/afb0																								
-file	machine																								
-res	none																								
-deflinear	false																								
-defoverlay	false																								
-linearorder	last																								
-overlayorder	last																								
-expvis	enabled																								
-sov	enabled																								
-maxwids	32																								
-extovl	enabled																								
-g	2.22																								
OPTIONS	The following options are supported: <code>-defaults</code> Resets all option values to their default values. <code>-deflinear true false</code> AFB possesses two types of visuals: linear and nonlinear. Linear visuals are gamma corrected and nonlinear visuals are not. There are two visuals that have both linear and nonlinear versions: 24-bit TrueColor and 8-bit StaticGray. If <code>true</code>, the default visual is set to the linear visual that satisfies other specified default visual selection options (specifically, the Xsun(1) <code>defdepth</code> and <code>defclass</code> options described in the OpenWindows Reference Manual).																								

afbconfig(1M)

If false, or if there is no linear visual that satisfies the other default visual selection options, the non-linear visual specified by these other options are chosen as the default. This option cannot be used when the `-defoverlay` option is present, because AFB doesn't possess a linear overlay visual.

`-defoverlay true | false`

The AFB provides an 8-bit PseudoColor visual whose pixels are disjoint from the rest of the AFB visuals. This is called the overlay visual. Windows created in this visual do not damage windows created in other visuals. The converse, however, is not true. Windows created in other visuals damage overlay windows.

The number of colors available to the windows created using this visual depends on the settings for the `-extovl` option. If the `-extovl` is enabled, extended overlay with 256 opaque color values is available. See `-extovl`. If `-extovl` is disabled, extended overlay is not available and the visual has 256 `-maxwids` number of opaque color values. See `-maxwids`.

If the value of `-defoverlay` is true, the overlay visual is made the default visual. If the value of `-defoverlay` is false, the nonoverlay visual that satisfies the other default visual selection options, such as `def`, `depth`, and `defclass`, are chosen as the default visual. See the OpenWindows Reference Manual.

Whenever the `defoverlay true` option is used, the default depth and class specified on the `openwin` command line must be 8-bit PseudoColor. If not, a warning message is printed and the `-defoverlay` option is treated as false.

The `-defoverlay` option can not be used when the `-deflinear` option specified, because AFB doesn't possess a linear overlay visual.

`-dev device-filename`

Specifies the AFB special file. The default is `/dev/fbs/afb0`.

`-expvis enable | disable`

If enabled, activates OpenGL Visual Expansion. Multiple instances of selected visual groups (8-bit PseudoColor, 24-bit TrueColor and so forth) are in the screen visual list.

`-extovl enable | disable`

If enabled, makes extended overlay available. The overlay visuals have 256 opaque colors. The SOV visuals have 255 opaque colors and 1 transparent color.

This option also enables hardware supported transparency, thus provides better performance for windows using the SOV visuals.

`-file machine | system`

Specifies which `OWconfig` file to update. If `machine` is specified, the machine-specific `OWconfig` file in the `/etc/openwin` directory tree is used. If `system` specifies the global `OWconfig` file in the `/usr/openwin` directory tree. If the specified file does not exist, it is created.

-g *gamma-correction value*

Allows changing the gamma correction value. All linear visuals provide gamma correction. By default, the *gamma-correction-value* is 2.22. Any value less than 0 is illegal. The gamma correction value is applied to the linear visual, which then has an effective gamma value of 1.0, which is the value returned by `XSolarisGetVisualGamma(3)`. See `XSolarisGetVisualGamma(3)` for a description of that function.

This option can be used while the window system is running. Changing the gamma correction value affects all the windows being displayed using the linear visuals.

-gfile *gamma-correction-file*

Loads the gamma correction table from the specified file (*gamma-correction-file*). This file should be formatted to provide the gamma correction values for R, G and B channels on each line. Each of these values should be in hexadecimal format and separated from each other by at least one space. *gamma-correction-file* should also provide 256 such triplets.

An example of a *gamma-correction-file* follows.

```
0x00 0x00 0x00
0x01 0x01 0x01
0x02 0x02 0x02
...
...
0xff 0xff 0xff
```

Using this option, the gamma correction table can be loaded while the window system is running. The new gamma correction affects all the windows being displayed using the linear visuals. When gamma correction is being done using user specified table, the gamma correction value is undefined. By default, the window system assumes a gamma correction value of 2.22 and loads the gamma table it creates corresponding to this value.

-help

Prints a list of the `afbconfig` command line options, along with a brief explanation of each.

-linearorder *first* | *last*

If *first*, linear visuals come before their non-linear counterparts on the X11 screen visual list for the AFB screen. If *last*, the nonlinear visuals come before the linear ones.

-maxwids *n*

Specifies the maximum number of AFB X channel pixel values that are reserved for use as window IDs (WIDs). The remainder of the pixel values in overlay colormaps are used for normal X11 opaque color pixels. The reserved WIDs are allocated on a first-come first-serve basis by 3D graphics windows (such as XGL), MBX windows, and windows that have a non-default visual. The X channel codes 0 to (255 - *n*) are opaque color pixels. The X channel codes (255 - *n* + 1) to 255 are reserved for use as WIDs. Legal values are 1, 2, 4, 8, 16, 32, and 64.

This option is available only if the `-extovl` is disabled.

afbconfig(1M)

-overlayorder first | last

If *first*, the depth 8 PseudoColor Overlay visual comes before the non-overlay visual on the X11 screen visual list for the AFB screen. If *last*, the non-overlay visual comes before the overlay one.

-propt

Prints the current values of all AFB options in the `OWconfig` file specified by the `-file` option for the device specified by the `-dev` option. Prints the values of options as they will be in the `OWconfig` file after the call to `afbconfig` completes.

The following is a typical display:

```
--- OpenWindows Configuration for /dev/fbs/afb0 ---
OWconfig: machine
Video Mode: 1280x1024x76
Default Visual: Non-Linear Normal Visual
Visual Ordering: Linear Visuals are last
                  Overlay Visuals are last
OpenGL Visual Expansion: enabled
Server Overlay Visuals: enabled
Extended Overlay: enabled
Underlay WIDs: 64 (not configurable)
Overlay WIDs: 4 (not configurable)
Gamma Correction Value: 2.220
Gamma Correction Table: Available
```

-prconf

Prints the AFB hardware configuration.

The following is a typical display:

```
--- Hardware Configuration for /dev/fbs/afb0 ---
Type: double-buffered AFB with Z-buffer
Board: rev 0 (Horizontal)
Number of Floats: 6
FROM Information: @(#)afb.fth x.xx xx/xx/xx
AFB ID: 0x101df06d
DAC: Brooktree 9070, version 1 (Pac2)
3DRAM: Mitsubishi 130a, version x
EDID Data: Available - EDID version 1 revision x
Monitor Sense ID: 4 (Sun 37x29cm RGB color monitor)
Monitor possible resolutions: 1024x768x77, 1024x800x84, 1
                              1152x900x76, 1280x1024x67, 1280x1024x76, 960x680xx108s
Current resolution setting: 1280x1024x76
```

-sov enable | disable

If enabled, the root window's `SERVER_OVERLAY_VISUALS` property are advertised. SOV visuals are exported and their transparent types, values and layers can be retrieved through this property. If disabled, the `SERVER_OVERLAY_VISUALS` property are not defined and SOV visuals are not exported.

-res *video-mode* [now | try [noconfirm | nocheck]]

Specifies the video mode used to drive the monitor connected to the specified AFB device.

The format of these built-in video modes is: *widthxheightxrate*, where *width* is the screen width in pixels, *height* is the screen height in pixels, and *rate* is the vertical frequency of the screen refresh.

The *s* suffix of 960x680x112s and 960x680x108s means that these are stereo video modes. The *i* suffix of 640x480x60i and 768x575x50i designates interlaced video timing. If absent, non-interlaced timing is used.

As a convenience, the *-res* also accepts formats with an at sign (@) in front of the refresh rate instead of *n*, (1280x1024@76). Some video-modes, supported by AFB, may not be supported by the monitor. The list of video-modes supported by the AFB device and the monitor can be obtained by running `afbconfig` with the *-res ?* option (the third form shown SYNOPSIS).

A list of all possible video-modes supported on AFB follows:

```
1024x768x60
1024x768x70
1024x768x75
1024x768x77
1024x800x84
1152x900x66
1152x900x76
1280x800x76
1280x1024x60
1280x1024x67
1280x1024x76
960x680x112s (Stereo)
960x680x108s (Stereo)
640x480x60
640x480x60i (Interlaced)
768x575x50i (Interlaced)
```

For convenience, some of the video-modes supported on the AFB have *symbolic names* defined for them. Instead of the form *widthxheightxrate*, one of these names may be supplied as the argument to the *-res* option. The meaning of the symbolic name *none* is that when the window system is run, the screen resolution is the video mode that is currently programmed in the device.

A list of symbolic names for video-modes supported on AFB follows:

Name	Corresponding Video Mode
svga	1024x768x60
1152	1152x900x76
1280	1280x1024x76
stereo	960x680x112s
ntsc	640x480x60i
pal	768x575x50i
none	(see text above)

afbconfig(1M)

The `-res` option also accepts the additional, optional arguments immediately following the video mode specification. Any or all of the following arguments can be specified:

`noconfirm` Using the `-res` option, the user could potentially put the system into an unusable state, a state where there is no video output. This can happen if there is ambiguity in the monitor sense codes for the particular code read. To reduce the chance of this, the default behavior of `afbconfig` is to print a warning message to this effect and to prompt the user to find out if it is okay to continue. The `noconfirm` option instructs `afbconfig` to bypass this confirmation and to program the requested video mode anyway. This option is useful when `afbconfig` is being run from a shell script.

`nocheck` If present, the normal error checking based on the monitor sense code is suspended. The video mode specified by the user is accepted regardless of whether it is appropriate for the currently attached monitor. (This option is useful if a different monitor is to be connected to the AFB device). Use of this option implies `noconfirm` well.

`now` Updates the video mode in the `OWconfig` file, and immediately programs the AFB device to display this video mode. This is useful for changing the video mode before starting the window system.

It is inadvisable to use this argument with `afbconfig` while the configured device is being used (for example, while running the window system); unpredictable results may occur. To run `afbconfig` with the `now` argument, first bring the window system down. If the `now` argument is used within a window system session, the video mode is changed immediately, but the width and height of the affected screen won't change until the window system is exited and re-entered again. In addition, the system may not recognize changes in stereo mode. Consequently, this usage is strongly discouraged.

`try` If present, the specified video mode is programmed on a trial basis. The user is asked to confirm the video mode by typing `y` within 10 seconds. Or the user may terminate the trial before 10 seconds are up by typing any character. Any character other

than y or Return is considered a no. The previous video mode is restored and `afbconfig` does not change the video mode in the `OWconfig` file (other options specified still take effect). If a Return is typed, the user is prompted for a yes or no answer on whether to keep the new video mode. This option implies the `now` argument (see the warning note on the `now` argument).

EXAMPLES **EXAMPLE 1** Switching the monitor type

The following example switches the monitor type to a resolution of 1280 x 1024 at 76 Hz:

```
example% /usr/sbin/afbconfig -res 1280x1024x76
```

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWafbcf

SEE ALSO `mmap(2)`, `attributes(5)`

aliasadm(1M)

NAME	aliasadm – manipulate the NIS+ aliases map								
SYNOPSIS	aliasadm -a <i>alias expansion</i> [<i>options comments</i>] <i>optional flags</i> aliasadm -c <i>alias expansion</i> [<i>options comments</i>] [<i>optional flags</i>] aliasadm -d <i>alias</i> [<i>optional flags</i>] aliasadm -e <i>alias</i> [<i>optional flags</i>] aliasadm -l <i>alias</i> [<i>optional flags</i>] aliasadm -m <i>alias</i> [<i>optional flags</i>] aliasadm [-I] [-D <i>domainname</i>] [-f <i>filename</i>] [-M <i>mapname</i>]								
DESCRIPTION	aliasadm makes changes to the alias map. The alias map is an NIS+ table object with four columns: <table> <tr> <td><i>alias</i></td><td>The name of the alias as a null terminated string.</td></tr> <tr> <td><i>expansion</i></td><td>The value of the alias as it would appear in a sendmail <i>/etc/aliases</i> file.</td></tr> <tr> <td><i>options</i></td><td>A list of options applicable to this alias. The only option currently supported is CANON. With this option, if the user has requested an inverse alias lookup, and there is more than one alias with this expansion, this alias is given preference.</td></tr> <tr> <td><i>comments</i></td><td>An arbitrary string containing comments about this alias. The sendmail(1M) command reads this map in addition to the NIS aliases map and the local <i>/etc/aliases</i> database.</td></tr> </table>	<i>alias</i>	The name of the alias as a null terminated string.	<i>expansion</i>	The value of the alias as it would appear in a sendmail <i>/etc/aliases</i> file.	<i>options</i>	A list of options applicable to this alias. The only option currently supported is CANON. With this option, if the user has requested an inverse alias lookup, and there is more than one alias with this expansion, this alias is given preference.	<i>comments</i>	An arbitrary string containing comments about this alias. The sendmail(1M) command reads this map in addition to the NIS aliases map and the local <i>/etc/aliases</i> database.
<i>alias</i>	The name of the alias as a null terminated string.								
<i>expansion</i>	The value of the alias as it would appear in a sendmail <i>/etc/aliases</i> file.								
<i>options</i>	A list of options applicable to this alias. The only option currently supported is CANON. With this option, if the user has requested an inverse alias lookup, and there is more than one alias with this expansion, this alias is given preference.								
<i>comments</i>	An arbitrary string containing comments about this alias. The sendmail(1M) command reads this map in addition to the NIS aliases map and the local <i>/etc/aliases</i> database.								
OPTIONS	-a Add an alias. -c Change an alias. -d Delete an alias. -e Edit the alias map. -I Initialize the NIS+ aliases database. -l List the alias map. -m Print or match an alias. -D <i>domainname</i> Edit the map in domain <i>domainname</i> instead of the current domain. -f <i>filename</i> When editing or listing the database, use <i>filename</i> instead of invoking the editor. -M <i>mapname</i> Edit <i>mapname</i> instead of <i>mail_aliases</i> .								
FILES	<i>/etc/aliases</i> mail aliases for the local host in ASCII format								

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO `sendmail(1M)`, `attributes(5)`

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

answerbook2_admin(1M)

NAME	answerbook2_admin – bring up AnswerBook2 administration tool GUI				
SYNOPSIS	/usr/dt/bin/answerbook2_admin [-h]				
DESCRIPTION	The AnswerBook2 server product is no longer included with Solaris or the Solaris Documentation CD products. Solaris documentation is now provided in HTML and PDF format on the Documentation CD and does not require the Answerbook2 server to be viewed. answerbook2_admin brings up the default web browser showing the administration interface for the local AnswerBook2 server. The administration functionality is also accessible through the AnswerBook2 Admin option within the System_Admin subset of the Application Manager function on the CDE front panel Applications menu. If you need an AnswerBook2 server, you can download the AnswerBook2 server software from http://www.sun.com.				
OPTIONS	The following option is supported: -h Displays a usage statement.				
USAGE	At startup time, answerbook2_admin starts up the default web browser (for example, HotJava or Netscape) and displays the URL specified for administering the local AnswerBook2 server (http://localhost:8888). If the user has set up administration access control, the web browser prompts for a valid administrator login and password for this document server before displaying the administration tool.				
FILES	/usr/lib/ab2/dweb/data/config/admin_passwd File containing <i>username: password</i>				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>http://www.sun.com</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	http://www.sun.com
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	http://www.sun.com				
SEE ALSO	attributes(5)				
NOTES	Once there is an open web browser and access to the AnswerBook2 Administration tool, use its online Help system to find out more about administering the AnswerBook2 server.				

NAME	apache – Apache hypertext transfer protocol server overview																						
DESCRIPTION	apache consists of a main server daemon, loadable server modules, some additional support utilities, configuration files, and documentation.																						
FILES	The apache HTTPD server is integrated with Solaris. The following files specify the installation locations for apache: <table> <tr> <td>/etc/apache</td><td>Contains server configuration files.</td></tr> <tr> <td></td><td>A newly-installed server must be manually configured before use. Typically this involves copying <code>httpd.conf-example</code> to the <code>httpd.conf</code> file and making local configuration adjustments.</td></tr> <tr> <td>/usr/apache/bin</td><td>Contains the <code>httpd</code> executable as well as other utility programs.</td></tr> <tr> <td>/usr/apache/htdocs</td><td>Contains the Apache manual in HTML format. This documentation is accessible by way of a link on the server test page that gets installed upon fresh installation.</td></tr> <tr> <td>/usr/apache/include</td><td>Contains the Apache header files, which are needed for building various optional server extensions with <code>apxs(8)</code></td></tr> <tr> <td>/usr/apache/jserv</td><td>Contains documentation for the <code>mod_jserv</code> java servlet module. Documentation can be read with a web browser using the url: <code>file:/usr/apache/jserv/docs/index.html</code></td></tr> <tr> <td>/usr/apache/libexec</td><td>Contains loadable modules (DSOs) supplied with the server. Any modules which are added using <code>apxs(8)</code> are also copied into this directory.</td></tr> <tr> <td>/usr/apache/man</td><td>Contains man pages for the server, utility programs, and <code>mod_perl</code>. Add this directory to your <code>MANPATH</code> to read the Apache man pages. See NOTES.</td></tr> <tr> <td>/usr/apache/perl5</td><td>Contains the modules and library files used by the <code>mod_perl</code> extension to Apache.</td></tr> <tr> <td>/var/apache/cgi-bin</td><td>Default location for the CGI scripts. This can be changed by altering the <code>httpd.conf</code> file and restarting the server.</td></tr> <tr> <td>/var/apache/htdocs</td><td>Default document root.</td></tr> </table>	/etc/apache	Contains server configuration files.		A newly-installed server must be manually configured before use. Typically this involves copying <code>httpd.conf-example</code> to the <code>httpd.conf</code> file and making local configuration adjustments.	/usr/apache/bin	Contains the <code>httpd</code> executable as well as other utility programs.	/usr/apache/htdocs	Contains the Apache manual in HTML format. This documentation is accessible by way of a link on the server test page that gets installed upon fresh installation.	/usr/apache/include	Contains the Apache header files, which are needed for building various optional server extensions with <code>apxs(8)</code>	/usr/apache/jserv	Contains documentation for the <code>mod_jserv</code> java servlet module. Documentation can be read with a web browser using the url: <code>file:/usr/apache/jserv/docs/index.html</code>	/usr/apache/libexec	Contains loadable modules (DSOs) supplied with the server. Any modules which are added using <code>apxs(8)</code> are also copied into this directory.	/usr/apache/man	Contains man pages for the server, utility programs, and <code>mod_perl</code> . Add this directory to your <code>MANPATH</code> to read the Apache man pages. See NOTES.	/usr/apache/perl5	Contains the modules and library files used by the <code>mod_perl</code> extension to Apache.	/var/apache/cgi-bin	Default location for the CGI scripts. This can be changed by altering the <code>httpd.conf</code> file and restarting the server.	/var/apache/htdocs	Default document root.
/etc/apache	Contains server configuration files.																						
	A newly-installed server must be manually configured before use. Typically this involves copying <code>httpd.conf-example</code> to the <code>httpd.conf</code> file and making local configuration adjustments.																						
/usr/apache/bin	Contains the <code>httpd</code> executable as well as other utility programs.																						
/usr/apache/htdocs	Contains the Apache manual in HTML format. This documentation is accessible by way of a link on the server test page that gets installed upon fresh installation.																						
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/usr/apache/jserv	Contains documentation for the <code>mod_jserv</code> java servlet module. Documentation can be read with a web browser using the url: <code>file:/usr/apache/jserv/docs/index.html</code>																						
/usr/apache/libexec	Contains loadable modules (DSOs) supplied with the server. Any modules which are added using <code>apxs(8)</code> are also copied into this directory.																						
/usr/apache/man	Contains man pages for the server, utility programs, and <code>mod_perl</code> . Add this directory to your <code>MANPATH</code> to read the Apache man pages. See NOTES.																						
/usr/apache/perl5	Contains the modules and library files used by the <code>mod_perl</code> extension to Apache.																						
/var/apache/cgi-bin	Default location for the CGI scripts. This can be changed by altering the <code>httpd.conf</code> file and restarting the server.																						
/var/apache/htdocs	Default document root.																						

apache(1M)

	This can be changed by altering the <code>httpd.conf</code> file and restarting the server.
<code>/var/apache/icons</code>	Icons used by the server.
	This normally shouldn't need to be changed.
<code>/var/apache/logs</code>	Contains server log files.
	The formats, names, and locations of the files in this directory can be altered by various configuration directives in the <code>httpd.conf</code> file.
<code>/var/apache/proxy</code>	Directory used to cache pages if the caching feature of <code>mod_proxy</code> is enabled in the <code>httpd.conf</code> file.
	The location of the cache can also be changed by changing the proxy configuration in the <code>httpd.conf</code> file.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWapchr
	SUNWapchu
	SUNWapchd

SEE ALSO `attributes(5)`
<http://www.apache.org>

NOTES In addition to the documentation and man pages included with Solaris, more information is available at <http://www.apache.org>

The Apache man pages are provided with the programming modules. To view the manual pages for the Apache modules with the `man` command, add `/usr/apache/man` to the `MANPATH` environment variable. See `man(1)` for more information. Running `catman(1M)` on the Apache manual pages is not supported.

NAME	arp – address resolution display and control								
SYNOPSIS	arp <i>hostname</i> arp -a [-n] arp -d <i>hostname</i> arp -f <i>filename</i> arp -s <i>hostname ether_address</i> [temp] [pub] [trail]								
DESCRIPTION	The arp program displays and modifies the Internet-to-Ethernet address translation tables used by the address resolution protocol (see arp(7P)). With no flags, the program displays the current ARP entry for <i>hostname</i>. The host may be specified by name or by number, using Internet dot notation.								
OPTIONS	-a Display all of the current ARP entries. The definition for the flags in the table are: <table> <tr> <td>M</td><td>Mapping; only used for the multicast entry for 224.0.0.0</td></tr> <tr> <td>P</td><td>Publish; includes IP address for the machine and the addresses that have explicitly been added by the -s option. ARP will respond to ARP requests for this address.</td></tr> <tr> <td>S</td><td>Static; not learned for the ARP protocol.</td></tr> <tr> <td>U</td><td>Unresolved; waiting for ARP response.</td></tr> </table> You can use the -n option with the -a option to disable the automatic numeric IP address-to-name translation. Use arp -an or arp -na to display numeric IP addresses. -d Delete an entry for the host called <i>hostname</i>. This option may only be used by the super-user. -f Read the file named <i>filename</i> and set multiple entries in the ARP tables. Entries in the file should be of the form: <i>hostname ether_address</i> [temp] [pub] [trail] See the -s option for argument definitions. -s Create an ARP entry for the host called <i>hostname</i> with the Ethernet address <i>ether_address</i>. The Ethernet address is given as six hexadecimal bytes separated by colons. The entry will be permanent unless the word <i>temp</i> is given in the command. If the word <i>pub</i> is given, the entry will be published. For instance, this system will respond to ARP requests for <i>hostname</i> even though the <i>hostname</i> is not its own. The word <i>trail</i> indicates that trailer encapsulations may be sent to this host. arp -s can be used for a limited form of proxy ARP when a host on one of the directly attached networks is not physically present on the subnet. Another	M	Mapping; only used for the multicast entry for 224.0.0.0	P	Publish; includes IP address for the machine and the addresses that have explicitly been added by the -s option. ARP will respond to ARP requests for this address.	S	Static; not learned for the ARP protocol.	U	Unresolved; waiting for ARP response.
M	Mapping; only used for the multicast entry for 224.0.0.0								
P	Publish; includes IP address for the machine and the addresses that have explicitly been added by the -s option. ARP will respond to ARP requests for this address.								
S	Static; not learned for the ARP protocol.								
U	Unresolved; waiting for ARP response.								

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machine can then be configured to respond to ARP requests using `arp -s`.
This is useful in certain *SLIP* configurations.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `ifconfig(1M)`, `arp(7P)`, `attributes(5)`

NAME	aset – monitors or restricts accesses to system files and directories		
SYNOPSIS	aset [-p] [-d <i>aset_dir</i>] [-l <i>sec_level</i>] [-n <i>user@host</i>] [-u <i>userlist_file</i>]		
DESCRIPTION	The Automated Security Enhancement Tool (ASET) is a set of administrative utilities that can improve system security by allowing the system administrators to check the settings of system files, including both the attributes (permissions, ownership, and the like) and the contents of the system files. It warns the users of potential security problems and, where appropriate, sets the system files automatically according to the security level specified. The security level for <i>aset</i> can be specified by setting the -l command line option or the ASETSECLEVEL environment variable to be one of 3 values: low, med, or high. All the functionality operates based on the value of the security level. At the low level, <i>aset</i> performs a number of checks and reports any potential security weaknesses. At the med level, <i>aset</i> modifies some of the settings of system files and parameters, thus restricting system access, to reduce the risks from security attacks. Again reports the security weaknesses and the modifications performed to restrict access. This does not affect the operations of system services. All the system applications and commands maintain all of their original functionality. At the high level, further restrictions are made to system access, rendering a very defensive system. Security practices which are not normally required are included. Many system files and parameters settings are modified to minimum access permissions. At this level, security is the foremost concern, higher than any other considerations that affect system behavior. The vast majority of system applications and commands maintain their functionality, although there may be a few that exhibit behaviors that are not familiar in normal system environment. More exact definitions of what exactly <i>aset</i> does at each level can be found in the <i>System Administration Guide: Basic Administration</i>. The <i>asetenv(4)</i> file and the <i>master files</i> determine to a large extent what <i>aset</i> performs at each level, and can be used by the experienced administrators to redefine the definitions of the levels to suit their particular needs. See <i>asetmasters(4)</i>. These files are provided by default to fit most security conscious environments and in most cases provide adequate security safeguards without modification. They are, however, designed in a way that can be easily edited by experienced administrators with specific needs. <i>aset</i> can be periodically activated at the specified security level with default definitions using the -p option. <i>aset</i> is automatically activated at a frequency specified by the administrator starting from a designated future time (see <i>asetenv(4)</i>). Without the -p option, <i>aset</i> operates only once immediately.		
OPTIONS	The following options are supported: <table> <tr> <td>-d <i>aset_dir</i></td><td>Specifies a working directory other than /usr/aset for ASET. /usr/aset is the default working directory.</td></tr> </table>	-d <i>aset_dir</i>	Specifies a working directory other than /usr/aset for ASET. /usr/aset is the default working directory.
-d <i>aset_dir</i>	Specifies a working directory other than /usr/aset for ASET. /usr/aset is the default working directory.		

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	It is where ASET is installed, and is the <i>root</i> directory of all ASET utilities and data files. If another directory is to be used as the ASET working directory, you can either define it with the <i>-d</i> option, or set the <i>ASETDIR</i> environment variable before invoking <i>aset</i>. The command line option, if specified, overwrites the environment variable.
<i>-l sec_level</i>	Specifies a security level, <i>low</i>, <i>med</i>, or <i>high</i>, for <i>aset</i> to operate at. The default level is <i>low</i>. Each security level is explained in detail above. The level can also be specified by setting the <i>ASETSECLEVEL</i> environment variable before invoking <i>aset</i>. The command line option, if specified, overwrites the environment variable.
<i>-n user@host</i>	Notifies <i>user</i> at machine <i>host</i>. Send the output of <i>aset</i> to <i>user</i> through e-mail. If this option is not specified, the output is sent to the standard output. Note that this is not the reports of ASET, but rather an execution log including error messages if there are any. This output is typically brief. The actual reports of ASET are found in the <i>/usr/aset/reports/latest</i> directory. See the <i>-d</i> option.
<i>-p</i>	Schedules <i>aset</i> to be executed periodically. This adds an entry for <i>aset</i> in the <i>/etc/crontab</i> file. The <i>PERIODIC_SCHEDULE</i> environment variable in the <i>/usr/aset/asetenv</i> file is used to define the time for execution. See <i>crontab(1)</i> and <i>asetenv(4)</i>. If a <i>crontab(1)</i> entry for <i>aset</i> already exists, a warning is produced in the execution log.
<i>-u userlist_file</i>	Specifies a file containing a list of users. <i>aset</i> performs environment checks, for example, <i>UMASK</i> and <i>PATH</i> variables, on these users. By default, <i>aset</i> only checks for <i>root</i>. <i>userlist_file</i> is an ASCII text file. Each entry in the file is a line that contains only one user name (login name).
USAGE	The following paragraphs discuss the features provided by ASET. Hereafter, each feature is referred to as a <i>task</i>. The first task, <i>tune</i>, is executed only once per installation of ASET. The other tasks are executed periodically at the specified frequency.
tune Task	This task is used to tighten system file permissions. In standard releases, system files or directories have permissions defined to maximize open information sharing. In a more security conscious environment, the administrator may want to redefine these permission settings to more restrictive values. <i>aset</i> allows resetting of these

	permissions, based on the specified security level. Generally, at the low level the permissions are set to what they should be as released. At the medium level, the permissions are tightened to ensure reasonable security that is adequate for most environments. At the high level they are further tightened to very restrictive access. The system files affected and the respective restrictions at different levels are configurable, using the <code>tune.low</code>, <code>tune.med</code>, and <code>tune.high</code> files. See <code>asetmasters(4)</code>.
cklist Task	System directories that contain relatively static files, that is, their contents and attributes do not change frequently, are examined and compared with a master description file. The <code>/usr/aset/masters/cklist.level</code> files are automatically generated the first time the <code>cklist</code> task is executed. See <code>asetenv(4)</code>. Any discrepancy found is reported. The directories and files are compared based on the following: ■ owner and group ■ permission bits ■ size and checksum (if file) ■ number of links ■ last modification time The lists of directories to check are defined in <code>asetenv(4)</code>, based on the specified security level, and are configurable using the <code>CKLISTPATH_LOW</code>, <code>CKLISTPATH_MED</code>, and <code>CKLISTPATH_HIGH</code> environment variables. Typically, the lower level lists are subsets of the higher level lists.
usrgrp Task	<code>aset</code> checks the consistency and integrity of user accounts and groups as defined in the <code>passwd</code> and <code>group</code> databases, respectively. Any potential problems are reported. Potential problems for the <code>passwd</code> file include: ■ <code>passwd</code> file entries are not in the correct format. ■ User accounts without a password. ■ Duplicate user names. ■ Duplicate user IDs. Duplicate user IDs are reported unless allowed by the <code>uid_alias</code> file. See <code>asetmasters(4)</code>. ■ Invalid login directories. ■ If C2 is enabled, check C2 hidden <code>passwd</code> format. Potential problems for the <code>group</code> file include: ■ Group file entries not in the right format. ■ Duplicate group names. ■ Duplicate group IDs. ■ Null group passwords.

aset(1M)

sysconf Task

aset checks the local `passwd` file. If the `YPCHECK` environment variable is set to `true`, `aset` also checks the NIS `passwd` files. See `asetenv(4)`. Problems in the NIS `passwd` file are only reported and not corrected automatically. The checking is done for all three security levels except where noted.

aset checks various system configuration tables, most of which are in the `/etc` directory. `aset` checks and makes appropriate corrections for each system table at all three levels except where noted. The following discussion assumes familiarity with the various system tables. See the manual pages for these tables for further details.

The operations for each system table are:

<code>/etc/hosts.equiv</code>	The default file contains a single "+" line, thus making every known host a trusted host, which is not advised for system security. <code>aset</code> performs the following operations: Low Warns the administrators about the "+" line. Medium High Warns about and deletes that entry.
<code>/etc/inetd.conf</code>	The following entries for system daemons are checked for possible weaknesses. <code>tftp(1)</code> does not do any authentication. <code>aset</code> ensures that <code>in.tftpd(1M)</code> is started in the right directory on the server and is not running on clients. At the low level, it gives warnings if the mentioned condition is not true. At the medium and high levels it gives warnings, and changes (if necessary) the <code>in.tftpd</code> entry to include the <code>-s /tftpboot</code> option after ensuring the directory <code>/tftpboot</code> exists. <code>ps(1)</code> and <code>netstat(1M)</code> provide valuable information to potential system crackers. These are disabled when <code>aset</code> is executed at a high security level. <code>rex</code>d is also known to have poor authentication mechanism. <code>aset</code> disables <code>rex</code>d for medium and high security levels by commenting out this entry. If <code>rex</code>d is activated with the <code>-s</code> (secure RPC) option, it is not disabled.
<code>/etc/aliases</code>	The decode alias of UUCP is a potential security weakness. <code>aset</code> disables the alias for medium and high security levels by commenting out this entry.
<code>/etc/default/login</code>	The <code>CONSOLE=</code> line is checked to allow root login only at a specific terminal depending on the security level:

aset(1M)

		Low	No action taken.
		Medium	
		High	Adds the following line to the file: CONSOLE=/dev/console
	/etc/vfstab		aset checks for world-readable or writable device files for mounted file systems.
	/etc/dfs/dfstab		aset checks for file systems that are exported without any restrictions.
	/etc/ftpd/ftpusers		At high security level, aset ensures root is in /etc/ftpd/ftpusers, thus disallowing root from logging into in.ftpd(1M). If necessary, create /etc/ftpd/ftpusers. See ftpusers(4).
	/var/adm/utmpx		aset makes these files not world-writable for the high level (some applications may not run properly with this setting.)
	/.rhosts		The usage of a .rhosts file for the entire system is not advised. aset gives warnings for the low level and moves it to /.rhosts.bak for levels medium and high.
env Task	aset checks critical environment variables for root and users specified with the -u <i>userlist_file</i> option by parsing the /.profile, /.login, and /.cshrc files. This task checks the PATH variable to ensure that it does not contain '.' as a directory, which makes an easy target for <i>trojan horse</i> attacks. It also checks that the directories in the PATH variable are not world-writable. Furthermore, it checks the UMASK variable to ensure files are not created as readable or writable by world. Any problems found by these checks are reported.		
eeprom Task	Newer versions of the EEPROM allow specification of a <i>secure</i> parameter. See eeprom(1M). aset recommends that the administrator sets the parameter to <i>command</i> for the medium level and to <i>full</i> for the high level. It gives warnings if it detects the parameter is not set adequately.		
firewall Task	At the high security level, aset takes proper measures such that the system can be safely used as a firewall in a network. This mainly involves disabling IP packets forwarding and making routing information invisible. Firewalling provides protection against external access to the network.		
ENVIRONMENT VARIABLES	ASETDIR	Specify ASET's working directory. Defaults to /usr/aset.	
	ASETSECLEVEL	Specify ASET's security level. Defaults to low.	
	TASKS	Specify the tasks to be executed by aset. Defaults to all tasks.	
FILES	/usr/aset/reports	directory of ASET reports	

aset(1M)

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWast

SEE ALSO

`crontab(1)`, `ps(1)`, `tftp(1)`, `aset.restore(1M)`, `eeprom(1M)`, `in.ftpd(1M)`, `in.tftpd(1M)`, `netstat(1M)`, `asetenv(4)`, `asetmasters(4)`, `ftpusers(4)`, `attributes(5)`

System Administration Guide: Basic Administration

NAME	aset.restore – restores system files to their content before ASET is installed				
SYNOPSIS	aset.restore [-d <i>aset_dir</i>]				
DESCRIPTION	aset.restore restores system files that are affected by the Automated Security Enhancement Tool (ASET) to their pre-ASET content. When ASET is executed for the first time, it saves and archives the original system files in the <code>/usr/aset/archives</code> directory. The <code>aset.restore</code> utility reinstates these files. It also deschedules ASET, if it is currently scheduled for periodic execution. See <code>asetenv(4)</code>. If you have made changes to system files after running ASET, these changes are lost when you run <code>aset.restore</code>. If you want to be absolutely sure that you keep the existing system state, it is recommended that you back-up your system before using <code>aset.restore</code>. You should use <code>aset.restore</code>, under the following circumstances: You want to remove ASET permanently and restore the original system (if you want to deactivate ASET, you can remove it from scheduling). You are unfamiliar with ASET and want to experiment with it. You can use <code>aset.restore</code> to restore the original system state. When some major system functionality is not working properly and you suspect that ASET is causing the problem; you may want to restore the system to see if the problem persists without ASET. <code>aset.restore</code> requires root privileges to execute.				
OPTIONS	The following options are supported: <code>-d <i>aset_dir</i></code> Specify the working directory for ASET. By default, this directory is <code>/usr/aset</code>. With this option the archives directory will be located under <i>aset_dir</i>.				
FILES	<code>/usr/aset/archives</code> archive of system files prior to executing <code>aset</code>				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:				
	<table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWast</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWast
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWast				
SEE ALSO	<code>aset(1M)</code>, <code>asetenv(4)</code>, <code>attributes(5)</code> <i>System Administration Guide: Basic Administration</i>				

audit(1M)

NAME	audit – control the behavior of the audit daemon				
SYNOPSIS	audit -n -s -t				
DESCRIPTION	The audit command is the general administrator's interface to maintaining the audit trail. The audit daemon may be notified to read the contents of the audit_control(4) file and re-initialize the current audit directory to the first directory listed in the audit_control file or to open a new audit file in the current audit directory specified in the audit_control file as last read by the audit daemon. The audit daemon may also be signaled to close the audit trail and disable auditing.				
OPTIONS	-n Signal audit daemon to close the current audit file and open a new audit file in the current audit directory. -s Signal audit daemon to read audit control file. The audit daemon stores the information internally. -t Signal audit daemon to close the current audit trail file, disable auditing and die.				
DIAGNOSTICS	The audit command will exit with 0 upon success and a positive integer upon failure.				
FILES	/etc/security/audit_user /etc/security/audit_control				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	bsmconv(1M), praudit(1M), audit(2), audit_control(4), audit_user(4), attributes(5)				
NOTES	The functionality described in this man page is available only if the Basic Security Module (BSM) has been enabled. See bsmconv(1M) for more information. This command does not modify a process's preselection mask. It only affects which audit directories are used for audit data storage and to specify the minimum size free.				

NAME	auditconfig – configure auditing
SYNOPSIS	auditconfig <i>option...</i>
DESCRIPTION	auditconfig provides a command line interface to get and set kernel audit parameters. This functionality is available only if the Basic Security Module (BSM) has been enabled. See bsmconv(1M) for more information.
OPTIONS	-aconf Set the non-attributable audit mask from the audit_control(4) file. For example: <pre># auditconfig -aconf Configured non-attributable events.</pre> -audit event sorf retval string This command constructs an audit record for audit event <i>event</i> using the process's audit characteristics containing a text token <i>string</i>. The return token is constructed from the <i>sorf</i> (success/failure flag) and the <i>retval</i> (return value). The event is type <i>char*</i>, the <i>sorf</i> is 0/1 for success/failure, <i>retval</i> is an errno value, <i>string</i> is type <i>*char</i>. This command is useful for constructing an audit record with a shell script. An example of this option: <pre># auditconfig -audit AUE_ftpd 0 0 "test string" # audit record from audit trail: header,76,2,ftp access,,Fri Dec 08 08:44:02 2000, + 669 msec subject,abc,root,other,root,other,104449,102336,235 197121 elbow text,test string return,success,0</pre> -chkaconf Checks the configuration of the non-attributable events set in the kernel against the entries in audit_control(4). If the runtime class mask of a kernel audit event does not match the configured class mask, a mismatch is reported. -chkconf Check the configuration of kernel audit event to class mappings. If the runtime class mask of a kernel audit event does not match the configured class mask, a mismatch is reported. -conf Configure kernel audit event to class mappings. Runtime class mappings are changed to match those in the audit event to class database file. -getasid Prints the audit session ID of the current process. For example: <pre># auditconfig -getasid audit session id = 102336</pre> -getaudit Returns the audit characteristics of the current process.

auditconfig(1M)

```
# auditconfig -getaudit
audit id = abc(666)
process preselection mask = lo(0x1000,0x1000)
terminal id (maj,min,host) = 235,197121,elbow(129.146.89.77)
audit session id = 102336
```

-getaudit

Prints the audit ID of the current process. For example:

```
# auditconfig -getaudit
audit id = abc(666)
```

-getcar

Prints current active root location (anchored from root at system boot). For example:

```
# auditconfig -getcar
current active root = /
```

-getclass *event*

Display the preselection mask associated with the specified kernel audit event. *event* is the kernel event number or event name.

-getcond

Display the kernel audit condition. The condition displayed is the literal string *auditing*, meaning auditing is enabled and turned on (the kernel audit module is constructing and queuing audit records); *noaudit*, meaning auditing is enabled but turned off (the kernel audit module is not constructing and queuing audit records); *disabled*, meaning that the audit module has not been enabled; or *nospace*, meaning there is no space for saving audit records. See [auditon\(2\)](#) and [auditd\(1M\)](#) for further information.

-getestate *event*

For the specified event (string or event number), print out classes *event* has been assigned. For example:

```
# auditconfig -getestate 20
audit class mask for event AUE_REBOOT(20) = 0x800
# auditconfig -getestate AUE_RENAME
audit class mask for event AUE_RENAME(42) = 0x30
```

-getfsize

Return the maximum audit file size in bytes and the current size of the audit file in bytes.

-getkaudit

Get audit characteristics of machine. For example:

```
# auditconfig -getkaudit
audit id = unknown(-2)
process preselection mask = lo,na(0x1400,0x1400)
terminal id (maj,min,host) = 0,0,(0.0.0.0)
audit session id = 0
```

-getkmask

Get non-attributable pre-selection mask for machine. For example:

```
# auditconfig -getkmask
audit flags for non-attributable events = lo,na(0x1400,0x1400)
```

-getpinfo *pid*
Display the audit ID, preselection mask, terminal ID, and audit session ID for the specified process.

-getpolicy
Display the kernel audit policy.

-getcwd
Prints current working directory (anchored from root at system boot). For example:

```
# cd /usr/tmp
# auditconfig -getcwd
current working directory = /var/tmp
```

-getqbufsz
Get audit queue write buffer size. For example:

```
# auditconfig -getqbufsz
audit queue buffer size (bytes) = 1024
```

-getqctrl
Get audit queue write buffer size, audit queue hiwater mark, audit queue lowater mark, audit queue prod interval (ticks).

```
# auditconfig -getqctrl
audit queue hiwater mark (records) = 100
audit queue lowater mark (records) = 10
audit queue buffer size (bytes) = 1024
audit queue delay (ticks) = 20
```

-getqdelay
Get interval at which audit queue is prodded to start output. For example:

```
# auditconfig -getqdelay
audit queue delay (ticks) = 20
```

-getqhiwater
Get high water point in undelivered audit records when audit generation will block. For example:

```
# ./auditconfig -getqhiwater
audit queue hiwater mark (records) = 100
```

-getqlowater
Get low water point in undelivered audit records where blocked processes will resume. For example:

```
# auditconfig -getqlowater
audit queue lowater mark (records) = 10
```

-getstat
Print current audit statistics information. For example:

```
# auditconfig -getstat
gen nona kern aud ctl enq wrtn wblk rblk drop tot mem
```

auditconfig(1M)

```
910      1 725 184      0 910 910      0 231      0 88 48
```

-gettid
Print audit terminal ID for current process. For example:

```
# auditconfig -gettid
terminal id (maj,min,host) = 235,197121,elbow(129.146.89.77)
```

-lsevent
Display the currently configured (runtime) kernel and user level audit event information.

-lspolicy
Display the kernel audit policies with a description of each policy.

-setasid *session-ID* [*cmd*]
Execute shell or *cmd* with specified *session-ID*. For example:

```
# ./auditconfig -setasid 2000 /bin/ksh
#
# ./auditconfig -getpinfo 104485
audit id = abc(666)
process preselection mask = 1o(0x1000,0x1000)
terminal id (maj,min,host) = 235,197121,elbow(129.146.89.77)
audit session id = 2000
```

-setaudit *audit-ID* *preselect_flags* *term-ID* *session-ID* [*cmd*]
Execute shell or *cmd* with the specified audit characteristics.

-setaudit *audit-ID* [*cmd*]
Execute shell or *cmd* with the specified *audit-ID*.

-setclass *event* *audit_flag* [*audit_flag* . . .]
Map the kernel event *event* to the classes specified by *audit_flag*. *event* is an event number or name. An *audit_flag* is a two character string representing an audit class. See `audit_control(4)` for further information.

-setcond [*auditing* | *noaudit* | *nospace*]
Set the kernel audit condition to the *condition* specified where *condition* is the literal string *auditing*, indicating auditing should be enabled; *noaudit*, indicating auditing should be disabled; or *nospace*, which forces a no-space condition. (See `-getcond`, above.)

-setfsize *size*
Set the maximum size of an audit file to *size* bytes. When the size limit is reached, the audit file is closed and another is started.

-setkaudit *IP-address_type* *IP_address*
Set IP address of machine to specified values. *IP-address_type* is *ipv6* or *ipv4*.

-setkmask *audit_flags*
Set non-attributes selection flags of machine.

-setpmask *pid* *flags*
Set the preselection mask of the specified process. *flags* is the ASCII representation of the flags similar to that in `audit_control(4)`.


```
-setpolicy [+|-]policy_flag[policy_flag ...]
```

Set the kernel audit policy. A policy *policy_flag* is literal strings that denotes an audit policy. A prefix of + adds the policies specified to the current audit policies. A prefix of - removes the policies specified from the current audit policies. The following are the valid policy flag strings (auditconfig -lspolicy also lists the current valid audit policy flag strings):

all	Include all policies.
arge	Include the <code>execv(2)</code> system call environment arguments to the audit record. This information is not included by default.
argv	Include the <code>execv(2)</code> system call parameter arguments to the audit record. This information is not included by default.
cnt	Do not suspend processes when audit resources are exhausted. Instead, drop audit records and keep a count of the number of records dropped. By default, process are suspended until audit resources become available.
group	Include the supplementary group token in audit records. By default, the group token is not included.
none	Include no policies.
path	Add secondary path tokens to audit record. These are typically the pathnames of dynamically linked shared libraries or command interpreters for shell scripts. By default, they are not included.
public	Audit public files. By default, read-type operations are not audited for certain files which meet <i>public</i> characteristics: owned by root, readable by all, and not writable by all.
trail	Include the trailer token in every audit record. By default, the trailer token is not included.
seq	Include the sequence token as part of every audit record. By default, the sequence token is not included. The sequence token attaches a sequence number to every audit record.

```
-setqbufsz buffer_size
```

Set the audit queue write buffer size (bytes).

```
-setqctrl hiwater lowater bufisz interval
```

Set the audit queue write buffer size (bytes), hiwater audit record count, lowater audit record count, and wakeup interval (ticks).

```
-setqdelay interval
```

Set the audit queue wakeup interval (ticks). This determines the interval at which the kernel pokes the audit queue, to write audit records to the audit trail.

```
-setqhiwater hiwater
```

Set the number of undelivered audit records in the audit queue at which audit record generation blocks.

auditconfig(1M)

- setqlowater *lowater*
Set the number of undelivered audit records in the audit queue at which blocked auditing processes unblock.
- setsmask *asid flags*
Set the preselection mask of all processes with the specified audit session ID.
- setstat
Reset audit statistics counters.
- setumask *audit flags*
Set the preselection mask of all processes with the specified audit ID.

EXAMPLES

EXAMPLE 1 Using auditconfig

The following is an example of an auditconfig program:

```
#
# map kernel audit event number 10 to the "fr" audit class
#
% auditconfig -setclass 10 fr

#
# turn on inclusion of exec arguments in exec audit records
#
% auditconfig -setpolicy +argv
```

EXIT STATUS

- 0 Successful completion.
- 1 An error occurred.

FILES

/etc/security/audit_event
/etc/security/audit_class

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	Evolving

SEE ALSO

auditd(1M), bsmconv(1M), praudit(1M), auditon(2), execv(2), audit_class(4), audit_control(4), audit_event(4), attributes(5)

NAME	auditd – audit daemon
SYNOPSIS	<code>/usr/sbin/auditd</code>
DESCRIPTION	The audit daemon controls the generation and location of audit trail files. If auditing is desired, auditd reads the <code>audit_control(4)</code> file to get a list of directories into which audit files can be written and the percentage limit for how much space to reserve on each filesystem before changing to the next directory. If auditd receives the signal <code>SIGUSR1</code>, the current audit file is closed and another is opened. If <code>SIGHUP</code> is received, the current audit trail is closed, the <code>audit_control</code> file reread, and a new trail is opened. If <code>SIGTERM</code> is received, the audit trail is closed and auditing is terminated. The program <code>audit(1M)</code> sends these signals and is recommended for this purpose. Each time the audit daemon opens a new audit trail file, it updates the file <code>audit_data(4)</code> to include the correct name.
Auditing Conditions	The audit daemon invokes the program <code>audit_warn(1M)</code> under the following conditions with the indicated options: <code>audit_warn soft pathname</code> The file system upon which <i>pathname</i> resides has exceeded the minimum free space limit defined in <code>audit_control(4)</code>. A new audit trail has been opened on another file system. <code>audit_warn allsoft</code> All available file systems have been filled beyond the minimum free space limit. A new audit trail has been opened anyway. <code>audit_warn hard pathname</code> The file system upon which <i>pathname</i> resides has filled or for some reason become unavailable. A new audit trail has been opened on another file system. <code>audit_warn allhard count</code> All available file systems have been filled or for some reason become unavailable. The audit daemon will repeat this call to <code>audit_warn</code> every twenty seconds until space becomes available. <i>count</i> is the number of times that <code>audit_warn</code> has been called since the problem arose. <code>audit_warn ebusy</code> There is already an audit daemon running. <code>audit_warn tmpfile</code> The file <code>/etc/security/audit/audit_tmp</code> exists, indicating a fatal error. <code>audit_warn nostart</code> The internal system audit condition is <code>AUC_FCHDONE</code>. Auditing cannot be started without rebooting the system. <code>audit_warn auditoff</code> The internal system audit condition has been changed to not be <code>AUC_AUDITING</code> by someone other than the audit daemon. This causes the audit daemon to exit.

auditd(1M)

audit_warn postsigterm

An error occurred during the orderly shutdown of the auditing system.

audit_warn getacdir

There is a problem getting the directory list from
/etc/security/audit/audit_control.

The audit daemon will hang in a sleep loop until this file is fixed.

FILES /etc/security/audit/audit_control
/etc/security/audit/audit_data

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO audit(1M), audit_warn(1M), bsmconv(1M), praudit(1M), auditon(2),
auditsvc(2), audit.log(4), audit_control(4), audit_data(4), attributes(5)

NOTES The functionality described in this man page is available only if the Basic Security
Module (BSM) has been enabled. See bsmconv(1M) for more information.

NAME	auditreduce – merge and select audit records from audit trail files
SYNOPSIS	auditreduce [<i>options</i>] [<i>audit-trail-file...</i>]
DESCRIPTION	auditreduce allows you to select or merge records from audit trail files. Audit files may be from one or more machines. The merge function merges together audit records from one or more input audit trail files into a single output file. The records in an audit trail file are assumed to be sorted in chronological order (oldest first) and this order is maintained by auditreduce in the output file. Unless instructed otherwise, auditreduce will merge the entire audit trail, which consists of all the audit trail files in the directory structure <i>audit_root_dir</i>/*/files (see <i>audit_control</i>(4) for details of the structure of the audit root). Unless stated with the -R or -S option, <i>audit_root_dir</i> defaults to <i>/etc/security/audit</i>. By using the file selection options it is possible to select some subset of these files, or files from another directory, or files named explicitly on the command line. The select function allows audit records to be selected on the basis of numerous criteria relating to the record's content (see <i>audit.log</i>(4) for details of record content). A record must meet all of the <i>record-selection-option</i> criteria to be selected.
Audit Trail Filename Format	Any audit trail file not named on the command line must conform to the audit trail filename format. Files produced by the audit system already have this format. Output file names produced by auditreduce are in this format. It is: <i>start-time . end-time . suffix</i> where <i>start-time</i> is the 14-character timestamp of when the file was opened, <i>end-time</i> is the 14-character timestamp of when the file was closed, and <i>suffix</i> is the name of the machine which generated the audit trail file, or some other meaningful suffix (e.g., <i>all</i>, if the file contains a combined group of records from many machines). The <i>end-time</i> may be the literal string <i>not_terminated</i>, to indicate that the file is still being written to by the audit system. Timestamps are of the form <i>yyyymmddhhmmss</i> (year, month, day, hour, minute, second). The timestamps are in Greenwich Mean Time (GMT).
OPTIONS	
File Selection Options	The file selection options indicate which files are to be processed and certain types of special treatment. -A All of the records from the input files will be selected regardless of their timestamp. This option effectively disables the -a, -b, and -d options. This is useful in preventing the loss of records if the -D option is used to delete the input files after they are processed. Note, however, that if a record is <i>not</i> selected due to another option, then -A will not override that.

auditreduce(1M)

-C

Only process complete files. Files whose filename *end-time* timestamp is *not_terminated* are not processed (such a file is currently being written to by the audit system). This is useful in preventing the loss of records if -D is used to delete the input files after they are processed. It does not apply to files specified on the command line.

-D *suffix*

Delete input files after they deleted if the entire run is successful. If *auditreduce* detects an error while reading a file, then that file is not deleted. If -D is specified, -A, -C and -O are also implied. *suffix* is given to the -O option. This helps prevent the loss of audit records by ensuring that all of the records are written, only complete files are processed, and the records are written to a file before being deleted. Note that if both -D and -O are specified in the command line, the order of specification is significant. The *suffix* associated with the latter specification is in effect.

-M *machine*

Allows selection of records from files with *machine* as the filename suffix. If -M is not specified, all files are processed regardless of suffix. -M can also be used to allow selection of records from files that contain combined records from many machines and have a common suffix (such as *all*).

-N

Select objects in *new mode*. This flag is off by default, thus retaining backward compatibility. In the existing, *old mode*, specifying the -e, -f, -g, -r, or -u flags would select not only actions taken with those IDs, but also certain objects owned by those IDs. When running in *new mode*, only actions are selected. In order to select objects, the -o option must be used.

-O *suffix*

Direct output stream to a file in the current *audit_root_dir* with the indicated suffix. *suffix* may alternatively contain a full pathname, in which case the last component is taken as the suffix, ahead of which the timestamps will be placed, ahead of which the remainder of the pathname will be placed. If the -O option is not specified, the output is sent to the standard output. When *auditreduce* places timestamps in the filename, it uses the times of the first and last records in the merge as the *start-time* and *end-time*.

-Q

Quiet. Suppress notification about errors with input files.

-R *pathname*

Specify the pathname of an alternate audit root directory *audit_root_dir* to be *pathname*. Therefore, rather than using */etc/security/audit/*/files* by default, *pathname/*/files* will be examined instead.

-S *server*

This option causes *auditreduce* to read audit trail files from a specific location (server directory). *server* is normally interpreted as the name of a subdirectory of the audit root, therefore *auditreduce* will look in *audit_root_dir/server/files* for

Record Selection Options

the audit trail files. But if *server* contains any '/' characters, it is the name of a specific directory not necessarily contained in the audit root. In this case, *server/files* will be consulted. This option allows archived files to be manipulated easily, without requiring that they be physically located in a directory structure like that of */etc/security/audit*.

-V

Verbose. Display the name of each file as it is opened, and how many records total were written to the output stream.

The record selection options listed below are used to indicate which records are written to the output file produced by *auditreduce*.

Multiple arguments of the same type are not permitted.

-a *date-time*

Select records that occurred at or after *date-time*. The *date-time* argument is described under Option Arguments, below. *date-time* is in local time. The -a and -b options can be used together to form a range.

-b *date-time*

Select records that occurred before *date-time*.

-c *audit-classes*

Select records by audit class. Records with events that are mapped to the audit classes specified by *audit-classes* are selected. Audit class names are defined in *audit_class*(4). The *audit-classes* can be a comma separated list of *audit flags* like those described in *audit_control*(4). Using the *audit flags*, one can select records based upon success and failure criteria.

-d *date-time*

Select records that occurred on a specific day (a 24-hour period beginning at 00:00:00 of the day specified and ending at 23:59:59). The day specified is in local time. The time portion of the argument, if supplied, is ignored. Any records with timestamps during that day are selected. If any hours, minutes, or seconds are given in *time*, they are ignored. -d can not be used with -a or -b.

-e *effective-user*

Select records with the specified *effective-user*.

-f *effective-group*

Select records with the specified *effective-group*.

-g *real-group*

Select records with the specified *real-group*.

-j *subject-ID*

Select records with the specified *subject-ID* where *subject-ID* is a process ID.

-m *event*

Select records with the indicated *event*. The *event* is the literal string or the *event* number.

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-o *object_type=objectID_value*

Select records by object type. A match occurs when the record contains the information describing the specified *object_type* and the object ID equals the value specified by *objectID_value*. The allowable object types and values are as follows:

file=pathname

Select records containing file system objects with the specified pathname, where pathname is a comma separated list of regular expressions. If a regular expression is preceded by a tilde (~), files matching the expression are excluded from the output. For example, the option *file=~ /usr/openwin, /usr, /etc* would select all files in /usr or /etc except those in /usr/openwin. The order of the regular expressions is important because auditreduce processes them from left to right, and stops when a file is known to be either selected or excluded. Thus the option *file= /usr, /etc, ~ /usr/openwin* would select all files in /usr and all files in /etc. Files in /usr/openwin are not excluded because the regular expression /usr is matched first. Care should be given in surrounding the *pathname* with quotes so as to prevent the shell from expanding any tildes.

filegroup=group

Select records containing file system objects with *group* as the owning group.

fileowner=user

Select records containing file system objects with *user* as the owning user.

msgqid=ID

Select records containing message queue objects with the specified *ID* where *ID* is a message queue ID.

msgqgroup=group

Select records containing message queue objects with *group* as the owning or creating group.

msgqowner=user

Select records containing message queue objects with *user* as the owning or creating user.

pid=ID

Select records containing process objects with the specified *ID* where *ID* is a process ID. Process are objects when they are receivers of signals.

procgroup=group

Select records containing process objects with *group* as the real or effective group.

procowner=user

Select records containing process objects with *user* as the real or effective user.

semid=ID

Select records containing semaphore objects with the specified *ID* where *ID* is a semaphore ID.

semgroup=group

Select records containing semaphore objects with *group* as the owning or creating group.

semowner=user

Select records containing semaphore objects with *user* as the owning or creating user.

shmID=ID

Select records containing shared memory objects with the specified *ID* where *ID* is a shared memory ID.

shmgroup=group

Select records containing shared memory objects with *group* as the owning or creating group.

shmowner=user

Select records containing shared memory objects with *user* as the owning or creating user.

sock=port_number | machine

Select records containing socket objects with the specified *port_number* or the specified *machine* where *machine* is a machine name as defined in `hosts(4)`.

-r real-user

Select records with the specified *real-user*.

-u audit-user

Select records with the specified *audit-user*. When one or more *filename* arguments appear on the command line, only the named files are processed. Files specified in this way need not conform to the audit trail filename format. However, *-M*, *-S*, and *-R* may not be used when processing named files. If the *filename* is “-” then the input is taken from the standard input.

Option Arguments

audit-trail-file

An audit trail file as defined in `audit.log(4)`. An audit trail file not named on the command line must conform to the audit trail file name format. Audit trail files produced as output of `auditreduce` are in this format as well. The format is:

start-time . end-time . suffix

start-time is the 14 character time stamp denoting when the file was opened.

end-time is the 14 character time stamp denoting when the file was closed. *end-time* may also be the literal string `not_terminated`, indicating the file is still be written to by the audit daemon or the file was not closed properly (a system crash or abrupt halt occurred). *suffix* is the name of the machine that generated the audit trail file (or some other meaningful suffix; e.g. `all` would be a good suffix if the audit trail file contains a combined group of records from many machines).

date-time

The *date-time* argument to *-a*, *-b*, and *-d* can be of two forms: An absolute *date-time* takes the form:

`yyyymmdd [ hh [ mm [ ss ] ] ]`

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where *yyyy* specifies a year (with 1970 as the earliest value), *mm* is the month (01-12), *dd* is the day (01-31), *hh* is the hour (00-23), *mm* is the minute (00-59), and *ss* is the second (00-59). The default is 00 for *hh*, *mm* and *ss*.

An offset can be specified as: *+n d|h|m|s* where *n* is a number of units, and the tags *d*, *h*, *m*, and *s* stand for days, hours, minutes and seconds, respectively. An offset is relative to the starting time. Thus, this form can only be used with the *-b* option.

event

The literal string or ordinal event number as found in `audit_event(4)`. If *event* is not found in the `audit_event` file it is considered invalid.

group

The literal string or ordinal group ID number as found in `group(4)`. If *group* is not found in the `group` file it is considered invalid. *group* may be negative.

pathname

A regular expression describing a pathname.

user

The literal username or ordinal user ID number as found in `passwd(4)`. If the username is not found in the `passwd` file it is considered invalid. *user* may be negative.

EXAMPLES

EXAMPLE 1 The `auditreduce` command.

`praudit(1M)` is available to display audit records in a human-readable form.

This will display the entire audit trail in a human-readable form:

```
% auditreduce | praudit
```

If all the audit trail files are being combined into one large file, then deleting the original files could be desirable to prevent the records from appearing twice:

```
% auditreduce -V -d /etc/security/audit/combined/all
```

This will print what user `milner` did on April 13, 1988. The output will be displayed in a human-readable form to the standard output:

```
% auditreduce -d 19880413 -u milner | praudit
```

The above example may produce a large volume of data if `milner` has been busy. Perhaps looking at only login and logout times would be simpler. The *-c* option will select records from a specified class:

```
% auditreduce -d 19880413 -u milner -c lo | praudit
```

To see `milner`'s login/logout activity for April 13, 14, and 15 the following is used. The results are saved to a file in the current working directory. Note that the name of the output file will have `milnerlo` as the *suffix*, with the appropriate timestamp prefixes. Note that the long form of the name is used for the *-c* option:

```
% auditreduce -a 19880413 -b +3d -u milner -c login_logout -o milnerlo
```

EXAMPLE 1 The auditreduce command. (Continued)

To follow milner's movement about the file system on April 13, 14, and 15 the chdir record types could be viewed. Note that in order to get the same time range as the above example we needed to specify the -b time as the day after our range. This is because 19880416 defaults to midnight of that day, and records before that fall on 0415, the end-day of the range.

```
% auditreduce -a 19880413 -b 19880416 -u milner -m AUE_CHDIR | praudit
```

In this example the audit records are being collected in summary form (the login/logout records only). The records are being written to a summary file in a different directory than the normal audit root to prevent the selected records from existing twice in the audit root.

```
% auditreduce -d 19880330 -c lo -o /etc/security/audit_summary/logins
```

If activity for user ID 9944 has been observed, but that user is not known to the system administrator, then the following example will search the entire audit trail for any records generated by that user. auditreduce will query the system as to the current validity of ID 9944, and print a warning message if it is not currently active:

```
% auditreduce -o /etc/security/audit_suspect/user9944 -u 9944
```

FILES /etc/security/audit/server/files/*
location of audit trails, when stored

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO bsmconv(1M), praudit(1M), audit.log(4), audit_class(4), audit_control(4), group(4), hosts(4), passwd(4), attributes(5)

DIAGNOSTICS auditreduce will print out error messages if there are command line errors and then exit. If there are fatal errors during the run auditreduce will print an explanatory message and exit. In this case the output file may be in an inconsistent state (no trailer or partially written record) and auditreduce will print a warning message before exiting. Successful invocation returns 0 and unsuccessful invocation returns 1.

Since auditreduce may be processing a large number of input files, it is possible that the machine-wide limit on open files will be exceeded. If this happens, auditreduce will print a message to that effect, give information on how many file there are, and exit.

If auditreduce prints a record's timestamp in a diagnostic message, that time is in local time. However, when filenames are displayed, their timestamps are in GMT.

auditreduce(1M)

BUGS	Conjunction, disjunction, negation, and grouping of record selection options should be allowed.

NOTES	The functionality described in this man page is available only if the Basic Security Module (BSM) has been enabled. See <code>bsmconv(1M)</code> for more information.

NAME	audit_startup – audit subsystem initialization script
SYNOPSIS	/etc/security/audit_startup
DESCRIPTION	The audit_startup script is used to initialize the audit subsystem before the audit daemon is started. This script is configurable by the system administrator, and currently consists of a series of auditconfig(1M) commands to set the system default policy, and download the initial event to class mapping.
SEE ALSO	auditconfig(1M), auditd(1M), bsmconv(1M), attributes(5)
NOTES	The functionality described in this man page is available only if the Basic Security Module (BSM) has been enabled. See bsmconv(1M) for more information.

auditstat(1M)

NAME	auditstat – display kernel audit statistics	
SYNOPSIS	auditstat [-c <i>count</i>] [-h <i>numlines</i>] [-i <i>interval</i>] [-n] [-v]	
DESCRIPTION	auditstat displays kernel audit statistics. The fields displayed are as follows:	
	aud	The total number of audit records processed by the audit(2) system call.
	ctl	This field is obsolete.
	drop	The total number of audit records that have been dropped. Records are dropped according to the kernel audit policy. See auditon(2), AUDIT_CNT policy for details.
	enq	The total number of audit records put on the kernel audit queue.
	gen	The total number of audit records that have been constructed (not the number written).
	kern	The total number of audit records produced by user processes (as a result of system calls).
	mem	The total number of Kbytes of memory currently in use by the kernel audit module.
	nona	The total number of non-attributable audit records that have been constructed. These are audit records that are not attributable to any particular user.
	rblk	The total number of times that auditsvc(2) has blocked waiting to process audit data.
	tot	The total number of Kbytes of audit data written to the audit trail.
	wblk	The total number of times that user processes blocked on the audit queue at the high water mark.
	wrtn	The total number of audit records written. The difference between enq and wrtn is the number of outstanding audit records on the audit queue that have not been written.
OPTIONS	-c <i>count</i>	Display the statistics a total of <i>count</i> times. If <i>count</i> is equal to zero, statistics are displayed indefinitely. A time interval must be specified.
	-h <i>numlines</i>	Display a header for every <i>numlines</i> of statistics printed. The default is to display the header every 20 lines. If <i>numlines</i> is equal to zero, the header is never displayed.
	-i <i>interval</i>	Display the statistics every <i>interval</i> where <i>interval</i> is the number of seconds to sleep between each collection.
	-n	Display the number of kernel audit events currently configured.
	-v	Display the version number of the kernel audit module software.

auditstat(1M)

EXIT STATUS auditstat returns 0 upon success and 1 upon failure.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO auditconfig(1M), praudit(1M), bsmconv(1M), audit(2), auditon(2), auditsvc(2), attributes(5)

NOTES The functionality described in this man page is available only if the Basic Security Module (BSM) has been enabled. See bsmconv(1M) for more information.

audit_warn(1M)

NAME	audit_warn – audit daemon warning script										
SYNOPSIS	<code>/etc/security/audit_warn</code> [<i>option</i> [<i>arguments</i>]]										
DESCRIPTION	The <code>audit_warn</code> utility processes warning or error messages from the audit daemon. When a problem is encountered, the audit daemon, <code>auditd(1M)</code> calls <code>audit_warn</code> with the appropriate arguments. The <i>option</i> argument specifies the error type. The system administrator can specify a list of mail recipients to be notified when an <code>audit_warn</code> situation arises by defining a mail alias called <code>audit_warn</code> in <code>aliases(4)</code>. The users that make up the <code>audit_warn</code> alias are typically the <code>audit</code> and <code>root</code> users.										
OPTIONS	The following options are supported: <table><tr><td><code>allhard count</code></td><td>Indicates that the hard limit for all filesystems has been exceeded <i>count</i> times. The default action for this option is to send mail to the <code>audit_warn</code> alias only if the <i>count</i> is 1, and to write a message to the machine console every time. It is recommended that mail <i>not</i> be sent every time as this could result in a the saturation of the file system that contains the mail spool directory.</td></tr><tr><td><code>allsoft</code></td><td>Indicates that the soft limit for all filesystems has been exceeded. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console.</td></tr><tr><td><code>auditoff</code></td><td>Indicates that someone other than the audit daemon changed the system audit state to something other than <code>AUC_AUDITING</code>. The audit daemon will have exited in this case. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console.</td></tr><tr><td><code>ebusy</code></td><td>Indicates that the audit daemon is already running. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console.</td></tr><tr><td><code>getacdir count</code></td><td>Indicates that there is a problem getting the directory list from <code>audit_control(4)</code>. The audit daemon will hang in a sleep loop until the file is fixed. The default action for this option is to send mail to the <code>audit_warn</code> alias only if <i>count</i> is 1, and to write a message to the machine console every time. It is recommended that mail <i>not</i> be sent every time as this could result in a the saturation of the file system that contains the mail spool directory.</td></tr></table>	<code>allhard count</code>	Indicates that the hard limit for all filesystems has been exceeded <i>count</i> times. The default action for this option is to send mail to the <code>audit_warn</code> alias only if the <i>count</i> is 1, and to write a message to the machine console every time. It is recommended that mail <i>not</i> be sent every time as this could result in a the saturation of the file system that contains the mail spool directory.	<code>allsoft</code>	Indicates that the soft limit for all filesystems has been exceeded. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console.	<code>auditoff</code>	Indicates that someone other than the audit daemon changed the system audit state to something other than <code>AUC_AUDITING</code> . The audit daemon will have exited in this case. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console.	<code>ebusy</code>	Indicates that the audit daemon is already running. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console.	<code>getacdir count</code>	Indicates that there is a problem getting the directory list from <code>audit_control(4)</code> . The audit daemon will hang in a sleep loop until the file is fixed. The default action for this option is to send mail to the <code>audit_warn</code> alias only if <i>count</i> is 1, and to write a message to the machine console every time. It is recommended that mail <i>not</i> be sent every time as this could result in a the saturation of the file system that contains the mail spool directory.
<code>allhard count</code>	Indicates that the hard limit for all filesystems has been exceeded <i>count</i> times. The default action for this option is to send mail to the <code>audit_warn</code> alias only if the <i>count</i> is 1, and to write a message to the machine console every time. It is recommended that mail <i>not</i> be sent every time as this could result in a the saturation of the file system that contains the mail spool directory.										
<code>allsoft</code>	Indicates that the soft limit for all filesystems has been exceeded. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console.										
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<code>ebusy</code>	Indicates that the audit daemon is already running. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console.										
<code>getacdir count</code>	Indicates that there is a problem getting the directory list from <code>audit_control(4)</code> . The audit daemon will hang in a sleep loop until the file is fixed. The default action for this option is to send mail to the <code>audit_warn</code> alias only if <i>count</i> is 1, and to write a message to the machine console every time. It is recommended that mail <i>not</i> be sent every time as this could result in a the saturation of the file system that contains the mail spool directory.										

<i>hard filename</i>	Indicates that the hard limit for the file has been exceeded. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console.
<code>nostart</code>	Indicates that auditing could not be started. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console. Some administrators may prefer to modify <code>audit_warn</code> to reboot the system when this error occurs.
<code>postsigterm</code>	Indicates that an error occurred during the orderly shutdown of the audit daemon. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console.
<i>soft filename</i>	Indicates that the soft limit for <i>filename</i> has been exceeded. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console.
<code>tmpfile</code>	Indicates that the temporary audit file already exists indicating a fatal error. The default action for this option is to send mail to the <code>audit_warn</code> alias and to write a message to the machine console.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsr
Interface Stability	See below

The interface stability is evolving. The file content is unstable.

SEE ALSO `audit(1M)`, `auditd(1M)`, `bsmconv(1M)`, `aliases(4)`, `audit.log(4)`, `audit_control(4)`, `attributes(5)`

NOTES This functionality is available only if the Basic Security Module (BSM) has been enabled. See `bsmconv(1M)` for more information.

automount(1M)

NAME	automount – install automatic mount points				
SYNOPSIS	/usr/sbin/automount [-t <i>duration</i>] [-v]				
DESCRIPTION	The automount utility installs <code>autofs</code> mount points and associates an automount map with each mount point. The <code>autofs</code> file system monitors attempts to access directories within it and notifies the <code>automountd(1M)</code> daemon. The daemon uses the map to locate a file system, which it then mounts at the point of reference within the <code>autofs</code> file system. A map can be assigned to an <code>autofs</code> mount using an entry in the <code>/etc/auto_master</code> map or a direct map. If the file system is not accessed within an appropriate interval (10 minutes by default), the <code>automountd</code> daemon unmounts the file system. The file <code>/etc/auto_master</code> determines the locations of all <code>autofs</code> mount points. By default, this file contains four entries: <pre># Master map for automounter # +auto_master /net -hosts -nosuid /home auto_home /xfn -xfn</pre> The <code>+auto_master</code> entry is a reference to an external NIS or NIS+ master map. If one exists, then its entries are read as if they occurred in place of the <code>+auto_master</code> entry. The remaining entries in the master file specify a directory on which an <code>autofs</code> mount will be made followed by the automounter map to be associated with it. Optional mount options may be supplied as an optional third field in the each entry. These options are used for any entries in the map that do not specify mount options explicitly. The automount command is usually run without arguments. It compares the entries <code>/etc/auto_master</code> with the current list of <code>autofs</code> mounts in <code>/etc/mnttab</code> and adds, removes or updates <code>autofs</code> mounts to bring the <code>/etc/mnttab</code> up to date with the <code>/etc/auto_master</code>. At boot time it installs all <code>autofs</code> mounts from the master map. Subsequently, it may be run to install <code>autofs</code> mounts for new entries in the master map or the direct map, or to perform unmounts for entries that have been removed from these maps.				
OPTIONS	The following options are supported: <table><tr><td>-t <i>duration</i></td><td>Specifies a <i>duration</i>, in seconds, that a file system is to remain mounted when not in use. The default is 10 minutes.</td></tr><tr><td>-v</td><td>Verbose mode. Notifies of <code>autofs</code> mounts, unmounts, or other non-essential information.</td></tr></table>	-t <i>duration</i>	Specifies a <i>duration</i> , in seconds, that a file system is to remain mounted when not in use. The default is 10 minutes.	-v	Verbose mode. Notifies of <code>autofs</code> mounts, unmounts, or other non-essential information.
-t <i>duration</i>	Specifies a <i>duration</i> , in seconds, that a file system is to remain mounted when not in use. The default is 10 minutes.				
-v	Verbose mode. Notifies of <code>autofs</code> mounts, unmounts, or other non-essential information.				
USAGE					
Map Entry Format	A simple map entry (mapping) takes the form: <pre>key [-mount-options] location . . .</pre>				

automount(1M)

where *key* is the full pathname of the directory to mount when used in a direct map, or the simple name of a subdirectory in an indirect map. *mount-options* is a comma-separated list of mount options, and *location* specifies a file system from which the directory may be mounted. In the case of a simple NFS mount, the options that can be used are as specified in mount_nfs(1M), and *location* takes the form:

host : *pathname*

host is the name of the host from which to mount the file system, and *pathname* is the absolute pathname of the directory to mount.

Options to other file systems are documented on the other mount_* reference manual pages, for example, mount_cacheefs(1M).

Replicated File Systems

Multiple *location* fields can be specified for replicated NFS file systems, in which case automount and the kernel will each try to use that information to increase availability. If the read-only flag is set in the map entry, automount mounts a list of locations that the kernel may use, sorted by several criteria. When a server does not respond, the kernel will switch to an alternate server. The sort ordering of automount is used to determine how the next server is chosen. If the read-only flag is not set, automount will mount the best single location, chosen by the same sort ordering, and new servers will only be chosen when an unmount has been possible, and a remount is done. Servers on the same local subnet are given the strongest preference, and servers on the local net are given the second strongest preference. Among servers equally far away, response times will determine the order if no weighting factors (see below) are used.

If the list includes server locations using both the NFS Version 2 Protocol and the NFS Version 3 Protocol, automount will choose only a subset of the server locations on the list, so that all entries will be the same protocol. It will choose servers with the NFS Version 3 Protocol so long as an NFS Version 2 Protocol server on a local subnet will not be ignored. See the *System Administration Guide: IP Services* for additional details.

If each *location* in the list shares the same *pathname* then a single *location* may be used with a comma-separated list of hostnames:

hostname,hostname . . . : pathname

Requests for a server may be weighted, with the weighting factor appended to the server name as an integer in parentheses. Servers without a weighting are assumed to have a value of zero (most likely to be selected). Progressively higher values decrease the chance of being selected. In the example,

```
man -ro alpha,bravo,charlie(1),delta(4) : /usr/man
```

hosts alpha and bravo have the highest priority; host delta has the lowest.

automount(1M)

Server proximity takes priority in the selection process. In the example above, if the server `delta` is on the same network segment as the client, but the others are on different network segments, then `delta` will be selected; the weighting value is ignored. The weighting has effect only when selecting between servers with the same network proximity.

In cases where each server has a different export point, the weighting can still be applied. For example:

```
man -ro alpha:/usr/man  bravo,charlie(1):/usr/share/man
      delta(3):/export/man
```

A mapping can be continued across input lines by escaping the NEWLINE with a backslash (\) Comments begin with a number sign (#) and end at the subsequent NEWLINE.

Map Key Substitution

The ampersand (&) character is expanded to the value of the key field for the entry in which it occurs. In this case:

```
jane sparcserver : /home/&
```

the & expands to jane.

Wildcard Key

The asterisk (*) character, when supplied as the key field, is recognized as the catch-all entry. Such an entry will match any key not previously matched. For instance, if the following entry appeared in the indirect map for `/config`:

```
*          & : /export/config/&
```

this would allow automatic mounts in `/config` of any remote file system whose location could be specified as:

```
hostname : /export/config/hostname
```

Variable Substitution

Client specific variables can be used within an automount map. For instance, if `$HOST` appeared within a map, automount would expand it to its current value for the client's host name. Supported variables are:

ARCH	The application architecture is derived from the output of <code>uname -m</code>	The architecture name. For example, "sun4" on a sun4u machine.
CPU	The output of <code>uname -p</code>	The processor type. For example, "sparc"
HOST	The output of <code>uname -n</code>	The host name. For example, "biggles"

OSNAME	The output of <code>uname -s</code>	The OS name. For example, "SunOS"
OSREL	The output of <code>uname -r</code>	The OS release name. For example "5.3"
OSVERS	The output of <code>uname -v</code>	The OS version. For example, "beta1.0"
NATISA	The output of <code>isainfo -n</code>	The native instruction set architecture for the system. For example, "sparcv9"

If a reference needs to be protected from affixed characters, you can surround the variable name with curly braces (`{ }`).

Multiple Mounts

A multiple mount entry takes the form:

`key [-mount-options] [ [mountpoint] [-mount-options] location . . . ] . . .`

The initial `/[mountpoint]` is optional for the first mount and mandatory for all subsequent mounts. The optional `mountpoint` is taken as a pathname relative to the directory named by `key`. If `mountpoint` is omitted in the first occurrence, a `mountpoint` of `/` (root) is implied.

Given an entry in the indirect map for `/src`

```
beta      -ro\  
  /        svr1,svr2:/export/src/beta  \  
  /1.0      svr1,svr2:/export/src/beta/1.0  \  
  /1.0/man  svr1,svr2:/export/src/beta/1.0/man
```

All offsets must exist on the server under `beta`. `automount` will automatically mount `/src/beta`, `/src/beta/1.0`, and `/src/beta/1.0/man`, as needed, from either `svr1` or `svr2`, whichever host is nearest and responds first.

Other File System Types

The automounter assumes NFS mounts as a default file system type. Other file system types can be described using the `fstype` mount option. Other mount options specific to this file system type can be combined with the `fstype` option. The location field must contain information specific to the file system type. If the location field begins with a slash, a colon character must be prepended, for instance, to mount a CD file system:

```
cdrom -fstype=hsfs,ro  : /dev/sr0
```

or to perform an `autofs` mount:

automount(1M)

```
src -fstype=autofs auto_src
```

Note: Use this procedure only if you are not using Volume Manager.

Mounts using CacheFS are most useful when applied to an entire map as map defaults. The following entry in the master map describes cached home directory mounts. It assumes the default location of the cache directory, /cache.

```
/home auto_home -fstype=cachefs,backfstype=nfs
```

See the NOTES section for information on option inheritance.

Indirect Maps An indirect map allows you to specify mappings for the subdirectories you wish to mount under the `directory` indicated on the command line. In an indirect map, each key consists of a simple name that refers to one or more file systems that are to be mounted as needed.

Direct Maps Entries in a direct map are associated directly with `autofs` mount points. Each key is the full pathname of an `autofs` mount point. The direct map as a whole is not associated with any single directory.

Included Maps The contents of another map can be included within a map with an entry of the form
+mapname

If *mapname* begins with a slash, it is assumed to be the pathname of a local file. Otherwise, the location of the map is determined by the policy of the name service switch according to the entry for the automounter in `/etc/nsswitch.conf`, such as

```
automount: files nis
```

If the name service is `files`, then the name is assumed to be that of a local file in `/etc`. If the key being searched for is not found in the included map, the search continues with the next entry.

Special Maps There are three special maps available: `-hosts`, `-xfn`, and `-null`. The `-hosts` map is used with the `/net` directory and assumes that the map key is the hostname of an NFS server. The `automountd` daemon dynamically constructs a map entry from the server's list of exported file systems. References to a directory under `/net/hermes` will refer to the corresponding directory relative to `hermes` root.

The `-xfn` map is used to mount the initial context of the Federated Naming Service (FNS) namespace under the `/xfn` directory. For more information on FNS, see `fns(5)`, `fns_initial_context(5)`, `fns_policies(5)`, and the Federated Naming Service Guide.

	The <code>-null</code> map cancels a previous map for the directory indicated. This is most useful in the <code>/etc/auto_master</code> for cancelling entries that would otherwise be inherited from the <code>+auto_master</code> include entry. To be effective, the <code>-null</code> entries must be inserted before the included map entry.
Executable Maps	Local maps that have the execute bit set in their file permissions will be executed by the automounter and provided with a key to be looked up as an argument. The executable map is expected to return the content of an automounter map entry on its stdout or no output if the entry cannot be determined. A direct map cannot be made executable.
Configuration and the auto_master Map	When initiated without arguments, <code>automount</code> consults the master map for a list of <code>autofs</code> mount points and their maps. It mounts any <code>autofs</code> mounts that are not already mounted, and unmounts <code>autofs</code> mounts that have been removed from the master map or direct map. The master map is assumed to be called <code>auto_master</code> and its location is determined by the name service switch policy. Normally the master map is located initially as a local file <code>/etc/auto_master</code>.
Browsing	The Solaris 2.6 release supports browsability of indirect maps. This allows all of the potential mount points to be visible, whether or not they are mounted. The <code>-nobrowse</code> option can be added to any indirect <code>autofs</code> map to disable browsing. For example: <pre>/net -hosts -nosuid,nobrowse /home auto_home</pre> In this case, any <i>hostnames</i> would only be visible in <code>/net</code> after they are mounted, but all potential mount points would be visible under <code>/home</code>. The <code>-browse</code> option enables browsability of <code>autofs</code> file systems. This is the default for all indirect maps.
EXIT STATUS	The following exit values are returned: 0 Successful completion. 1 An error occurred.
FILES	<code>/etc/auto_master</code> master automount map. <code>/etc/auto_home</code> map to support automounted home directories. <code>/etc/nsswitch.conf</code> the name service switch configuration file.
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

automount(1M)

SEE ALSO isainfo(1), ls(1), uname(1), automountd(1M), mount(1M), mount_cachefs(1M), mount_nfs(1M), attributes(5), fns(5), fns_initial_context(5), fns_policies(5), nfssec(5)

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NOTES autofs mount points must not be hierarchically related. automount does not allow an autofs mount point to be created within another autofs mount.

Since each direct map entry results in a new autofs mount such maps should be kept short.

Entries in both direct and indirect maps can be modified at any time. The new information is used when automountd next uses the map entry to do a mount.

New entries added to a master map or direct map will not be useful until the automount command is run to install them as new autofs mount points. New entries added to an indirect map may be used immediately.

As of the Solaris 2.6 release, a listing (see ls(1)) of the autofs directory associated with an indirect map shows all potential mountable entries. The attributes associated with the potential mountable entries are temporary. The real file system attributes will only be shown once the file system has been mounted.

Default mount options can be assigned to an entire map when specified as an optional third field in the master map. These options apply only to map entries that have no mount options. Note that map entities with options override the default options, as at this time, the options do not concatenate. The concatenation feature is planned for a future release.

When operating on a map that invokes an NFS mount, the default number of retries for the automounter is 0, that is, a single mount attempt, with no retries. Note that this is significantly different from the default (10000) for the mount_nfs(1M) utility.

The Network Information Service (NIS) was formerly known as Sun Yellow Pages (YP). The functionality of the two remains the same.

NAME	automountd – autofs mount/unmount daemon				
SYNOPSIS	automountd [-Tvn] [-D <i>name=value</i>]				
DESCRIPTION	automountd is an RPC server that answers file system mount and unmount requests from the autofs file system. It uses local files or name service maps to locate file systems to be mounted. These maps are described with the automount(1M) command. The automountd daemon is automatically invoked in run level 2.				
OPTIONS	-T Trace. Expand each RPC call and display it on the standard output. -v Verbose. Log status messages to the console. -n Turn off browsing for all autofs mount points. This option overrides the -browse autofs map option on the local host. -D <i>name=value</i> Assign <i>value</i> to the indicated automount map substitution variable. These assignments cannot be used to substitute variables in the master map auto_master.				
USAGE	See largefile(5) for the description of the behavior of automountd when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).				
FILES	/etc/auto_master master map for automounter				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	automount(1M), attributes(5), largefile(5)				

autopush(1M)

NAME	autopush – configures lists of automatically pushed STREAMS modules
SYNOPSIS	autopush -f <i>filename</i> autopush -g -M <i>major</i> -m <i>minor</i> autopush -r -M <i>major</i> -m <i>minor</i>
DESCRIPTION	The autopush command configures the list of modules to be automatically pushed onto the stream when a device is opened. It can also be used to remove a previous setting or get information on a setting.
OPTIONS	The following options are supported: -f <i>filename</i> Sets up the autopush configuration for each driver according to the information stored in <i>filename</i>. An autopush file consists of lines of four or more fields, separated by spaces as shown below: <i>major minor last-minor module1 module2 . . . module8</i> The first field is a string that specifies the <i>major</i> device name, as listed in the <code>/kernel/drv</code> directory. The next two fields are integers that specify the <i>minor</i> device number and <i>last-minor</i> device number. The fields following represent the names of modules. If <i>minor</i> is -1, then all minor devices of a major driver specified by <i>major</i> are configured, and the value for <i>last-minor</i> is ignored. If <i>last-minor</i> is 0, then only a single minor device is configured. To configure a range of minor devices for a particular major, <i>minor</i> must be less than <i>last-minor</i>. The remaining fields list the names of modules to be automatically pushed onto the stream when opened, along with the position of an optional anchor. The maximum number of modules that can be pushed is eight. The modules are pushed in the order they are specified. The optional special character sequence <code>[anchor]</code> indicates that a STREAMS anchor should be placed on the stream at the module previously specified in the list; it is an error to specify more than one anchor or to have an anchor first in the list. A nonzero exit status indicates that one or more of the lines in the specified file failed to complete successfully. -g Gets the current configuration setting of a particular <i>major</i> and <i>minor</i> device number specified with the -M and -m options respectively and displays the autopush modules associated with it. It will also return the starting minor device number if the request corresponds to a setting of a range (as described with the -f option). -m <i>minor</i> Specifies the minor device number.

	-M <i>major</i> Specifies the major device number. -r Removes the previous configuration setting of the particular <i>major</i> and <i>minor</i> device number specified with the -M and -m options respectively. If the values of <i>major</i> and <i>minor</i> correspond to a previously established setting of a range of minor devices, where <i>minor</i> matches the first minor device number in the range, the configuration would be removed for the entire range.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. non-zero An error occurred.				
EXAMPLES	EXAMPLE 1 Using the autopush command. The following example gets the current configuration settings for the <i>major</i> and <i>minor</i> device numbers as indicated and displays the autopush modules associated with them for the character-special device <code>/dev/term/a</code>: <pre>example# autopush -g -M 29 -m 0 Major Minor Lastminor Modules 29 0 1 ldterm ttcompat</pre>				
FILES	<code>/etc/iu.ap</code>				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>bdconfig(1M)</code>, <code>ttymon(1M)</code>, <code>attributes(5)</code>, <code>ldterm(7M)</code>, <code>sad(7D)</code>, <code>streamio(7I)</code>, <code>ttcompat(7M)</code> <i>STREAMS Programming Guide</i>				

bdconfig(1M)

NAME	bdconfig – configures the bd (buttons and dials) stream												
SYNOPSIS	bdconfig [startup] [off] [on] [<i>term</i>] [status] [verbose]												
DESCRIPTION	The bdconfig utility is responsible for configuring the autopush facility and defining to the system what serial device to use for the bd stream.												
OPTIONS	If no options are given, then an interactive mode is assumed. In this mode the current status is presented along with this usage line, and a series of interactive questions asked to determine the user's desires. Root privilege is required to change the configuration. The status option does not require root privilege. bdconfig can be installed as a setuid root program. The non-interactive options below can be given in any order. <table><tr><td><i>term</i></td><td>Specify to the system the serial device for bd use. This option implies the on option unless the off option is present.</td></tr><tr><td>iff</td><td>Reconfigure the configured term for tty use.</td></tr><tr><td>on</td><td>Reconfigure the configured term for bd use. If <i>term</i> has not been previously specified, interactive questions are asked to determine the user's desires.</td></tr><tr><td>startup</td><td>Configure as was last configured before the system went down. This option is used by the startup script, and precludes the use of the on, off, and <i>term</i> options. This option implies non-interactive mode.</td></tr><tr><td>status</td><td>Emit the current configuration in terms of the words used as options: off, on, /dev/term/a, /dev/term/b, and so forth. This option implies non interactive mode.</td></tr><tr><td>verbose</td><td>bdconfig describes what it finds and what it is doing.</td></tr></table>	<i>term</i>	Specify to the system the serial device for bd use. This option implies the on option unless the off option is present.	iff	Reconfigure the configured term for tty use.	on	Reconfigure the configured term for bd use. If <i>term</i> has not been previously specified, interactive questions are asked to determine the user's desires.	startup	Configure as was last configured before the system went down. This option is used by the startup script, and precludes the use of the on, off, and <i>term</i> options. This option implies non-interactive mode.	status	Emit the current configuration in terms of the words used as options: off, on, /dev/term/a, /dev/term/b, and so forth. This option implies non interactive mode.	verbose	bdconfig describes what it finds and what it is doing.
<i>term</i>	Specify to the system the serial device for bd use. This option implies the on option unless the off option is present.												
iff	Reconfigure the configured term for tty use.												
on	Reconfigure the configured term for bd use. If <i>term</i> has not been previously specified, interactive questions are asked to determine the user's desires.												
startup	Configure as was last configured before the system went down. This option is used by the startup script, and precludes the use of the on, off, and <i>term</i> options. This option implies non-interactive mode.												
status	Emit the current configuration in terms of the words used as options: off, on, /dev/term/a, /dev/term/b, and so forth. This option implies non interactive mode.												
verbose	bdconfig describes what it finds and what it is doing.												
EXIT STATUS	The bdconfig utility returns 0 on success, 1 on general error, and 2 on argument error.												
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWdialh</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWdialh								
ATTRIBUTE TYPE	ATTRIBUTE VALUE												
Availability	SUNWdialh												
SEE ALSO	autopush(1M), attributes(5), x_buttontest(6), x_dialtest(6), bd(7M), sad(7D), streamio(7I)												
NOTES	All bdconfig does is configure the AUTOPUSH facility. bdconfig does not actually manipulate the serial port or stream in any way. Only the first open of a dismantled stream will see the effects of a previously run bdconfig.												

The `bdconfig` utility is silent except for error messages unless:

- a) invoked with no args: status / usage line emitted
- b) interactive modes are invoked as described above
- c) the verbose option is used

BUGS The interface does not support more than one dialbox and one buttonbox, both of which must be on the same serial device.

There should be a library routine to read, parse, and validate records in the `iu.ap` file, so that `bdconfig` could return to the appropriate record in `iu.ap` as the default configuration.

boot(1M)

NAME	boot – start the system kernel or a standalone program
SYNOPSIS	
SPARC	boot [<i>OBP names</i>] [<i>file</i>] [-a <i>fV</i>] [-D <i>default-file</i>] [<i>boot-flags</i>] [—] [<i>client-program-args</i>]
x86	b [<i>file</i>] [- <i>f</i>] [-D <i>default-file</i>] [<i>boot-args</i>] i
DESCRIPTION	Bootstrapping is the process of loading and executing a standalone program. For the purpose of this discussion, bootstrapping means the process of loading and executing the bootable operating system. Typically, the standalone program is the operating system kernel (see <code>kernel(1M)</code>), but any standalone program can be booted instead. On a SPARC-based system, the diagnostic monitor for a machine is a good example of a standalone program other than the operating system that can be booted. If the standalone is identified as a dynamically-linked executable, <code>boot</code> will load the interpreter (linker/loader) as indicated by the executable format and then transfer control to the interpreter. If the standalone is statically-linked, it will jump directly to the standalone. Once the kernel is loaded, it starts the UNIX system, mounts the necessary file systems (see <code>vfstab(4)</code>), and runs <code>/sbin/init</code> to bring the system to the "initdefault" state specified in <code>/etc/inittab</code>. See <code>inittab(4)</code>. SPARC Bootstrap Procedure On SPARC based systems, the bootstrap procedure on most machines consists of the following basic phases. After the machine is turned on, the system firmware (in PROM) executes power-on self-test (POST). The form and scope of these tests depends on the version of the firmware in your system. After the tests have been completed successfully, the firmware attempts to autoboot if the appropriate flag has been set in the non-volatile storage area used by the firmware. The name of the file to load, and the device to load it from can also be manipulated. These flags and names can be set using the <code>eeeprom(1M)</code> command from the shell, or by using PROM commands from the <code>ok</code> prompt after the system has been halted. The second level program is either <code>ufsboot</code> (when booting from a disk), or <code>inetboot</code> or <code>wanboot</code> (when booting across the network). Network Booting Network booting occurs in two steps: the client first obtains an IP address and any other parameters necessary to permit it to load the second-stage booter. The second-stage booter in turn loads the UNIX kernel.

An IP address can be obtained in one of three ways: RARP, DHCP, or manual configuration, depending on the functions available in and configuration of the PROM. Machines of the sun4u kernel architecture have DHCP-capable PROMs.

The boot command syntax for specifying the two methods of network booting are:

```
boot net:rarp
boot net:dhcp
```

The command:

```
boot net
```

without a rarp or dhcp specifier, invokes the default method for network booting over the network interface for which net is an alias.

The sequence of events for network booting using RARP/bootparams is described in the following paragraphs. The sequence for DHCP follows the RARP/bootparams description.

When booting over the network using RARP/bootparams, the PROM begins by broadcasting a reverse ARP request until it receives a reply. When a reply is received, the PROM then broadcasts a TFTP request to fetch the first block of inetboot. Subsequent requests will be sent to the server that initially answered the first block request. After loading, inetboot will also use reverse ARP to fetch its IP address, then broadcast bootparams RPC calls (see bootparams(4)) to locate configuration information and its root file system. inetboot then loads the kernel via NFS and transfers control to it.

When booting over the network using DHCP, the PROM broadcasts the hardware address and kernel architecture and requests an IP address, boot parameters, and network configuration information. After a DHCP server responds and is selected (from among potentially multiple servers), that server sends to the client an IP address and all other information needed to boot the client. After receipt of this information, the client PROM examines the name of the file to be loaded, and will behave in one of two ways, depending on whether the file's name appears to be an HTTP URL. If it does not, the PROM downloads inetboot, loads that file into memory, and executes it. inetboot invokes the kernel, which loads the files it needs and releases inetboot. Startup scripts then initiate the DHCP agent (see dhcpagent(1M)), which implements further DHCP activities.

If the file to be loaded is an HTTP URL, the PROM will use HTTP to load the referenced file. If the client has been configured with an HMAC SHA-1 key, it will check the integrity of the loaded file before proceeding to execute it. The file is expected to be the wanboot binary. When wanboot begins executing, it will determine whether sufficient information is available to it to allow it to proceed. If any necessary information is missing, it will either exit with an appropriate error or bring up a command interpreter and prompt for further configuration information. Once wanboot has obtained the necessary information, it will load its boot file system into memory by means of HTTP. If an encryption key has been installed on the client,

boot(1M)

wanboot will decrypt the file system image and its accompanying hash (presence of an encryption key but no hashing key is an error), then verify the hash. The boot file system contains various configuration data needed to allow wanboot to set the correct time and proceed to obtain a root file system.

The boot file system is examined to determine whether wanboot should use HTTP or secure HTTP. If the former, and if the client has been configured with an HMAC SHA-1 key, wanboot will perform an integrity check of the root file system. Once the root file system has been loaded into memory (and possibly had an integrity check performed), wanboot loads and executes UNIX from it. If provided with a `boot_logger` URL by means of the `wanboot.conf(4)` file, wanboot will periodically log its progress.

Not all PROMs are capable of consuming URLs. You can determine whether a client is so capable using the `list-security-keys OBP` command (see `monitor(1M)`).

WAN booting is not currently available on the x86 platform.

The wanboot Command Line

When the client program is wanboot, it accepts `client-program-args` of the form:

```
boot ... -o opt1[,opt2[,...]]
```

where each option may be an action:

`dhcp`

Require wanboot to obtain configuration parameters by means of DHCP.

`prompt`

Cause wanboot to enter its command interpreter.

`<cmd>`

One of the interpreter commands listed below.

...or an assignment, using the interpreter's parameter names listed below.

The wanboot Command Interpreter

The wanboot command interpreter is invoked by supplying a `client-program-args` of `"-o prompt"` when booting. Input consists of single commands or assignments, or a comma-separated list of commands or assignments. The configuration parameters are:

`host-ip`

IP address of the client (in dotted-decimal notation)

`router-ip`

IP address of the default router (in dotted-decimal notation)

`subnet-mask`

subnet mask (in dotted-decimal notation)

`client-id`

DHCP client identifier (a quoted ASCII string or hex ASCII)

`hostname`

hostname to request in DHCP transactions (ASCII)

`http-proxy`

HTTP proxy server specification (IPADDR[:PORT])

The key names are:

`3des`

the triple DES encryption key (48 hex ASCII characters)

`aes`

the AES encryption key (32 hex ASCII characters)

`sha1`

the HMAC SHA-1 signature key (40 hex ASCII characters)

Finally, the URL or the WAN boot CGI is referred to by means of:

`bootserver`

URL of WAN boot's CGI (the equivalent of OBP's `file` parameter)

The interpreter accepts the following commands:

`help`

Print a brief description of the available commands

`var=val`

Assign *val* to *var*, where *var* is one of the configuration parameter names, the key names, or `bootserver`.

`var=`

Unset parameter *var*.

`list`

List all parameters and their values (key values retrieved by means of OBP are never shown).

`prompt`

Prompt for values for unset parameters. The name of each parameter and its current value (if any) is printed, and the user can accept this value (press Return) or enter a new value.

`go`

Once the user is satisfied that all values have been entered, leave the interpreter and continue booting.

`exit`

Quit the boot interpreter and return to OBP's `ok` prompt.

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OpenBoot PROM boot Command Behavior

Any of these assignments or commands can be passed on the command line as part of the `-o` options, subject to the OBP limit of 128 bytes for boot arguments. For example, `-o list,go` would simply list current (default) values of the parameters and then continue booting.

Booting from Disk

When booting from disk (or disk-like device), the bootstrapping process consists of two conceptually distinct phases, primary boot and secondary boot. In the primary boot phase, the PROM loads the primary boot block from blocks 1 to 15 of the disk partition selected as the boot device.

If the pathname to the standalone is relative (does not begin with a slash), the second level boot will look for the standalone in a platform-dependent search path. This path is guaranteed to contain `/platform/platform-name`. Many SPARC platforms next search the platform-specific path entry `/platform/hardware-class-name`. See `filesystem(5)`. If the pathname is absolute, boot will use the specified path. The boot program then loads the standalone at the appropriate address, and then transfers control.

If the filename is not given on the command line or otherwise specified, for example, by the `boot-file` NVRAM variable, boot chooses an appropriate default file to load based on what software is installed on the system, the capabilities of the hardware and firmware, and on a user configurable policy file (see `FILES`, below).

The OpenBoot `boot` command takes arguments of the following form:

```
ok boot [device-specifier] [arguments]
```

The default `boot` command has no arguments:

```
ok boot
```

If no *device-specifier* is given on the `boot` command line, OpenBoot typically uses the *boot-device* or *diag-device* NVRAM variable. If no optional *arguments* are given on the command line, OpenBoot typically uses the *boot-file* or *diag-file* NVRAM variable as default `boot` arguments. (If the system is in diagnostics mode, *diag-device* and *diag-file* are used instead of *boot-device* and *boot-file*).

arguments may include more than one string. All *argument* strings are passed to the secondary booter; they are not interpreted by OpenBoot.

If any *arguments* are specified on the `boot` command line, then neither the *boot-file* nor the *diag-file* NVRAM variable is used. The contents of the NVRAM variables are not merged with command line arguments. For example, the command:

```
ok boot -s
```

ignores the settings in both *boot-file* and *diag-file*; it interprets the string `"-s"` as *arguments*. boot will not use the contents of *boot-file* or *diag-file*.

With older PROMs, the command:

```
ok boot net
```

took no arguments, using instead the settings in *boot-file* or *diag-file* (if set) as the default file name and arguments to pass to boot. In most cases, it is best to allow the `boot` command to choose an appropriate default based upon the system type, system hardware and firmware, and upon what is installed on the root file system. It is accepted practice to augment the `boot` command's policy by modifying the policy file; however, changing *boot-file* or *diag-file* may generate unexpected results in certain circumstances.

This behavior is found on most OpenBoot 2.x and 3.x based systems. Note that differences may occur on some platforms.

The command:

```
ok boot cdrom
```

...also normally takes no arguments. Accordingly, if *boot-file* is set to the 64-bit kernel filename and you attempt to boot the installation CD with `boot cdrom`, boot will fail if the installation CD contains only a 32-bit kernel.

Because the contents of *boot-file* or *diag-file* can be ignored depending on the form of the `boot` command used, reliance upon *boot-file* should be discouraged for most production systems. To change the OS policy, change the policy file. A significant exception is when a production system has both 32-bit and 64-bit packages installed, but the production system requires use of the 32-bit OS.

When executing a WAN boot from a local (CD) copy of wanboot, one must use:

```
ok boot cdrom -F wanboot - install
```

Modern PROMs have enhanced the network boot support package to support the following syntax for arguments to be processed by the package:

```
[protocol,] [key=value,]*
```

All arguments are optional and can appear in any order. Commas are required unless the argument is at the end of the list. If specified, an argument takes precedence over any default values, or, if booting using DHCP, over configuration information provided by a DHCP server for those parameters.

protocol, above, specifies the address discovery protocol to be used.

Configuration parameters, listed below, are specified as *key=value* attribute pairs.

```
tftp-server
```

IP address of the TFTP server

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`file`
file to download using TFTP or URL for WAN boot

`host-ip`
IP address of the client (in dotted-decimal notation)

`router-ip`
IP address of the default router

`subnet-mask`
subnet mask (in dotted-decimal notation)

`client-id`
DHCP client identifier

`hostname`
hostname to use in DHCP transactions

`http-proxy`
HTTP proxy server specification (IPADDR[:PORT])

`tftp-retries`
maximum number of TFTP retries

`dhcp-retries`
maximum number of DHCP retries

The list of arguments to be processed by the network boot support package is specified in one of two ways:

- As arguments passed to the package's open method, or
- arguments listed in the NVRAM variable `network-boot-arguments`.

Arguments specified in `network-boot-arguments` will be processed only if there are no arguments passed to the package's open method.

Argument Values

protocol specifies the address discovery protocol to be used. If present, the possible values are `rarp` or `dhcp`.

If other configuration parameters are specified in the new syntax and style specified by this document, absence of the *protocol* parameter implies manual configuration.

If no other configuration parameters are specified, or if those arguments are specified in the positional parameter syntax currently supported, the absence of the *protocol* parameter causes the network boot support package to use the platform-specific default address discovery protocol.

Manual configuration requires that the client be provided its IP address, the name of the boot file, and the address of the server providing the boot file image. Depending on the network configuration, it might be required that `subnet-mask` and `router-ip` also be specified.

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If the *protocol* argument is not specified, the network boot support package uses the platform-specific default address discovery protocol.

tftp-server is the IP address (in standard IPv4 dotted-decimal notation) of the TFTP server that provides the file to download if using TFTP.

When using DHCP, the value, if specified, overrides the value of the TFTP server specified in the DHCP response.

The TFTP RRQ is unicast to the server if one is specified as an argument or in the DHCP response. Otherwise, the TFTP RRQ is broadcast.

file specifies the file to be loaded by TFTP from the TFTP server, or the URL if using HTTP. The use of HTTP is triggered if the file name is a URL, that is, the file name starts with `http:` (case-insensitive).

When using RARP and TFTP, the default file name is the ASCII hexadecimal representation of the IP address of the client, as documented in a preceding section of this document.

When using DHCP, this argument, if specified, overrides the name of the boot file specified in the DHCP response.

When using DHCP and TFTP, the default file name is constructed from the root node's name property, with commas (,) replaced by periods (.).

When specified on the command line, the filename must not contain slashes (/).

The format of URLs is described in RFC 2396. The HTTP server must be specified as an IP address (in standard IPv4 dotted-decimal notation). The optional port number is specified in decimal. If a port is not specified, port 80 (decimal) is implied.

The URL presented must be "safe-encoded", that is, the package does not apply escape encodings to the URL presented. URLs containing commas must be presented as a quoted string. Quoting URLs is optional otherwise.

host-ip specifies the IP address (in standard IPv4 dotted-decimal notation) of the client, the system being booted. If using RARP as the address discovery protocol, specifying this argument makes use of RARP unnecessary.

If DHCP is used, specifying the *host-ip* argument causes the client to follow the steps required of a client with an "Externally Configured Network Address", as specified in RFC 2131.

router-ip is the IP address (in standard IPv4 dotted-decimal notation) of a router on a directly connected network. The router will be used as the first hop for communications spanning networks. If this argument is supplied, the router specified here takes precedence over the preferred router specified in the DHCP response.

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`subnet-mask` (specified in standard IPv4 dotted-decimal notation) is the subnet mask on the client's network. If the subnet mask is not provided (either by means of this argument or in the DHCP response), the default mask appropriate to the network class (Class A, B, or C) of the address assigned to the booting client will be assumed.

`client-id` specifies the unique identifier for the client. The DHCP client identifier is derived from this value. Client identifiers can be specified as:

- The ASCII hexadecimal representation of the identifier, or
- a quoted string

Thus, `client-id="openboot"` and `client-id=6f70656e626f6f74` both represent a DHCP client identifier of 006F70656E626F6F74.

Identifiers specified on the command line must not include slash (/) or spaces.

The maximum length of the DHCP client identifier is 32 bytes, or 64 characters representing 32 bytes if using the ASCII hexadecimal form. If the latter form is used, the number of characters in the identifier must be an even number. Valid characters are 0-9, a-f, and A-F.

For correct identification of clients, the client identifier must be unique among the client identifiers used on the subnet to which the client is attached. System administrators are responsible for choosing identifiers that meet this requirement.

Specifying a client identifier on a command line takes precedence over any other DHCP mechanism of specifying identifiers.

`hostname` (specified as a string) specifies the hostname to be used in DHCP transactions. The name might or might not be qualified with the local domain name. The maximum length of the hostname is 255 characters.

Note – The `hostname` parameter can be used in service environments that require that the client provide the desired hostname to the DHCP server. Clients provide the desired hostname to the DHCP server, which can then register the hostname and IP address assigned to the client with DNS.

`http-proxy` is specified in the following standard notation for a host:

```
host [ ":" port ]
```

...where *host* is specified as an IP address (in standard IPv4 dotted-decimal notation) and the optional *port* is specified in decimal. If a port is not specified, port 8080 (decimal) is implied.

`tftp-retries` is the maximum number of retries (specified in decimal) attempted before the TFTP process is determined to have failed. Defaults to using infinite retries.

`dhcp-retries` is the maximum number of retries (specified in decimal) attempted before the DHCP process is determined to have failed. Defaults to using infinite retries.

x86 Bootstrap Procedure

On x86 based systems, the bootstrapping process consists of two conceptually distinct phases, primary boot and secondary boot. The primary boot is implemented in the BIOS ROM on the system board, and BIOS extensions in ROMs on peripheral boards. It is distinguished by its ability to control the installed peripheral devices and to provide I/O services through software interrupts. It begins the booting process by loading the first physical sector from a floppy disk, hard disk, or CD-ROM, or, if supported by the system or network adapter BIOS, by reading a bootstrap program from a network boot server. The primary boot is implemented in x86 real-mode code.

The secondary boot is loaded by the primary boot. It is implemented in 32-bit, paged, protected mode code. It also loads and uses peripheral-specific BIOS extensions written in x86 real-mode code. The secondary boot is called `boot.bin` and is capable of reading and booting from a UFS file system on a hard disk or a CD or by way of a LAN using the NFS protocol.

The secondary boot is responsible for running the Configuration Assistant program which determines the installed devices in the system (possibly with help from the user). The secondary boot then reads the script in `/etc/bootrc`, which controls the booting process. This file contains `boot` interpreter commands, which are defined below, and can be modified to change defaults or to adapt to a specific machine.

The standard `/etc/bootrc` script prompts the user to enter a `b` character to boot with specified options, or an `i` character to invoke the interpreter interactively. Pressing ENTER without entering a character boots the default kernel. All other responses are considered errors and cause the script to restart.

Once the kernel is loaded, it starts the operating system, loads the necessary modules, mounts the necessary file systems (see `vfstab(4)`), and runs `/sbin/init` to bring the system to the “initdefault” state specified in `/etc/inittab`. See `inittab(4)`.

OPTIONS**SPARC**

The following SPARC options are supported:

- a The boot program interprets this flag to mean *ask me*, and so it prompts for the name of the standalone. The `'-a'` flag is then passed to the standalone program.
- D *default-file* Explicitly specify the *default-file*. On some systems, `boot` chooses a dynamic default file, used when none is otherwise specified. This option allows the *default-file* to be explicitly set and can be useful when booting `kadb(1M)` since, by default, `kadb` loads the *default-file* as exported by the `boot` program.
- f When booting an Autoclient system, this flag forces the boot program to bypass the client's local cache and read all files over the network from the client's file

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	server. This flag is ignored for all non-Autoclient systems. The <code>-f</code> flag is then passed to the standalone program.
<code>-V</code>	Display verbose debugging information.
<code>boot-flags</code>	The boot program passes all <i>boot-flags</i> to <i>file</i> . They are not interpreted by <i>boot</i> . See the <i>kernel(1M)</i> and <i>kadb(1M)</i> manual pages for information about the options available with the default standalone program.
<code>client-program-args</code>	The boot program passes all <i>client-program-args</i> to <i>file</i> . They are not interpreted by <i>boot</i> .
<code>file</code>	Name of a standalone program to boot. If a filename is not explicitly specified, either on the <i>boot</i> command line or in the <i>boot-file</i> NVRAM variable, <i>boot</i> chooses an appropriate default filename. On most systems, the default filename is the 32-bit kernel. On systems capable of supporting both the 32-bit and 64-bit kernels, the 64-bit kernel will be chosen in preference to the 32-bit kernel. <i>boot</i> chooses an appropriate default <i>file</i> to boot based on what software is installed on the system, the capabilities of the hardware and firmware, and on a user configurable policy file.
<code>OBP names</code>	Specify the open boot prom designations. For example, on Desktop SPARC based systems, the designation <code>/sbus/esp@0,800000/sd@3,0:a</code> indicates a SCSI disk (sd) at target 3, lun0 on the SCSI bus, with the esp host adapter plugged into slot 0.
x86	The following x86 options are supported:
<code>-D default-file</code>	Explicitly specify the <i>default-file</i> . On some systems, <i>boot</i> chooses a dynamic default file, used when none is otherwise specified. This option allows the <i>default-file</i> to be explicitly set and can be useful when booting <i>kadb(1M)</i> since, by default, <i>kadb</i> loads the default-file as exported by the <i>boot</i> program.
<code>-f</code>	When booting an Autoclient system, this flag forces the boot program to bypass the client's local cache and read all files over the network from the client's file server. This flag is ignored for all non-Autoclient systems. The <code>-f</code> flag is then passed to the standalone program.
<code>boot-args</code>	The boot program passes all <i>boot-args</i> to <i>file</i> . They are not interpreted by <i>boot</i> . See <i>kernel(1M)</i> and <i>kadb(1M)</i> for information about the options available with the kernel.

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x86 BOOT SEQUENCE DETAILS

file Name of a standalone program to boot. The default is to boot `/platform/platform-name/kernel/unix` from the root partition, but you can specify another program on the command line.

After a PC-compatible machine is turned on, the system firmware in the BIOS ROM executes a power-on self test (POST), runs BIOS extensions in peripheral board ROMs, and invokes software interrupt INT 19h, Bootstrap. The INT 19h handler typically performs the standard PC-compatible boot, which consists of trying to read the first physical sector from the first diskette drive, or, if that fails, from the first hard disk. The processor then jumps to the first byte of the sector image in memory.

x86 Primary Boot

The first sector on a floppy disk contains the master boot block. The boot block is responsible for loading the image of the boot loader `strap.com`, which then loads the secondary boot, `boot.bin`. A similar sequence occurs for CD-ROM boot, but the master boot block location and contents are dictated by the El Torito specification. The El Torito boot also leads to `strap.com`, which in turn loads `boot.bin`.

The first sector on a hard disk contains the master boot block, which contains the master boot program and the FDISK table, named for the PC program that maintains it. The master boot finds the active partition in the FDISK table, loads its first sector, and jumps to its first byte in memory. This completes the standard PC-compatible hard disk boot sequence.

An x86 FDISK partition for the Solaris software begins with a one-cylinder boot slice, which contains the partition boot program (`pboot`) in the first sector, the standard Solaris disk label and volume table of contents (VTOC) in the second and third sectors, and the `bootblk` program in the fourth and subsequent sectors. When the FDISK partition for the Solaris software is the active partition, the master boot program (`mboot`) reads the partition boot program in the first sector into memory and jumps to it. It in turn reads the `bootblk` program into memory and jumps to it. Regardless of the type of the active partition, if the drive contains multiple FDISK partitions, the user is given the opportunity to reboot another partition.

`bootblk` or `strap.com` (depending upon the active partition type) reads `boot.bin` from the file system in the Solaris root slice and jumps to its first byte in memory.

For network booting, you have the choice of the boot floppy or Intel's Preboot eXecution Environment (PXE) standard. When booting from the network using the boot floppy, you can select which network configuration strategy you want by editing the boot properties, changing the setting for `net-config-strategy`. By default, `net-config-strategy` is set to `rarp`. It can have two settings, `rarp` or `dhcp`. When booting from the network using PXE, the system or network adapter BIOS uses DHCP to locate a network bootstrap program (NBP) on a boot server and reads it using Trivial File Transfer Protocol (TFTP). The BIOS executes the NBP by jumping to its first byte in memory. The NBP uses DHCP to locate the secondary bootstrap on a boot server, reads it using TFTP, and executes it.

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x86 Secondary Boot	The secondary boot, <code>boot.bin</code>, switches the processor to 32-bit, paged, protected mode, and performs some limited machine initialization. It runs the <code>Configuration Assistant</code> program which either auto-boots the system, or presents a list of possible boot devices, depending on the state of the <code>auto-boot?</code> variable (see <code>eeprom(1M)</code>). Disk target devices (including CDROM drives) are expected to contain UFS file systems. Network devices can be configured to use either DHCP or Reverse Address Resolution Protocol (RARP) and <code>bootparams</code> RPC to discover the machine's IP address and which server will provide the root file system. The root file system is then mounted using NFS. After a successful root mount, <code>boot.bin</code> invokes a command interpreter, which interprets <code>/etc/bootrc</code>.
Secondary Boot Programming Language for x86	The wide range of hardware that must be supported on x86 based systems demands great flexibility in the booting process. This flexibility is achieved in part by making the secondary boot programmable. The secondary boot contains an interpreter that accepts a simple command language similar to those of <code>sh</code> and <code>csh</code>. The primary differences are that pipelines, loops, standard output, and output redirection are not supported.
x86 Lexical Structure	The boot interpreter splits input lines into words separated by blanks and tabs. The metacharacters are dollar sign (<code>\$</code>), single-quote (<code>'</code>), double-quote (<code>"</code>), number sign (<code>#</code>), new-line, and backslash (<code>\</code>). The special meaning of metacharacters can be avoided by preceding them with a backslash. A new-line preceded by a backslash is treated as a blank. A number sign introduces a comment, which continues to the next new-line. A string enclosed in a pair of single-quote or double-quote characters forms all or part of a single word. White space and new-line characters within a quoted string become part of the word. Characters within a quoted string can be quoted by preceding them with a backslash character; thus a single-quote character can appear in a single-quoted string by preceding it with a backslash. Two backslashes produce a single backslash, and a new-line preceded by a backslash produces a new-line in the string.
x86 Variables	The boot maintains a set of variables, each of which has a string value. The first character of a variable name must be a letter, and subsequent characters can be letters, digits, or underscores. The <code>set</code> command creates a variable and/or assigns a value to it, or displays the values of variables. The <code>unset</code> command deletes a variable. Variable substitution is performed when the interpreter encounters a dollar-sign that is not preceded by a backslash. The variable name following the dollar sign is replaced by the value of the variable, and parsing continues at the beginning of the value. Variable substitution is performed in double-quoted strings, but not in single-quoted strings. A variable name can be enclosed in braces to separate it from following characters.
x86 Commands	A command is a sequence of words terminated by a new-line character. The first word is the name of the command and subsequent words are arguments to the command. All commands are built-in commands. Standalone programs are executed with the <code>run</code> command.

x86 Conditional Execution of Commands

Commands can be conditionally executed by surrounding them with the `if`, `elseif`, `else`, and `endif` commands:

```
if expr1
. . .
elseif expr2
. . .
elseif expr3
. . .
else
. . .
endif
```

An `if` block may be embedded in other `if` blocks.

x86 Expressions

The `set`, `if`, and `elseif` commands evaluate arithmetic expressions with the syntax and semantics of the C programming language. The `|`, `&&`, `|`, `^`, `&`, `==`, `!=`, `<`, `>`, `<=`, `>=`, `>>`, `<<`, `+`, `-`, `*`, `/`, `%`, `~`, and `!` operators are accepted, as are `(`, `)`, and comma. Signed 32-bit integer arithmetic is performed.

Expressions are parsed after the full command line has been formed. Each token in an expression must be a separate argument word, so blanks must separate all tokens on the command line.

Before an arithmetic operation is performed on an operand word, it is converted from a string to a signed 32-bit integer value. After an optional leading sign, a leading `0` produces octal conversion and a leading `0x` or `0X` produces hexadecimal conversion. Otherwise, decimal conversion is performed. A string that is not a legal integer is converted to zero.

Several built-in functions for string manipulation are provided. Built-in function names begin with a dot. String arguments to these functions are not converted to integers. To cause an operator, for example, `-`, to be treated as a string, it must be preceded by a backslash, and that backslash must be quoted with another backslash. Also be aware that a null string can produce a blank argument, and thus an expression syntax error. For example:

```
if .strneq ( ${usrarg}X , \- , 1 )
```

is the safe way to test whether the variable `usrarg` starts with a `-`, even if it could be null.

x86 I/O

The boot interpreter takes its input from the system console or from one or more files. The `source` command causes the interpreter to read a file into memory and begin parsing it. The `console` command causes the interpreter to take its input from the system console. Reaching EOF causes the interpreter to resume parsing the previous input source. CTRL-D entered at the beginning of console line is treated as EOF.

The `echo` command writes its arguments to the display. The `read` command reads the system console and assigns word values to its argument variables.

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x86 Debugging	The <code>verbose</code> command turns verbose mode on and off. In verbose mode, the interpreter displays lines from the current source file and displays the command as actually executed after variable substitution. The <code>singlestep</code> command turns singlestep mode on and off. In singlestep mode, the interpreter displays <code>step ?</code> before processing the next command, and waits for keyboard input, which is discarded. Processing proceeds when ENTER is pressed. This allows slow execution in verbose mode.
x86 Initialization	When the interpreter is first invoked by the <code>boot</code>, it begins execution of a compiled-in initialization string. This string typically consists of <code>"source /etc/bootrc\n"</code> to run the boot script in the root file system.
x86 Communication With Standalone Programs	The boot passes information to standalone programs through arguments to the <code>run</code> command. A standalone program can pass information back to the boot by setting a boot interpreter variable using the <code>var_ops()</code> boot service function. It can also pass information to the kernel using the <code>setprop()</code> boot service function. The <code>whoami</code> property is set to the name of the standalone program.
x86 Built-in Commands	<code>console</code> Interpret input from the console until CTRL-D. <code>echo arg1 ...</code> Display the arguments separated by blanks and terminate with a new-line. <code>echo -n arg1 ...</code> Display the arguments separated by blanks, but do not terminate with a new-line. <code>getprop propname varname</code> Assign the value of property <i>propname</i> to the variable <i>varname</i>. A property value of length zero produces a null string. If the property does not exist, the variable is not set. <code>getproplen propname varname</code> Assign the length in hexadecimal of the value of property <i>propname</i> to the variable <i>varname</i>. Property value lengths include the terminating null. If the property does not exist, the variable is set to 0xFFFFFFFF (-1). <code>if expr</code> If the expression <i>expr</i> is true, execute instructions to the next <code>elseif</code>, <code>else</code>, or <code>endif</code>. If <i>expr</i> is false, do not execute the instructions. <code>elseif expr</code> If the preceding <code>if</code> and <code>elseif</code> commands all failed, and <i>expr</i> is true, execute instructions to the next <code>elseif</code>, <code>else</code>, or <code>endif</code>. Otherwise, do not execute the instructions. <code>else</code> If the preceding <code>if</code> and <code>elseif</code> commands all failed, execute instructions to the next <code>elseif</code>, <code>else</code>, or <code>endif</code>. Otherwise, do not execute the instructions.

```

endif
    Revert to the execution mode of the surrounding block.

help
    Display a help screen that contains summaries of all available boot shell
    commands.

read name1 ...
    Read a line from the console, break it into words, and assign them as values to the
    variables name1, and so forth.

readt time ...
    Same as read, but timeout after time seconds.

run name arg1 ...
    Load and transfer control to the standalone program name, passing it arg1 and
    further arguments.

set
    Display all the current variables and their values.

set name
    Set the value of the variable name to the null string.

set name word
    Set the value of the variable name to word.

set name expr
    Set the value of the variable name to the value of expr. expr must consist of more
    than one word. The value is encoded in unsigned hexadecimal, so that -1 is
    represented by 0xFFFFFFFF.

setcolor
    Set the text mode display attributes. Allowable colors are black, blue, green, cyan,
red, magenta, brown, white, gray, lt_blue, lt_green, lt_cyan, lt_red, lt_magenta, yellow,
    and hi_white.

setprop propname word
    Set the value of the property propname to word.

singlestep or singlestep on
    Turn on singlestep mode, in which the interpreter displays step ? before each
    command is processed, and waits for keyboard input. Press ENTER to execute the
    next command.

singlestep off
    Turn off singlestep mode.

source name
    Read the file name into memory and begin to interpret it. At EOF, return to the
    previous source of input.

unset name
    Delete the variable name.

```

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	verbose or verbose on Turn on verbose mode, which displays lines from source files and commands to be executed.
	verbose off Turn off verbose mode.
x86 Built-in Functions	The following built-in functions are accepted within expressions: <code>.strcmp(string1, string2)</code> Returns an integer value that is less than, equal to, or greater than zero, as <i>string1</i> is lexicographically less than, equal to, or greater than <i>string2</i>. <code>.strncmp(string1, string2, n)</code> Returns an integer value that is less than, equal to, or greater than zero, as <i>string1</i> is lexicographically less than, equal to, or greater than <i>string2</i>. At most, <i>n</i> characters are compared. <code>.streq(string1, string2)</code> Returns true if <i>string1</i> is equal to <i>string2</i>, and false otherwise. <code>.strneq(string1, string2, n)</code> Returns true if <i>string1</i> is equal to <i>string2</i>, and false otherwise. At most, <i>n</i> characters are compared. <code>.strfind(string, addr, n)</code> Scans <i>n</i> locations in memory starting at <i>addr</i>, looking for the beginning of <i>string</i>. The <i>string</i> in memory need not be null-terminated. Returns true if <i>string</i> is found, and false otherwise. <code>.strfind</code> can be used to search for strings in the ROM BIOS and BIOS extensions that identify different machines and peripheral boards.
EXAMPLES	
SPARC	EXAMPLE 1 To Boot the Default Kernel In Single-User Interactive Mode To boot the default kernel in single-user interactive mode, respond to the ok prompt with one of the following: <pre>boot -as</pre> <pre>boot disk3 -as</pre>
32-bit SPARC	EXAMPLE 2 To Boot kadb Specifying The 32-Bit Kernel As The Default File To boot kadb specifying the 32-bit kernel as the default file: <pre>boot kadb -D kernel/unix</pre>

EXAMPLE 2 To Boot kadb Specifying The 32-Bit Kernel As The Default File (Continued)

EXAMPLE 3 To Boot the 32-Bit Kernel Explicitly

To boot the 32-bit kernel explicitly, the kernel file name should be specified. So, to boot the 32-bit kernel in single-user interactive mode, respond to the ok prompt with one of the following:

```
boot kernel/unix -as
boot disk3 kernel/unix -as
```

64-bit SPARC

EXAMPLE 4 To Boot the 64-Bit Kernel Explicitly

To boot the 64-bit kernel explicitly, the kernel file name should be specified. So, to boot the 64-bit kernel in single-user interactive mode, respond to the ok prompt with one of the following:

```
boot kernel/sparcv9/unix -as
boot disk3 kernel/sparcv9/unix -as
```

Refer to the NOTES section "Booting UltraSPARC Systems" before booting the 64-bit kernel using an explicit filename.

EXAMPLE 5 Network Booting with WAN Boot-Capable PROMs

To illustrate some of the subtle repercussions of various boot command line invocations, assume that the `network-boot-arguments` are set and that `net` is devaliased as shown in the commands below.

In the following command, device arguments in the device alias are processed by the device driver. The network boot support package processes arguments in `network-boot-arguments`.

```
boot net
```

The command below results in no device arguments. The network boot support package processes arguments in `network-boot-arguments`.

```
boot net:
```

The command below results in no device arguments. `rarp` is the only network boot support package argument. `network-boot-arguments` is ignored.

```
boot net:rarp
```

In the command below, the specified device arguments are honored. The network boot support package processes arguments in `network-boot-arguments`.

```
boot net:speed=100,duplex=full
```

boot(1M)

EXAMPLE 6 Using wanboot with Older PROMs

The command below results in the wanboot binary being loaded from CD-ROM, at which time wanboot will perform DHCP and then drop into its command interpreter to allow the user to enter keys and any other necessary configuration.

```
boot cdrom -F wanboot -o dhcp,prompt
```

x86 EXAMPLE 7 To Boot the Default Kernel In Single-User Interactive Mode

To boot the default kernel in single-user interactive mode, respond to the > prompt with one of the following:

```
b -as
```

```
b kernel/unix -as
```

FILES

/platform/*platform-name*/ufsboot

second level program to boot from a disk or CD.

/etc/inittab

table in which the "initdefault" state is specified.

/sbin/init

program that brings the system to the "initdefault" state.

/platform/*platform-name*/boot.conf

/platform/*hardware-class-name*/boot.conf

Primary and alternate pathnames for the boot policy file. Note that the policy file is not implemented on all platforms.

32-bit SPARC and x86

/platform/*platform-name*/kernel/unix

default program to boot system.

64-bit SPARC only

/platform/*platform-name*/kernel/sparcv9/unix

default program to boot system.

See NOTES section "Booting UltraSPARC Systems."

x86 Only

/etc/bootrc

script that controls the booting process.

/platform/*platform-name*/boot/solaris/boot.bin

second level boot program used on x86 systems in place of ufsboot.

/platform/*platform-name*/boot

directory containing boot-related files.

SEE ALSO

uname(1), eeprom(1M), init(1M), installboot(1M), kadb(1M), kernel(1M), monitor(1M), shutdown(1M), uadmin(2), bootparams(4), inittab(4), vfstab(4), wanboot.conf(4), filesystem(5)

RFC 903, *A Reverse Address Resolution Protocol*,

<http://www.ietf.org/rfc/rfc903.txt>

RFC 2131, *Dynamic Host Configuration Protocol*,
<http://www.ietf.org/rfc/rfc2131.txt>

RFC 2132, *DHCP Options and BOOTP Vendor Extensions*,
<http://www.ietf.org/rfc/rfc2132.txt>

RFC 2396, *Uniform Resource Identifiers (URI): Generic Syntax*,
<http://www.ietf.org/rfc/rfc2396.txt>

System Administration Guide: Basic Administration

Sun Hardware Platform Guide

OpenBoot Command Reference Manual

WARNINGS The boot utility is unable to determine which files can be used as bootable programs. If the booting of a file that is not bootable is requested, the boot utility loads it and branches to it. What happens after that is unpredictable.

NOTES *platform-name* can be found using the -i option of uname(1). *hardware-class-name* can be found using the -m option of uname(1).

64-bit SPARC

Booting UltraSPARC Systems

Certain platforms may need a firmware upgrade to run the 64-bit kernel. See the *Sun Hardware Platform Guide* for details. If the 64-bit kernel packages are installed and boot detects that the platform needs a firmware upgrade to run 64-bit, boot displays a message on the console and chooses the 32-bit kernel as the default file instead.

On systems containing 200MHz or lower UltraSPARC-1 processors, it is possible for a user to run a 64-bit program designed to exploit a problem that could cause a processor to stall. Because 64-bit programs cannot run on the 32-bit kernel, the 32-bit kernel is chosen as the default file on these systems.

The code sequence that exploits the problem is very unusual and is not likely to be generated by a compiler. Assembler code had to be specifically written to demonstrate the problem. It is highly unlikely that a legitimate handwritten assembler routine would use this code sequence.

Users willing to assume the risk that a user might accidentally or deliberately run a program that was designed to cause a processor to stall may choose to run the 64-bit kernel by modifying the boot policy file. Edit `/platform/platform-name/boot.conf` so that it contains an uncommented line with the variable named `ALLOW_64BIT_KERNEL_ON_UltraSPARC_1_CPU` set to the value `true` as shown in the example that follows:

```
ALLOW_64BIT_KERNEL_ON_UltraSPARC_1_CPU=true
```

For more information, see the *Sun Hardware Platform Guide*.

boot(1M)

x86 Only | Because the “-” key on national language keyboards has been moved, an alternate key must be used to supply arguments to the `boot` command on an x86 based system using these keyboards. Use the “-” on the numeric keypad. The specific language keyboard and the alternate key to be used in place of the “-” during bootup is shown below.

Keyboard	Substitute Key
Italy	'
Spain	'
Sweden	+
France	?
Germany	?

For example, `b -r` would be typed as `b +r` on Swedish keyboards, although the screen display will show as `b -r`.

NAME	bootconfchk – verify the integrity of a network boot configuration file						
SYNOPSIS	<code>/usr/sbin/bootconfchk</code> [<i>bootconf-file</i>]						
DESCRIPTION	The <code>bootconfchk</code> command checks that the file specified is a valid network boot configuration file as described in <code>wanboot.conf(4)</code>. Any discrepancies are reported on standard error.						
EXIT STATUS	0 Successful completion. 1 An error occurred. 2 Usage error.						
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWwbsup</td></tr><tr><td>Interface Stability</td><td>Evolving</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWwbsup	Interface Stability	Evolving
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWwbsup						
Interface Stability	Evolving						
SEE ALSO	<code>wanboot.conf(4)</code> , <code>attributes(5)</code>						

bsmconv(1M)

NAME	bsmconv, bsmunconv – enable or disable the Basic Security Module (BSM) on Solaris				
SYNOPSIS	<pre>/etc/security/bsmconv [rootdir...] /etc/security/bsmunconv [rootdir...]</pre>				
DESCRIPTION	The <code>bsmconv</code> and <code>bsmunconv</code> scripts are used to enable or disable the BSM features on a Solaris system. The optional argument <i>rootdir</i> is a list of one or more root directories of diskless clients which have already been configured by way of the Host Manager, see <code>admintool(1M)</code> To enable or disable BSM on a diskless client, a server, or a stand-alone system, logon as super-user to the system being converted and use the <code>bsmconv</code> or <code>bsmunconv</code> commands without any options. To enable or disable BSM on a diskless client from that client's server, logon to the server as super-user and use <code>bsmconv</code>, specifying the root directory of each diskless client you wish to affect. For example, the command: <pre>myhost# bsmconv /export/root/client1 /export/root/client2</pre> enables BSM on the two machines named <code>client1</code> and <code>client2</code>. While the command: <pre>myhost# bsmconv</pre> enables BSM only on the machine called <code>myhost</code>. It is no longer necessary to enable BSM on both the server and its diskless clients. After running <code>bsmconv</code> the system can be configured by editing the files in <code>/etc/security</code>. Each diskless client has its own copy of configuration files in its root directory. You might want to edit these files before rebooting each client. Following the completion of either script, the affected system(s) should be rebooted to allow the auditing subsystem to come up properly initialized.				
FILES	The following files are created by <code>bsmconv</code>: <table><tr><td><code>/etc/security/device_maps</code></td><td>Administrative file defining the mapping of device special files to allocatable device names.</td></tr><tr><td><code>/etc/security/device_allocate</code></td><td>Administrative file defining parameters for device allocation.</td></tr></table>	<code>/etc/security/device_maps</code>	Administrative file defining the mapping of device special files to allocatable device names.	<code>/etc/security/device_allocate</code>	Administrative file defining parameters for device allocation.
<code>/etc/security/device_maps</code>	Administrative file defining the mapping of device special files to allocatable device names.				
<code>/etc/security/device_allocate</code>	Administrative file defining parameters for device allocation.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsr</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsr
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsr				

bsmconv(1M)

SEE ALSO admintool(1M), auditconfig(1M), auditd(1M), audit_startup(1M),
audit.log(4), audit_control(4), attributes(5)

h1>bsmrecord(1M)

NAME	bsmrecord – display Solaris audit record formats																
SYNOPSIS	<code>/usr/sbin/bsmrecord [-d] [[-a] [-e <i>string</i>] [-c <i>class</i>] [-i <i>id</i>] [-p <i>programname</i>] [-s <i>systemcall</i>] [-h]]</code>																
DESCRIPTION	The <code>bsmrecord</code> utility displays the event ID, audit class and selection mask, and record format for audit record event types defined in <code>audit_event(4)</code>. You can use <code>bsmrecord</code> to generate a list of all audit record formats, or to select audit record formats based on event class, event name, generating program name, system call name, or event ID. There are two output formats. The default format is intended for display in a terminal window; the optional HTML format is intended for viewing with a web browser.																
OPTIONS	The following options are supported: <table> <tr> <td><code>-a</code></td><td>List all audit records.</td></tr> <tr> <td><code>-c <i>class</i></code></td><td>List all audit records selected by <i>class</i>. <i>class</i> is one of the two-character class codes from the file <code>/etc/security/audit_class</code>.</td></tr> <tr> <td><code>-d</code></td><td>Debug mode. Display number of audit records that are defined in <code>audit_event</code>, the number of classes defined in <code>audit_class</code>, any mismatches between the two files, and report which defined events do not have format information available to <code>bsmrecord</code>.</td></tr> <tr> <td><code>-e <i>string</i></code></td><td>List all audit records for which the event ID label contains the string <i>string</i>. The match is case insensitive.</td></tr> <tr> <td><code>-h</code></td><td>Generate the output in HTML format.</td></tr> <tr> <td><code>-i <i>id</i></code></td><td>List the audit records having the numeric event ID <i>id</i>.</td></tr> <tr> <td><code>-p <i>programname</i></code></td><td>List all audit records generated by the program <i>programname</i>, for example, audit records generated by a user-space program.</td></tr> <tr> <td><code>-s <i>systemcall</i></code></td><td>List all audit records generated by the system call <i>systemcall</i>, for example, audit records generated by a system call.</td></tr> </table> The <code>-p</code> and <code>-s</code> options are different names for the same thing and are mutually exclusive. The <code>-a</code> option is ignored if any of <code>-c</code>, <code>-e</code>, <code>-i</code>, <code>-p</code>, or <code>-s</code> are given. Combinations of <code>-c</code>, <code>-e</code>, <code>-i</code>, and either <code>-p</code> or <code>-s</code> are ANDed together.	<code>-a</code>	List all audit records.	<code>-c <i>class</i></code>	List all audit records selected by <i>class</i> . <i>class</i> is one of the two-character class codes from the file <code>/etc/security/audit_class</code> .	<code>-d</code>	Debug mode. Display number of audit records that are defined in <code>audit_event</code> , the number of classes defined in <code>audit_class</code> , any mismatches between the two files, and report which defined events do not have format information available to <code>bsmrecord</code> .	<code>-e <i>string</i></code>	List all audit records for which the event ID label contains the string <i>string</i> . The match is case insensitive.	<code>-h</code>	Generate the output in HTML format.	<code>-i <i>id</i></code>	List the audit records having the numeric event ID <i>id</i> .	<code>-p <i>programname</i></code>	List all audit records generated by the program <i>programname</i> , for example, audit records generated by a user-space program.	<code>-s <i>systemcall</i></code>	List all audit records generated by the system call <i>systemcall</i> , for example, audit records generated by a system call.
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<code>-s <i>systemcall</i></code>	List all audit records generated by the system call <i>systemcall</i> , for example, audit records generated by a system call.																
EXAMPLES	EXAMPLE 1 Displaying an Audit Record with a Specified Event ID The following example shows how to display the contents of a specified audit record. <pre>% bsmrecord -i 6152 login: terminal login program /usr/sbin/login see login(1)</pre>																

EXAMPLE 1 Displaying an Audit Record with a Specified Event ID (Continued)

```

event ID      6152                AUE_login
class        lo                (0x00001000)
  header-token
  subject-token
  text-token                error message
  exit-token

```

EXAMPLE 2 Displaying an Audit Record with an Event ID Label that Contains a Specified String

The following example shows how to display the contents of a audit record with an event ID label that contains the string login.

```

# bsmrecord -e login
terminal login
  program      /usr/sbin/login      see login(1)
  event ID     6152                AUE_login
  class        lo                (0x00001000)
    header-token
    subject-token
    text-token                error message
    exit-token

rlogin
  program      /usr/sbin/login      see login(1) - rlogin
  event ID     6155                AUE_rlogin
  class        lo                (0x00001000)
    header-token
    subject-token
    text-token                error message
    exit-token

```

EXIT STATUS 0 Successful operation

non- Error
zero

FILES /etc/security/audit_class
Provides the list of valid classes and the associated audit mask.

/etc/security/audit_event
Provides the numeric event ID, the literal event name, and the name of the associated system call or program.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsr

bsmrecord(1M)

ATTRIBUTE TYPE	ATTRIBUTE VALUE
CSI	Enabled
Interface Stability	Unstable

SEE ALSO `audit_class(4)`, `audit_event(4)`, `attributes(5)`

DIAGNOSTICS If unable to read either of its input files or to write its output file, `bsmrecord` shows the name of the file on which it failed and exits with a non-zero return.

If no options are provided, if an invalid option is provided, or if both `-s` and `-p` are provided, an error message is displayed and `bsmrecord` displays a usage message then exits with a non-zero return.

NOTES If `/etc/security/audit_event` has been modified to add user-defined audit events, `bsmrecord` displays the record format as undefined.

NAME	busstat – report bus-related performance statistics
SYNOPSIS	busstat -e <i>device-inst</i> -h -l busstat [-a] [-n] [-w <i>device-inst</i> [,pic0= <i>event</i> ,picn= <i>event</i>]]... [-r <i>device-inst</i>]... [<i>interval</i> [<i>count</i>]]
DESCRIPTION	busstat provides access to the bus-related performance counters in the system. These performance counters allow for the measurement of statistics like hardware clock cycles, bus statistics including DMA and cache coherency transactions on a multiprocessor system. Each bus device that supports these counters can be programmed to count a number of events from a specified list. Each device supports one or more Performance Instrumentation Counters (PIC) that are capable of counting events independently of each other. Separate events can be selected for each PIC on each instance of these devices. busstat summarizes the counts over the last interval seconds, repeating forever. If a count is given, the statistics are repeated count times. Only root users can program these counters. Non-root users have the option of reading the counters that have been programmed by a root user. The default value for the <i>interval</i> argument is 1 second, and the default <i>count</i> is unlimited. The devices that export these counters are highly platform-dependent and the data may be difficult to interpret without an in-depth understanding of the operation of the components that are being measured and of the system they reside in.
OPTIONS	The following options are supported: -a Display absolute counter values. The default is delta values. -e <i>device-inst</i> Display the list of events that the specified device supports for each pic. Specify <i>device-inst</i> as device (name) followed by an optional instance number. If an instance number is specified, the events for that instance are displayed. If no instance number is specified, the events for the first instance of the specified device are displayed. -h Print a usage message. -l List the devices in the system which support performance counters. -n Do not display a title in the output. The default is to display titles. -r <i>device-inst</i> Read and display all pic values for the specified device

busstat(1M)

Specify *device-inst* as *device* (name) followed by *instance number*, if specifying an instance number of a device whose counters are to be read and displayed. If all instances of this device are to be read, use *device* (name) without an instance number. All pic values will be sampled when using the *-r* option.

-w device-inst [*,pic0=event*] [*,picn=event*]

Program (write) the specified devices to count the specified events. Write access to the counters is restricted to root users only. Non-root users can use *-r* option.

Specify *device-inst* as *device* (name) followed by an optional *instance number*. If specifying an instance number of a device to program these events on. If all instances of this device are to be programmed the same, then use *device* without an instance number. Specify an event to be counted for a specified pic by providing a comma separated list of *picn=event* values.

The *-e* option displays all valid event names for each device. Any devices that are programmed will be sampled every interval seconds and repeated count times. It is recommended that the interval specified is small enough to ensure that counter wraparound will be detected. The rate at which counters wraparound varies from device to device. If a user is programming events using the *-w* option and *busstat* detects that another user has changed the events that are being counted, the tool will terminate as the programmed devices are now being controlled by another user. Only one user can be programming a device instance at any one time. Extra devices can be sampled using the *-r* option. Using multiple instances of the *-w* option on the same command line, with the same *device-inst* specifying a different list of events for the pics will give the effect of multiplexing for that device. *busstat* will switch between the list of events for that device every interval seconds. Event can be a string representing the event name, or even a number representing the bit pattern to be programmed into the Performance Control Register (PCR). This assumes explicit knowledge of the meaning of the control register bits for a device. The number can be specified in hexadecimal, decimal, or octal, using the usual conventions of *strtol*(3C).

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	An error occurred.
2	Another user is writing to the same devices.

EXAMPLES

SPARC Only

EXAMPLE 1 Programming and monitoring the Address Controller counters

In this example, *ac0* refers to the Address Controller instance 0. The counters are programmed to count Memory Bank stalls on an Ultra Enterprise system at 10 second intervals with the values displayed in absolute form instead of deltas.

```
# busstat -a -w ac0,pic0=mem_bank0_stall,pic1=mem_bank1_stall 10
time dev  event0          pic0  event1          pic1
10    ac0  mem_bank0_stall  1234  mem_bank1_stall  5678
```

EXAMPLE 1 Programming and monitoring the Address Controller counters (Continued)

```

20    ac0    mem_bank0_stall    5678    mem_bank1_stall    12345
30    ac0    mem_bank0_stall    12345    mem_bank1_stall    56789
...

```

For a complete list of the supported events for a device, use the `-e` option.

EXAMPLE 2 Programming and monitoring the counters on all instances of the Address Controller

In this example, `ac` refers to all `ac` instances. This example programs all instances of the Address Controller counters to count `_clock` cycles and `mem_bank0_rds` at 2 second intervals, 100 times, displaying the values as deltas.

```

# busstat -w ac,pic0=clock_cycles,pic1=mem_bank0_rds 2 100
time dev    event0          pic0          event1          pic1
2    ac0     clock_cycles    167242902     mem_bank0_rds   3144
2    ac1     clock_cycles    167254476     mem_bank0_rds   1392
4    ac0     clock_cycles    168025190     mem_bank0_rds   40302
4    ac1     clock_cycles    168024056     mem_bank0_rds   40580
...

```

EXAMPLE 3 Monitoring the events being counted

This example monitors the events that are being counted on the `sbus1` device, 100 times at 1 second intervals. It suggests that a root user has changed the events that `sbus1` was counting to be `dvma_tlb_misses` and `interrupts` instead of `pio_cycles`.

```

% busstat -r sbus0 1 100

time dev    event0          pic0          event1          pic1
1    sbus1   pio_cycles      2321          pio_cycles      2321
2    sbus1   pio_cycles      48            pio_cycles      48
3    sbus1   pio_cycles      49            pio_cycles      49
4    sbus1   pio_cycles      2281          pio_cycles      2281
5    sbus1   dvma_tlb_misses  0             interrupts      0
6    sbus1   dvma_tlb_misses  6             interrupts      2
7    sbus1   dvma_tlb_misses  8             interrupts      11
...

```

EXAMPLE 4 Event Multiplexing

This example programs `ac0` to alternate between counting (clock cycles, `mem_bank0_rds`) and (`addr_pkts`, `data_pkts`) at 2 second intervals while also monitoring what `ac1` is counting :

It shows the expected output of the above `busstat` command. Another root user on the machine has changed the events that this user had programmed and `busstat` has detected this and terminates the command with a message.

busstat(1M)

EXAMPLE 4 Event Multiplexing (Continued)

```
# busstat -w ac0,pic0=clock_cycles,pic1=mem_bank0_rds \  
-w ac0,pic0=addr_pkts,pic1=data_pkts \  
-r ac1 2
```

time	dev	event0	pic0	event1	pic1
2	ac0	addr_pkts	12866	data_pkts	17015
2	ac1	rio_pkts	385	rio_pkts	385
4	ac0	clock_cycles	168018914	mem_bank0_rds	2865
4	ac1	rio_pkts	506	rio_pkts	506
6	ac0	addr_pkts	144236	data_pkts	149223
6	ac1	rio_pkts	522	rio_pkts	522
8	ac0	clock_cycles	168021245	mem_bank0_rds	2564
8	ac1	rio_pkts	387	rio_pkts	387
10	ac0	addr_pkts	144292	data_pkts	159645
10	ac1	rio_pkts	506	rio_pkts	506
12	ac0	clock_cycles	168020364	mem_bank0_rds	2665
12	ac1	rio_pkts	522	rio_pkts	522

busstat: events changed (possibly by another busstat).
#

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO iostat(1M), mpstat(1M), vmstat(1M), strtol(3C), attributes(5)

NAME	cachefsd – CacheFS daemon				
SYNOPSIS	/usr/lib/fs/cachefs/cachefsd				
DESCRIPTION	The <code>cachefsd</code> server implements features of the cache filesystem (CacheFS). It is invoked at boot time and run if the <code>/</code> (root) and <code>/usr</code> filesystems are being cached. If <code>/usr</code> is being cached, <code>cachefsd</code> is invoked by <code>inetd(1M)</code> from <code>inetd.conf(4)</code>. At run time, <code>cachefsd</code> is invoked by the <code>inetd</code> mechanism in response to an RPC request from a user command such as <code>mount_cachefs(1M)</code>. The <code>cachefsd</code> server supports the “disconnected mode” of CacheFS. In this mode, a user can continue to read and, depending on the option selected, write to files in a cached filesystem when the NFS server for the cached files is not available. The <code>cachefsd</code> daemon performs the following functions in support of the CacheFS: ■ Implements the connection policy. The daemon determines whether the NFS server backing the cache is connected or disconnected from the cache, or is in transition from the connected or disconnected states. ■ Implements “log rolling,” wherein the daemon monitors a disconnected NFS server for reconnection. After such a server returns to a connected state, <code>cachefsd</code> rolls any local changes to cached files (kept in a log) back to the server. ■ Manages “packing,” wherein <code>cachefsd</code> makes a best effort to ensure that files in a user-specified list are available in the cache in disconnected mode. ■ Supports user interfaces by supplying statistics, reporting conflicts between the cache and the back filesystem, and supporting a list of files for packing. The running of <code>cachefsd</code> is required for the disconnected mode of CacheFS.				
OPTIONS	The following options are supported: <code>-r</code> Used for invoking <code>cachefsd</code> for the <code>/</code> filesystem.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>cachefspack(1M)</code>, <code>cfsadmin(1M)</code>, <code>mount_cachefs(1M)</code>, <code>inetd.conf(4)</code>, <code>attributes(5)</code> <i>System Administration Guide: Basic Administration</i>				

cachefslog(1M)

NAME	cachefslog – Cache File System logging
SYNOPSIS	cachefslog [-f <i>logfile</i> -h] <i>cache_mount_point</i>
DESCRIPTION	The cachefslog command displays where CacheFS statistics are being logged. Optionally, it sets where CacheFS statistics are being logged, or it halts logging for a cache specified by <i>cache_mount_point</i> . The <i>cache_mount_point</i> argument is a mount point of a cache file system. All file systems cached under the same cache as <i>cache_mount_point</i> will be logged.
OPTIONS	The following options are supported. You must be super-user to use the -f and -h options. -f <i>logfile</i> Specify the log file to be used. -h Halt logging.
OPERANDS	<i>cache_mount_point</i> A mount point of a cache file system.
USAGE	See largefile(5) for the description of the behavior of cachefslog when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).
EXAMPLES	EXAMPLE 1 Checking the Logging of a directory. The example below checks if the directory /home/sam is being logged: <pre>example% cachefslog /home/sam not logged: /home/sam</pre> EXAMPLE 2 Changing the <i>logfile</i>. The example below changes the <i>logfile</i> of /home/sam to /var/tmp/samlog: <pre>example# cachefslog -f /var/tmp/samlog /home/sam /var/tmp/samlog: /home/sam</pre> EXAMPLE 3 Verifying the change of a <i>logfile</i>. The example below verifies the change of the previous example: <pre>example% cachefslog /home/sam /var/tmp/samlog: /home/sam</pre> EXAMPLE 4 Halting the logging of a directory. The example below halts logging for the /home/sam directory: <pre>example# cachefslog -h /home/sam not logged: /home/sam</pre>
EXIT STATUS	The following exit values are returned: 0 success

cachefslog(1M)

non-zero an error has occurred.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO cachefsstat(1M), cachefswssize(1M), cfsadmin(1M), attributes(5),
largefile(5)

DIAGNOSTICS Invalid path It is illegal to specify a path within a cache file system.

cachefspack(1M)

NAME	cachefspack – pack files and file systems in the cache
SYNOPSIS	cachefspack [-h] [-i -p -u] [-f <i>packing-list</i>] [-U <i>cache-directory</i>] [<i>file...</i>]
DESCRIPTION	The <code>cachefspack</code> utility is used to set up and maintain files in the cache. This utility affords greater control over the cache, ensuring that the specified files will be in the cache whenever possible.
OPTIONS	The following options are supported: -f <i>packing-list</i> Specify a file containing a list of files and directories to be packed. Options within subdirectories and files can also be specified. The format and rules governing <i>packing-list</i> are described on the <code>packingrules(4)</code> manual page. Directories are packed recursively. Symlinks that match a regular expression on a <code>LIST</code> command are followed. Symlinks encountered while recursively processing directories are not followed. -h Help. Print a brief summary of all the options. -i View information about the packed files. -p Pack the file or files specified by <i>file</i>. This is the default behavior. -u Unpack the file or files specified by <i>file</i>. -U <i>cache-directory</i> Unpack all files in the specified cache directory.
OPERANDS	The following operands are supported: <i>file</i> A path name of a file to be packed or unpacked.
USAGE	See <code>largefile(5)</code> for the description of the behavior of <code>cachefspack</code> when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).
EXAMPLES	EXAMPLE 1 The following example packs the file <code>projects</code> in the cache. <pre>% cachefspack -p projects</pre> EXAMPLE 2 The following example packs the files <code>projects</code>, <code>updates</code>, and <code>master_plan</code> in the cache. <pre>% cachefspack -p projects updates master_plan</pre> EXAMPLE 3 The following example unpacks the file <code>projects</code> from the cache. <pre>% cachefspack -u projects</pre>

EXAMPLE 4 The following example unpacks the files `projects`, `updates`, and `master_plan` from the cache.

```
% cachefspack -u projects updates master_plan
```

EXAMPLE 5 The following example unpacks all files in the cache directory `cache1`.

```
% cachefspack -U /cache/cache1
```

EXAMPLE 6 The following example illustrates the use of a packing list to specify files to be packed in the cache. The contents of `lists.pkg` are as follows:

```
IGNORE SCCS BASE /src/junk LIST *.c LIST *.h
```

This example will pack all files in the directory `/src/junk` with `.c` and `.h` extensions that do not contained the string `SCCS` in the file's path name.

```
% cachefspack -f lists.pkg
```

EXIT STATUS

0	Successful completion.
>0	An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `cfsadmin(1M)`, `mount_cachefs(1M)`, `packingrules(4)`, `attributes(5)`, `largefile(5)`

cacheostat(1M)

NAME	cacheostat – Cache File System statistics						
SYNOPSIS	<code>/usr/bin/cacheostat [-z] [path...]</code>						
DESCRIPTION	The <code>cacheostat</code> command displays statistical information about the cache file system mounted on <i>path</i>. The statistical information includes cache hits and misses, consistency checking, and modification operations. If <i>path</i> is not specified, all mounted cache file systems are used. <code>cacheostat</code> can also be used to reinitialize this information (see <code>-z</code> option). The statistical information has the following format: <pre><cache hit rate> <consistency checks> <modifies></pre> where: <table> <tr> <td><i>hit rate</i></td><td>The percentage of cache hits over the total number of attempts, followed by the actual numbers of hits and misses.</td></tr> <tr> <td><i>consistency checks</i></td><td>The number of consistency checks performed, followed by the number that passed, and the number that failed.</td></tr> <tr> <td><i>modifies</i></td><td>The number of modify operations, including writes, creates, etc.</td></tr> </table>	<i>hit rate</i>	The percentage of cache hits over the total number of attempts, followed by the actual numbers of hits and misses.	<i>consistency checks</i>	The number of consistency checks performed, followed by the number that passed, and the number that failed.	<i>modifies</i>	The number of modify operations, including writes, creates, etc.
<i>hit rate</i>	The percentage of cache hits over the total number of attempts, followed by the actual numbers of hits and misses.						
<i>consistency checks</i>	The number of consistency checks performed, followed by the number that passed, and the number that failed.						
<i>modifies</i>	The number of modify operations, including writes, creates, etc.						
OPTIONS	The following option is supported: <code>-z</code> Zero (reinitialize) statistics. Execute <code>cacheostat -z</code> before executing <code>cacheostat</code> again to gather statistics on the cache performance. This option can only be use by the superuser. The statistics printed reflect those just before the statistics are reinitialized.						
USAGE	See <code>largefile(5)</code> for the description of the behavior of <code>cacheostat</code> when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).						
EXAMPLES	EXAMPLE 1 Example of <code>cacheostat</code>. <pre>example% cacheostat /home/sam cache hit rate: 73% (1234 hits, 450 misses) consistency checks: 700 (650 pass, 50 fail) modifies: 321</pre>						
EXIT STATUS	The following exit values are returned: <table> <tr> <td>0</td><td>success</td></tr> <tr> <td>non-zero</td><td>an error has occurred.</td></tr> </table>	0	success	non-zero	an error has occurred.		
0	success						
non-zero	an error has occurred.						

cachefsstat(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO cachefslog(1M), cachefswssize(1M), cfsadmin(1M), attributes(5), largefile(5)

cachefswssize(1M)

NAME	cachefswssize – determine working set size for cachefs		
SYNOPSIS	cachefswssize logfile		
DESCRIPTION	The cachefswssize command displays the workspace size determined from logfile. This includes the amount of cache space needed for each filesystem that was mounted under the cache, as well as a total.		
USAGE	See largefile(5) for the description of the behavior of cachefswssize when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).		
EXAMPLES	EXAMPLE 1 A sample output of cachefswssize.		
	example% cachefswssize /var/tmp/samlog		
	/home/sam		
		end size:	10688k
		high water size:	10704k
	/foo		
		end size:	128k
		high water size:	128k
/usr/dist			
	end size:	1472k	
	high water size:	1472k	
total for cache			
	initial size:	110960k	
	end size:	12288k	
	high water size:	12304k	
EXIT STATUS	The following exit values are returned:		
	0	success	
	non-zero	an error has occurred.	

cachefswssize(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO cachefslog(1M), cachefsstat(1M), cfsadmin(1M), attributes(5), largefile(5)

DIAGNOSTICS problems were encountered writing log file
There were problems encountered when the kernel was writing the logfile. The most common problem is running out of disk space.
invalid log file
The logfile is not a valid logfile or was created with a newer version of Solaris than the one where cachefswssize is running.

captainfo(1M)

NAME	captainfo – convert a termcap description into a terminfo description						
SYNOPSIS	captainfo [-1] [-v...] [-V] [-w width] filename...						
DESCRIPTION	captainfo looks in <i>filename</i> for termcap descriptions. For each one found, an equivalent terminfo description is written to standard output, along with any comments found. A description which is expressed as relative to another description (as specified in the termcap <code>tc = field</code>) is reduced to the minimum superset before being displayed. If no <i>filename</i> is given, then the environment variable <code>TERMCAP</code> is used for the filename or entry. If <code>TERMCAP</code> is a full pathname to a file, only the terminal whose name is specified in the environment variable <code>TERM</code> is extracted from that file. If the environment variable <code>TERMCAP</code> is not set, then the file <code>/usr/share/lib/termcap</code> is read.						
OPTIONS	-1	Display the fields one to a line. Otherwise, the fields are printed several to a line, with a maximum width of 60 characters.					
	-v	Display tracing information on the standard error as the program runs. Specifying additional -v options displays more detailed information.					
	-V	Display the version of the program in use on the standard error and then exit.					
	-w width	Change the output to <i>width</i> characters.					
FILES	/usr/share/lib/terminfo/?/*	compiled terminal description database					
	/usr/share/lib/termcap						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:						
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>			ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWcsu						
SEE ALSO	infocmp(1M), curses(3CURSES), terminfo(4), attributes(5)						
NOTES	captainfo should be used to convert termcap entries to terminfo entries because the termcap database may not be supplied in future releases.						

NAME	catman – create the formatted files for the reference manual
SYNOPSIS	<code>/usr/bin/catman [-c] [-n] [-p] [-t] [-w] [-M <i>directory</i>]</code> <code>[-T <i>macro-package</i>] [<i>sections</i>]</code>
DESCRIPTION	The catman utility creates the preformatted versions of the on-line manual from the <code>nroff(1)</code> or <code>sgml(5)</code> input files. This feature allows easy distribution of the preformatted manual pages among a group of associated machines (for example, with <code>rdist(1)</code>), since it makes the directories of preformatted manual pages self-contained and independent of the unformatted entries. catman also creates the windex database file in the directories specified by the <code>MANPATH</code> or the <code>-M</code> option. The windex database file is a three column list consisting of a keyword, the reference page that the keyword points to, and a line of text that describes the purpose of the utility or interface documented on the reference page. Each keyword is taken from the comma separated list of words on the <code>NAME</code> line before the <code>'–'</code> (dash). The reference page that the keyword points to is the first word on the <code>NAME</code> line. The text after the <code>–</code> on the <code>NAME</code> line is the descriptive text in the third column. The <code>NAME</code> line must be immediately preceded by the page heading line created by the <code>.TH</code> macro (see <code>NOTES</code> for required format). Each manual page is examined and those whose preformatted versions are missing or out of date are recreated. If any changes are made, catman recreates the windex database. If a manual page is a <i>shadow</i> page, that is, it sources another manual page for its contents, a symbolic link is made in the <code>catx</code> or <code>fmtx</code> directory to the appropriate preformatted manual page. Shadow files in an unformatted <code>nroff</code> source file are identified by the first line being of the form <code>.so manx/yyy.x</code>. Shadow files in the SGML sources are identified by the string <code>SHADOW_PAGE</code>. The file entity declared in the shadow file identifies the file to be sourced.
OPTIONS	The following options are supported: <code>-c</code> Create unformatted <code>nroff</code> source files in the appropriate <code>man</code> subdirectories from the SGML sources. This option will overwrite any existing file in the <code>man</code> directory of the same name as the SGML file. <code>-n</code> Do not create (or recreate) the windex database. If the <code>-n</code> option is specified, the windex database is not created and the <code>apropos</code>, <code>what is</code>, <code>man -f</code>, and <code>man -k</code> commands will fail. <code>-p</code> Print what would be done instead of doing it.

catman(1M)

	-t	Create <code>troffed</code> entries in the appropriate <code>fmt</code> subdirectories instead of <code>nroffing</code> into the <code>cat</code> subdirectories.
	-w	Only create the <code>windex</code> database that is used by <code>whatis(1)</code> and the <code>man(1)</code> <code>-f</code> and <code>-k</code> options. No manual reformatting is done.
	-M <i>directory</i>	Update manual pages located in the specified <i>directory</i> , (<code>/usr/share/man</code> by default). If the <code>-M</code> option is specified, the directory argument must not contain a <code>,</code> (comma), since a comma is used to delineate section numbers. See <code>man(1)</code> .
	-T <i>macro-package</i>	Use <i>macro-package</i> in place of the standard manual page macros, (<code>man(5)</code> by default).
OPERANDS	The following operand is supported:	
	<i>sections</i>	If there is one parameter not starting with a <code>-</code> , it is taken to be a space separated list of manual sections to be processed by <code>catman</code> . If this operand is specified, only the manual sections in the list will be processed. For example, <pre>catman 1 2 3</pre> only updates manual sections 1, 2, and 3. If specific sections are not listed, all sections in the <code>man</code> directory specified by the environment variable <code>MANPATH</code> are processed.
ENVIRONMENT VARIABLES	TROFF	The name of the formatter to use when the <code>-t</code> flag is given. If not set, <code>troff(1)</code> is used.
	MANPATH	A colon-separated list of directories that are processed by <code>catman</code> and <code>man(1)</code> . Each directory can be followed by a comma-separated list of sections. If set, its value overrides <code>/usr/share/man</code> as the default directory search path, and the <code>man.cf</code> file as the default section search path. The <code>-M</code> and <code>-s</code> flags, in turn, override these values.
FILES	<code>/usr/share/man</code>	default manual directory location
	<code>/usr/share/man/man*/**.*</code>	raw <code>nroff</code> input files
	<code>/usr/share/man/sman*/**.*</code>	raw SGML input files
	<code>/usr/share/man/cat*/**.*</code>	preformatted <code>nroffed</code> manual pages
	<code>/usr/share/man/fmt*/**.*</code>	preformatted <code>troffed</code> manual pages
	<code>/usr/share/man/windex</code>	table of contents and keyword database
	<code>/usr/lib/makewhatis</code>	command script to make <code>windex</code> database
	<code>/usr/share/lib/tmac/an</code>	default macro package

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWdoc
CSI	Enabled

SEE ALSO apropos(1), man(1), nroff(1), rdist(1), rm(1), troff(1), whatis(1), attributes(5), man(5), sgml(5)

DIAGNOSTICS man?/xxx.? (.so'ed from man?/yyy.): No such file or directory
The file outside the parentheses is missing, and is referred to by the file inside them.

target of .so in man?/xxx.? must be relative to /usr/man
catman only allows references to filenames that are relative to the directory /usr/man.

opendir:man?: No such file or directory
A harmless warning message indicating that one of the directories catman normally looks for is missing.

.: No such file or directory
A harmless warning message indicating catman came across an empty directory.

WARNINGS If a user, who has previously run catman to install the cat* directories, upgrades the operating system, the entire cat* directory structure should be removed prior to running catman. See rm(1).

Do not re-run catman to re-build the whatis database unless the complete set of man* directories is present. catman builds this windex file based on the man* directories.

NOTES To generate a valid windex index file, catman has certain requirements. Within the individual man page file, catman requires two macro lines to have a specific format. These are the .TH page heading line and the .SH NAME line.

The .TH macro requires at least the first three arguments, that is, the filename, section number, and the date. The .TH line starts off with the .TH macro, followed by a space, the man page filename, a single space, the section number, another single space, and the date. The date should appear in double quotes and is specified as "day month year," with the month always abbreviated to the first three letters (Jan, Feb, Mar, and so forth).

The .SH NAME macro, also known as the NAME line, must immediately follow the .TH line, with nothing in between those lines. No font changes are permitted in the NAME line. The NAME line is immediately followed by a line containing the man page filename; then shadow page names, if applicable, separated by commas; a dash; and a brief summary statement. These elements should all be on one line; no carriage returns are permitted.

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An example of proper coding of these lines is:

```
.TH nismatch 1M "10 Apr 1998"  
.SH NAME  
nismatch, nisgrep \- utilities for searching NIS+ tables
```

NAME	cfgadm – configuration administration
SYNOPSIS	<pre> /usr/sbin/cfgadm [-f] [-y -n] [-v] [-o hardware_options] -c function ap_id... /usr/sbin/cfgadm [-f] [-y -n] [-v] [-o hardware_options] -x hardware_function ap_id... /usr/sbin/cfgadm [-v] [-a] [-s listing_options] [-o hardware_options] [-l [ap_id ap_type]] /usr/sbin/cfgadm [-v] [-o hardware_options] -t ap_id... /usr/sbin/cfgadm [-v] [-o hardware_options] -h [ap_id ap_type] </pre>
DESCRIPTION	The <code>cfgadm</code> command provides configuration administration operations on dynamically reconfigurable hardware resources. These operations include displaying status, (-l), initiating testing, (-t), invoking configuration state changes, (-c), invoking hardware specific functions, (-x), and obtaining configuration administration help messages (-h). Configuration administration is performed at <i>attachment points</i>, which are places where system software supports dynamic reconfiguration of hardware resources during continued operation of Solaris. Configuration administration makes a distinction between hardware resources that are physically present in the machine and hardware resources that are configured and visible to Solaris. The nature of configuration administration functions are hardware specific, and are performed by calling hardware specific libraries. Configuration administration operates on an <i>attachment point</i>. Hardware resources located at attachment points can or can not be physically replaceable during system operation, but are dynamically reconfigurable by way of the configuration administration interfaces. An attachment point defines two unique elements, which are distinct from the hardware resources that exist beyond the attachment point. The two elements of an attachment point are a <i>receptacle</i> and an <i>occupant</i>. Physical insertion or removal of hardware resources occurs at attachment points and results in a receptacle gaining or losing an occupant. Configuration administration supports the physical insertion and removal operations as well as other configuration administration functions at an attachment point. Attachment points have associated state and condition information. The configuration administration interfaces provide control for transitioning attachment point states. A receptacle can exist in one of three states: <i>empty</i>, <i>disconnected</i> or <i>connected</i>, while an occupant can exist in one of two states: <i>configured</i> or <i>unconfigured</i>. A receptacle can provide the <i>empty</i> state, which is the normal state of a receptacle when the attachment point has no occupants. A receptacle can also provide the <i>disconnected</i> state if it has the capability of isolating its occupants from normal system access. Typically this state is used for various hardware specific testing prior to bringing the occupant's resources into full use by the system, or as a step in preparing

an occupant for physical removal or reconfiguration. A receptacle in the disconnected state isolates its occupant from the system as much as its hardware allows, but can provide access for testing and setup. A receptacle must provide the connected state, which allows normal access to hardware resources contained on any occupants. The connected state is the normal state of a receptacle that contains an occupant and that is not currently undergoing configuration administration operations.

The hardware resources contained on an occupant in the unconfigured state are not represented by normal Solaris data structures and are thus not available for use by Solaris. Operations allowed on an unconfigured occupant are limited to configuration administration operations. The hardware resources of an occupant in the configured state are represented by normal Solaris data structures and thus some or all of those hardware resources can be in use by Solaris. All occupants provide both the configured and unconfigured states,

An attachment point can be in one of five conditions: `unknown`, `ok`, `failing`, `failed`, or `unusable`. An attachment point can enter the system in any condition depending upon results of power-on tests and non-volatile record keeping.

An attachment point with an occupant in the configured state is in one of four conditions: `unknown`, `ok`, `failing`, or `failed`. If the condition is not `failing` or `failed` an attachment point can change to `failing` during the course of operation if a hardware dependent recoverable error threshold is exceeded. If the condition is not `failed` an attachment point can change to `failed` during operation as a result of an unrecoverable error.

An attachment point with an occupant in the unconfigured state can be in any of the defined conditions. The condition of an attachment point with an unconfigured occupant can decay from `ok` to `unknown` after a machine dependent time threshold. Initiating a test function changes the attachment point's condition to `ok`, `failing` or `failed` depending on the outcome of the test. An attachment point that does not provide a test function can leave the attachment point in the `unknown` condition. If a test is interrupted, the attachment point's condition can be set to the previous condition, `unknown` or `failed`. An attachment point in the `unknown`, `ok`, `failing`, or `failed` conditions can be re-tested.

An attachment point can exist in the `unusable` condition for a variety of reasons, such as inadequate power or cooling for the receptacle, an occupant that is unidentifiable, unsupported, incorrectly configured, etc. An attachment point in the `unusable` condition can never be used by the system. It typically remains in this condition until the physical cause is remedied.

An attachment point also maintains busy information that indicates when a state change is in progress or the condition is being reevaluated.

Attachment points are referred to using hardware specific identifiers (*ap_ids*) that are related to the type and location of the attachment points in the system device hierarchy. An *ap_id* can not be ambiguous, it must identify a single attachment point.

Two types of *ap_id* specifications are supported: physical and logical. A physical *ap_id* contains a fully specified pathname, while a logical *ap_id* contains a shorthand notation that identifies an attachment point in a more user-friendly way.

For example, an attachment point representing a system's backplane slot number 7 could have a physical *ap_id* of `/devices/central/fhc/sysctrl:slot7` while the logical *ap_id* could be `system:slot7`. Another example, the third receptacle on the second PCI I/O bus on a system could have a logical *ap_id* of `pci2:plug3`.

Attachment points may also be created dynamically. A dynamic attachment point is named relative to a base attachment point which is present in the system. *ap_ids* for dynamic attachment points consist of a base component followed by two colons (:) and a dynamic component. The base component is the base attachment point *ap_id*. The dynamic component is hardware specific and generated by the corresponding hardware specific library.

For example, consider a base attachment point, which represents a SCSI HBA, with the physical *ap_id* `/devices/sbus@1f,0/SUNW,fas@e,8800000:scsi` and logical *ap_id* `c0`. A disk attached to this SCSI HBA could be represented by a dynamic attachment point with logical *ap_id* `c0::dsk/c0t0d0` where `c0` is the base component and `dsk/c0t0d0` is the hardware specific dynamic component. Similarly the physical *ap_id* for this dynamic attachment point would be:
`/devices/sbus@1f,0/SUNW,fas@e,8800000:scsi::dsk/c0t0d0`

An *ap_type* is a partial form of a logical *ap_id* that can be ambiguous and not specify a particular attachment point. An *ap_type* is a substring of the portion of the logical *ap_id* up to but not including the colon (:) separator. For example, an *ap_type* of `pci` would show all attachment points whose logical *ap_ids* begin with `pci`.

The use of *ap_types* is discouraged. The new select sub-option to the `-s` option provides a more general and flexible mechanism for selecting attachment points. See `OPTIONS`.

The `cfgadm` command interacts primarily with hardware dependent functions contained in hardware specific libraries and thus its behavior is hardware dependent.

For each configuration administration operation a service interruption can be required. Should the completion of the function requested require a noticeable service interruption to interactive users, a prompt is output on the standard error output for confirmation on the standard input before the function is started. Confirmation can be overridden using the `-y` or `-n` options to always answer yes or no respectively. Hardware specific options, such as test level, are supplied as sub-options using the `-o` option.

Operations that change the state of the system configuration are audited by the system log daemon `syslogd(1M)`.

The arguments for this command conform to the `getopt(3C)` and `getsubopt(3C)` syntax convention.

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OPTIONS

The following options are supported:

-a

Specifies that the -l option must also list dynamic attachment points.

-c *function*

Performs the state change *function* on the attachment point specified by *ap_id*.

Specify *function* as insert, remove, disconnect, connect, configure or unconfigure. These functions cause state transitions at the attachment point by calling hardware specific library routines and are defined in the following list.

insert Performs operations that allows the user to manually insert an occupant or to activate a hardware supplied mechanism that performs the physical insertion. **insert** can have hardware specific side effects that temporarily suspend activity in portions of the system. In such cases the hardware specific library generates appropriate warning messages and informs the user of any special considerations or procedures unique to that hardware. Various hardware specific errors can cause this function to fail and set the receptacle condition to unusable.

remove Performs operations that allow the user to manually remove an occupant or to activate a hardware supplied mechanism to perform the physical removal. **remove** can have hardware specific side effects that temporarily suspend activity in portions of the system. In such cases the hardware specific library generates appropriate warning messages and informs the user of any special considerations or procedures unique to that hardware. Various hardware specific errors can cause this function to fail and set the receptacle condition to unusable.

disconnect Performs hardware specific operations to put a receptacle in the disconnected state, which can prevent an occupant from operating in a normal fashion through the receptacle.

connect Performs hardware specific operations to put the receptacle in the connected state, which allows an occupant to operate in a normal fashion through the receptacle.

configure Performs hardware specific operations that allow an occupant's hardware resources to be usable by Solaris. Occupants that are configured are part of the system configuration and are available for manipulation by Solaris device manipulation maintenance commands (eg: psradm(1M), mount(1M), ifconfig(1M)).

unconfigure Performs hardware specific operations that logically remove an occupant's hardware resources from the system. The occupant must currently be configured and its hardware resources must not be in use by Solaris.

State transition functions can fail due to the condition of the attachment point or other hardware dependent considerations. All state change *functions* in the direction of adding resources, (*insert*, *connect* and *configure*) are passed onto the hardware specific library when the attachment point is in the *ok* or *unknown* condition. All other conditions require the use of the *force* option to allow these *functions* to be passed on to the hardware specific library. Attachment point condition does not prevent a hardware specific library being called for related to the removal (*remove*, *disconnect* and *unconfigure*), of hardware resources from the system. Hardware specific libraries can reject state change *functions* if the attachment point is in the *unknown* condition.

The condition of an attachment point is not necessarily changed by the state change functions, however errors during state change operations can change the attachment point condition. An attempt to override a condition and force a state change that would otherwise fail can be made by specifying the *force* option (*-f*). Hardware specific safety and integrity checks can prevent the *force* option from having any effect.

- f
Forces the specified action to occur. Typically, this is a hardware dependent override of a safety feature. Forcing a state change operation can allow use of the hardware resources of occupant that is not in the *ok* or *unknown* conditions, at the discretion of any hardware dependent safety checks.
- h [*ap_id* | *ap_type* ...]
Prints out the help message text. If *ap_id* or *ap_type* is specified, the help routine of the hardware specific library for the attachment point indicated by the argument is called.
- l [*ap_id* | *ap_type* ...]
Lists the state and condition of attachment points specified. Attachment points can be filtered by using the *-s* option and *select* sub-option. Invoking *cfgadm* without one of the action options is equivalent to *-l* without an argument. The format of the list display is controlled by the *-v* and *-s* options. When the *-a* option is specified attachment points are dynamically expanded.
- n
Suppress any interactive confirmation and assume that the answer is *no*. If neither *-n* or *-y* is specified, interactive confirmation is obtained through the standard error output and the standard input. If either of these standard channels does not correspond to a terminal (as determined by *isatty(3C)*) then the *-n* option is assumed.
- o *hardware_options*
Supplies hardware specific options to the main command option. The format and content of the hardware option string is completely hardware specific. The option string *hardware_options* conforms to the *getsubopt(3C)* syntax convention.
- s *listing_options*
Supplies listing options to the list (*-l*) command. *listing_options* conforms to the *getsubopt(3C)* syntax convention. The sub-options are used to specify the

attachment point selection criteria (*select=select_string*), the type of matching desired (*match=match_type*), order of listing (*sort=field_spec*), the data that is displayed (*cols=field_spec* and *cols2=field_spec*), the column delimiter (*delim=string*) and whether to suppress column headings (*noheadings*).

When the *select* sub-option is specified, only attachment points which match the specified criteria will be listed. The *select* sub-option has the following syntax:

```
cfgadm -s select=attr1(value1):attr2(value2)...
```

where an *attr* is one of *ap_id*, *class* or *type*. *ap_id* refers to the logical *ap_id* field, *class* refers to attachment point class and *type* refers to the type field. *value1*, *value2*, etc. are the corresponding values to be matched. The type of match can be specified by the *match* sub-option as follows:

```
cfgadm -s match=match_type,select=attr1(value1)...
```

where *match_type* can be either *exact* or *partial*. The default value is *exact*.

Arguments to the *select* sub-option can be quoted to protect them from the shell.

A *field_spec* is one or more *data-fields* concatenated using colon (:), as in *data-field:data-field:data-field*. A *data-field* is one of *ap_id*, *physid*, *r_state*, *o_state*, *condition*, *type*, *busy*, *status_time*, *status_time_p*, *class*, and *info*. The *ap_id* field output is the logical name for the attachment point, while the *physid* field contains the physical name. The *r_state* field can be *empty*, *disconnected* or *connected*. The *o_state* field can be *configured* or *unconfigured*. The *busy* field can be either *y* if the attachment point is busy, or *n* if it is not. The *type* and *info* fields are hardware specific. The *status_time* field provides the time at which either the *r_state*, *o_state*, or *condition* of the attachment point last changed. The *status_time_p* field is a parsable version of the *status_time* field. If an attachment point has an associated class, the *class* field lists the class name. If an attachment point does not have an associated class, the *class* field lists *none*.

The order of the fields in *field_spec* is significant: For the *sort* sub-option, the first field given is the primary sort key. For the *cols* and *cols2* sub-options, the fields are printed in the order requested. The order of sorting on a *data-field* can be reversed by placing a minus (-) before the *data-field* name within the *field_spec* for the *sort* sub-option. The default value for *sort* is *ap_id*. The default values for *cols* and *cols2* depend on whether the *-v* option is given: Without it *cols* is *ap_id:r_state:o_state:condition* and *cols2* is not set. With *-v* *cols* is *ap_id:r_state:o_state:condition:info* and *cols2* is *status_time:type:busy:physid:.* The default value for *delim* is a single space. The value of *delim* can be a string of arbitrary length. The delimiter cannot include comma (,) character, see *getsubopt(3C)*. These listing options can be used to create parsable output. See NOTES.

-t

Performs a test of one or more attachment points. The test function is used to re-evaluate the condition of the attachment point. Without a test level specifier in *hardware_options*, the fastest test that identifies hard faults is used.

More comprehensive tests are hardware specific and are selected using the *hardware_options*.

The results of the test is used to update the condition of the specified occupant to either *ok* if no faults are found, *failing* if recoverable faults are found or *failed* if any unrecoverable faults are found.

If a test is interrupted, the attachment point's condition can be restored to its previous value or set to *unknown* if no errors were found or *failing* if only recoverable errors were found or to *failed* if any unrecoverable errors were found. The attachment point should only be set to *ok* upon normal completion of testing with no errors.

-v

Executes in verbose mode. For the -c, -t and -x options outputs a message giving the results of each attempted operation. Outputs detailed help information for the -h option. Outputs verbose information for each attachment point for the -l option.

-x *hardware_function*

Performs hardware specific functions. Private hardware specific functions can change the state of a receptacle or occupant. Attachment point conditions can change as the result of errors encountered during private hardware specific functions. The format and content of the *hardware_function* string is completely hardware specific. The option string *hardware_function* conforms to the *getsubopt(3C)* syntax convention.

-y

Suppresses any interactive confirmation and assume that the answer is yes.

USAGE The required privileges to use this command are hardware dependent. Typically, a default system configuration restricts all but the list option to the superuser.

EXAMPLES **EXAMPLE 1** Listing Attachment Points in the Device Tree

The following example lists all attachment points except dynamic attachment points.

example# cfgadm

Ap_Id	Type	Receptacle	Occupant	Cond
system:slot0	cpu/mem	connected	configured	ok
system:slot1	sbus-upa	connected	configured	ok
system:slot2	cpu/mem	connected	configured	ok
system:slot3	unknown	connected	unconfigured	unknown
system:slot4	dual-sbus	connected	configured	failing
system:slot5	cpu/mem	connected	configured	ok
system:slot6	unknown	disconnected	unconfigured	unusable
system:slot7	unknown	empty	unconfigured	ok
c0	scsi-bus	connected	configured	unknown
c1	scsi-bus	connected	configured	unknown

EXAMPLE 2 Listing All Configurable Hardware Information

The following example lists all current configurable hardware information, including those represented by dynamic attachment points:

```
example# cfgadm -al
```

Ap_Id	Type	Receptacle	Occupant	Cond
system:slot0	cpu/mem	connected	configured	ok
system:slot1	sbus-upa	connected	configured	ok
system:slot2	cpu/mem	connected	configured	ok
system:slot3	unknown	connected	unconfigured	unknown
system:slot4	dual-sbus	connected	configured	failing
system:slot5	cpu/mem	connected	configured	ok
system:slot6	unknown	disconnected	unconfigured	unusable
system:slot7	unknown	empty	unconfigured	ok
c0	scsi-bus	connected	configured	unknown
c0::dsk/c0t14d0	disk	connected	configured	unknown
c0::dsk/c0t11d0	disk	connected	configured	unknown
c0::dsk/c0t8d0	disk	connected	configured	unknown
c0::rmt/0	tape	connected	configured	unknown
c1	scsi-bus	connected	configured	unknown

EXAMPLE 3 Listing Selectively, Based on Attachment Point Attributes

The following example lists all attachment points whose class begins with *scsi*, *ap_id* begins with *c* and *type* field begins with *scsi*. The argument to the *-s* option is quoted to protect it from the shell.

```
example# cfgadm -s "match=partial,select=class(scsi):ap_id(c):type(scsi)"
```

Ap_Id	Type	Receptacle	Occupant	Cond
c0	scsi-bus	connected	configured	unknown
c1	scsi-bus	connected	configured	unknown

EXAMPLE 4 Listing Current Configurable Hardware Information in Verbose Mode

The following example lists current configurable hardware information for *ap-type* system in verbose mode:

```
example# cfgadm -v -l system
```

Ap_Id	Type	Receptacle	Occupant	Condition	Information
When		Busy	Phys_Id		
system:slot1		connected	configured	ok	
Apr 4 23:50	sbus-upa	n	/devices/central/fhc/sysctrl:slot1		
system:slot3		connected	configured	ok	non-detachable
Apr 17 11:20	cpu/mem	n	/devices/central/fhc/sysctrl:slot3		
system:slot5		connected	configured	ok	
Apr 4 23:50	cpu/mem	n	/devices/central/fhc/sysctrl:slot5		
system:slot7		connected	configured	ok	
Apr 4 23:50	dual-sbus	n	/devices/central/fhc/sysctrl:slot7		

The When column represents the *status_time* field.

EXAMPLE 5 Testing Two Occupants Using the Hardware Specific Extended Test

The following example tests two occupants using the hardware specific extended test:

```
example# cfgadm -v -o extended -t system:slot3 system:slot5
Testing attachment point system:slot3 ... ok
Testing attachment point system:slot5 ... ok
```

EXAMPLE 6 Configuring an Occupant Using the Force Option

The following example configures an occupant in the failing state to the system using the force option:

```
example# cfgadm -f -c configure system:slot3
```

EXAMPLE 7 Unconfiguring an Occupant From the System

The following example unconfigures an occupant from the system:

```
example# cfgadm -c unconfigure system:slot4
```

EXAMPLE 8 Configuring an Occupant at an Attachment Point

The following example configures an occupant:

```
example# cfgadm -c configure c0::disk/c0t0d0
```

**ENVIRONMENT
VARIABLES**

See environ(5) for descriptions of the following environment variables that affect the execution of cfgadm: LC_TIME, LC_MESSAGES, NLSPATH and TZ.

LC_MESSAGES	Determines how cfgadm displays column headings and error messages. Listing output data is not affected by the setting of this variable.
LC_TIME	Determines how cfgadm displays human readable status changed time (status_time).
TZ	Specifies the timezone used when converting the status changed time. This applies to both the human readable (status_time) and parsable (status_time_p) formats.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	An error occurred.
2	Configuration administration not supported on specified target.
3	Usage error.

cfgadm(1M)

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

cfgadm_pci(1M), cfgadm_sbd(1M), cfgadm_usb(1M), cfgadm_scsi(1M), ifconfig(1M), mount(1M), prtdiag(1M), psradm(1M), syslogd(1M), config_admin(3CFGADM), getopt(3C), getsubopt(3C), isatty(3C), attributes(5), environ(5)

DIAGNOSTICS

Diagnostic messages appear on the standard error output. Other than options and usage errors, the following are diagnostic messages produced by this utility:

```
cfgadm: Configuration administration not supported on ap_id
cfgadm: No library found for ap_id
cfgadm: ap_id is ambiguous
cfgadm: operation: Insufficient privileges
cfgadm: Attachment point is busy, try again
cfgadm: No attachment points with specified attributes found
cfgadm: System is busy, try again
cfgadm: operation: Operation requires a service interruption
cfgadm: operation: Data error: error_text
cfgadm: operation: Hardware specific failure: error_text
```

See config_admin(3CFGADM) for additional details regarding error messages.

NOTES

Hardware resources enter the unconfigured pool in a hardware specific manner. This can occur at various times such as: system initialization or as a result of an unconfigure operation. An occupant that is in the unconfigured state is not available for use by the system until specific intervention occurs. This intervention can be manifested as an operator initiated command or it can be by way of an automatic configuring mechanism.

The listing option of the `cfgadm` command can be used to provide parsable input for another command, for example within a shell script. For parsable output, the `-s` option must be used to select the fields required. The `-s` option can also be used to suppress the column headings. The following fields always produce parsable output: `ap_id`, `physid`, `r_state`, `o_state`, `condition`, `busy status_time_p`, `class`, and `type`. Parsable output never has white-space characters embedded in the field value.

The following shell script fragment finds the first good unconfigured occupant of type CPU.

```
found=
cfgadm -l -s "noheadings,cols=ap_id:r_state:condition:type" | \
while read ap_id r_state cond type
do
    if [ "$r_state" = unconfigured -a "$cond" = ok -a "$type" = CPU ]
    then
        if [ -z "$found" ]
        then
            found=$ap_id
        fi
    fi
done
if [ -n "$found" ]
then
    echo "Found CPU $found"
fi
```

The format of the parsable time field (`status_time_p`) is `YYYYMMDDhhmmss`, giving the year, month, day, hour, minute and second in a form suitable for string comparison.

Reference should be made to the hardware specific documentation for details of System Configuration Administration support.

cfgadm_ac(1M)

NAME	cfgadm_ac – EXX00 memory system administration
SYNOPSIS	<pre> /usr/sbin/cfgadm [-c configure] [-f] [-o disable-at-boot enable-at-boot] ac#:bank# ... /usr/sbin/cfgadm [-c unconfigure] [-o disable-at-bootp enable-at-boot] ac#:bank# ... /usr/sbin/cfgadm [-v] [-o quick normal extended, [max_errors=#]] -t ac#:bank#... /usr/sbin/cfgadm -x relocate-test ac#:bank# ... /usr/sbin/cfgadm [-l] -o disable-at-boot enable-at-boot ac#:bank# ... </pre>
DESCRIPTION	The ac hardware specific library <code>/usr/platform/sun4u/lib/cfgadm/cfgadm_ac.so.1</code> provides the functionality for configuring and unconfiguring memory banks on E6X00, E5X00, E4X00 and E3X00 systems as part of the Dynamic Reconfiguration of CPU/Memory boards using <code>cfgadm_sysctrl(1M)</code>. Memory banks appear as attachment points in the device tree. For each CPU/Memory board, two attachment points are published, one for each bank on the board: <code>bank0</code> and <code>bank1</code>. If the bank is unpopulated, the receptacle state is empty. If the bank is populated, the receptacle state is connected. The receptacle state of a memory bank can never be disconnected. The occupant state of a connected memory bank can be configured or unconfigured. If the occupant state is configured, the memory is in use by Solaris, if unconfigured it is not.
OPTIONS	Refer to <code>cfgadm(1M)</code> for complete descriptions of the command options. The following options are supported: <code>-c configure unconfigure</code> Change the occupant state. The <code>configure</code> argument ensures that the memory is initialized and adds the memory to the Solaris memory pool. The <code>unconfigure</code> argument removes the memory from use by Solaris. When a CPU/Memory board is to be removed from a system, both banks of memory must be unconfigured. <code>cfgadm</code> refuses the <code>configure</code> operation if the memory on the board is marked <code>disabled-at-boot</code> (see <code>info</code> field), unless either the <code>-f</code> (force) option or the enable at boot flag, (<code>-o enable-at-boot</code>), is given. The <code>configure</code> operation takes a short time proportional to the size of memory that must be initialized. <code>cfgadm</code> refuses the <code>unconfigure</code> operation if there is not enough uncommitted memory in the system (VM viability error) or if the bank to be unconfigured has memory that can't be removed (non-relocatable pages error). The presence of non-relocatable pages is indicated by the word <code>permanent</code> in the <code>info</code> listing field. Removing memory from use by Solaris may take a significant time due to factors such as system load and how much paging to secondary storage is required. The <code>unconfigure</code> operation can be cancelled at any time and the memory

returned to the fully configured state by interrupting the command invocation with a signal. The `unconfigure` operation self-cancels if no memory can be removed within a timeout period. The default timeout period of 60 seconds can be changed using the `-o timeout=#` option, with a value of 0 disabling the timeout.

-f

Force option. Use this option to override the block on configuring a memory bank marked as disabled at boot in the non-volatile `disabled-memory-list` variable. See *Platform Notes: Sun Enterprise 6x00/5x00/4x00/3x00 Systems*

-l

List option. This option is supported as described in `cfgadm(1M)`.

The `type` field is always *memory*.

The *info* field has the following information for empty banks:

```
slot# empty
```

The `slot#` indicates the system slot into which the CPU/Memory board is inserted. For example, if this were `slot11` the attachment point for use with `cfgadm` to manipulate the associated board would be `sysctrl0:slot11`. The *info* field has the following information for connected banks:

```
slot# sizeMb|sizeGb [(sizeMb|sizeGb used)] base 0x###
      [interleaved #-way] [disabled at boot] [permanent]
```

The size of the bank is given in Mb or Gb as appropriate. If the memory is less than completely used, the used size is reported. The physical base address is given in hexadecimal. If the memory bank is interleaved with some other bank, the interleave factor is reported. If the memory on the board is disabled at boot using the non-volatile `disabled-memory-list` variable, this is reported. If the bank has memory that cannot be removed this is reported as permanent.

-o disable-at-boot | enable-at-boot

These options allow the state of the non-volatile `disabled-memory-list` variable to be modified. These options can be used in conjunction with the issuing of a `-c` option or with the explicit or implied listing command, `-l`, if no command is required. Use of `-o enable-at-boot` with the `configure` command to override the block on configuring memory on a board in the disabled memory list.

-o extended | normal | quick

Use with the `-t` option to specify test level.

The `normal` test level ensures that each memory cell stores both a 0 and a 1, and checks that all cells are separately addressable. The `quick` test level only does the 0s and 1s test, and typically misses address line problems. The `extended` test uses patterns to test for adjacent cell interference problems. The default test level is `normal`. See `-t` option.

-o max_errors=#

Use with the `-t` option to specify the maximum number of allowed errors. If not specified, a default of 32 is assumed.

cfgadm_ac(1M)

	-o timeout=# Use with the <code>unconfigure</code> command to set the self-cancelling timeout. The default value is 60 and the unit is seconds. A value of 0 means no timeout. -t Test an unconfigured bank of memory. Specify the test level using the <code>-o quick normal extended</code> option. <code>cfgadm</code> exits with a 0 (success) if the <i>test</i> was able to run on the memory bank. The result of the test is available in the condition for the attachment point. -v Verbose option. Use this option in combination with the <code>-t</code> option to display detailed progress and results of tests. -x relocate-test For all pages of memory in use on the specified memory bank, a relocation operation as used in the <code>unconfigure</code> command is attempted. The success of this operation does not guarantee that the bank can be unconfigured. Failure indicates that it probably cannot be unconfigured. This option is for test purposes only.
OPERANDS	The following operand is supported: <i>ac#</i>:<i>bank#</i> The attachment points for memory banks are published by instances of the address controller (ac) driver (<i>ac#</i>). One instance of the ac driver is created for each system board, but only those instances associated with CPU/Memory boards publish the two bank attachment points, bank0 and bank1. This form conforms to the logical <code>ap_id</code> specification given in <code>cfgadm(1M)</code>. The corresponding physical <code>ap_ids</code> are listed in the FILES section. The ac driver instance numbering has no relation to the slot number for the corresponding board. The full physical attachment point identifier has the slot number incorporated into it as twice the slot number in hexadecimal directly following the <code>fhc@</code> part.
FILES	<code>/devices/fhc@*,f8800000/ac@0,1000000:bank?</code> attachment points <code>/usr/platform/sun4u/lib/cfgadm/cfgadm_ac.so.1</code> hardware specific library file
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:

cfgadm_ac(1M)

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkvm.u

SEE ALSO `cfgadm(1M)`, `cfgadm_sysctrl(1M)`, `config_admin(3CFGADM)`, `attributes(5)`
Sun Enterprise 6x00, 5x00, 4x00 and 3x00 Systems Dynamic Reconfiguration User's Guide
Platform Notes: Sun Enterprise 6x00/5x00/4x00/3x00 Systems

NOTES Refer to the *Sun Enterprise 6x00, 5x00, 4x00 and 3x00 Systems Dynamic Reconfiguration User's Guide* for additional details regarding dynamic reconfiguration of EXX00 system CPU/Memory boards.

cfgadm_pci(1M)

NAME	cfgadm_pci – PCI Hotplug hardware specific commands for cfgadm										
SYNOPSIS	<pre> /usr/sbin/cfgadm [-f] [-y -n] [-v] [-o hardware_options] -c function ap_id [ap_id] /usr/sbin/cfgadm [-f] [-y -n] [-v] [-o hardware_options] -x hardware_function ap_id [ap_id] /usr/sbin/cfgadm [-v] [-s listing_options] [-o hardware_options] [-l [ap_id ap_type]] /usr/sbin/cfgadm [-v] [-o hardware_options] -t ap_id [ap_id] /usr/sbin/cfgadm [-v] [-o hardware_function] -h [ap_id ap_type] </pre>										
DESCRIPTION	The PCI hardware specific library <code>/usr/lib/cfgadm/pci.so.1</code> provides the support for hot plugging pci adapter cards into pci hot pluggable slots in a system that is hot plug capable, through <code>cfgadm(1M)</code>. See <code>cfgadm(1M)</code>. For PCI Hot Plug, each hot plug slot on a specific PCI bus is represented by an attachment point of that specific PCI bus. An attachment point consist of two parts: a receptacle and an occupant. The receptacle under PCI hot plug is usually referred to as the physical hot pluggable slot; and the occupant is usually referred to as the PCI adapter card that plugs into the slot. Attachment points are named through <code>ap_ids</code>. There are two types of <code>ap_ids</code>: logical and physical. The physical <code>ap_id</code> is based on the physical pathname, that is, <code>/devices/pci@1/hpc0_slot3</code>, whereas the logical <code>ap_id</code> is a shorter, and more user-friendly name. For PCI hot pluggable slots, the logical <code>ap_id</code> is usually the corresponding hot plug controller driver name plus the logical slot number, that is, <code>pci0:hpc0slot1</code>; pci nexus driver, with hot plug controller driver named <code>hpc</code> and slot number 1. The <code>ap_type</code> for Hot plug PCI is <code>pci</code>. Note that the <code>ap_type</code> is not the same as the information in the <code>Type</code> field. See the <i>System Administration Guide, Volume I</i> for a detailed description of the hot plug procedure.										
OPTIONS	The following options are supported: <code>-c function</code> The following <i>functions</i> are supported for PCI hot pluggable slots: <table> <tbody> <tr> <td>configure</td><td>Configure the PCI device in the slot to be used by Solaris.</td></tr> <tr> <td>connect</td><td>Connect the slot to PCI bus.</td></tr> <tr> <td>disconnect</td><td>Disconnect the slot from the PCI bus.</td></tr> <tr> <td>insert</td><td>Not supported.</td></tr> <tr> <td>remove</td><td>Not supported.</td></tr> </tbody> </table>	configure	Configure the PCI device in the slot to be used by Solaris.	connect	Connect the slot to PCI bus.	disconnect	Disconnect the slot from the PCI bus.	insert	Not supported.	remove	Not supported.
configure	Configure the PCI device in the slot to be used by Solaris.										
connect	Connect the slot to PCI bus.										
disconnect	Disconnect the slot from the PCI bus.										
insert	Not supported.										
remove	Not supported.										

- unconfigure Logically remove the PCI device's resources from the system.
- f
Not supported.
- h *ap_id* | *ap_type*
Print out PCI hot plug specific help message.
- l *list*
List the values of PCI Hot Plug slots.
- o *hardware_options*
No hardware specific options are currently defined.
- s *listing_options*
Same as the generic `cfgadm(1M)`.
- t *ap_id*
This command is only supported on platforms which support testing capability on the slot.
- v
Execute in verbose mode.

When `-v` is used with `-l` option the `cfgadm` command outputs information about the attachment point. For PCI Hot Plug, the Information field will be the slot's system label. This string will be obtained from the `slot-name` property of the slot's bus node. The information in the Type field is printed with or without the `-v` option. The occupant Type field will describe the contents of the slot. There are 2 possible values:

NULL	The slot is empty. NULL should be unknown. There could be a card in the slot that is simply not configured.
<i>subclass,board</i>	The card in the slot is either a single- function or multi-function device.

subclass is a string representing the subclass code of the device, for example, SCSI, ethernet, pci-isa, and so forth. If the card is a multi-functional device, MULT will get printed instead.

board is a string representing the board type of the device, for example, hp for PCI Hot Plug adapter, hs for Hot Swap Board, nhs for Non—Hot Swap cPCI Board, bhs for Basic Hot Swap cPCI Board, fhs for Full Hot Swap cPCI Board.

Most pci cards with more than one device on them are not actually multi-function devices, but are implimented as a pci bridge with arbitraty devices behind it. In that case, the subclass displayed will be

that of the pci bridge.

-x hardware_function

Perform hardware specific function. These hardware specific functions should not normally change the state of a receptacle or occupant.

The following *hardware_functions* are supported:

enable_slot | disable_slot

Change the state of the slot and preserve the state of slot across reboot. Preservation of state across reboot is only supported on select platforms.

enable_slot enables the addition of hardware to this slot for hot plugging and at boot time.

disable_slot disables the addition of hardware to this slot for hot plugging and at boot time. When a slot is disabled its condition is shown as unusable.

enable_autoconfig | disable_autoconfig

Change the ability to autoconfigure the occupant of the slot. Only platforms that support auto configuration support this feature.

enable_autoconfig enables the ability to autoconfigure the slot.

disable_autoconfig disables the ability to autoconfigure the slot.

led=[led_sub_arg],mode=[mode_sub_arg]

Without sub-arguments, print a list of the current LED settings. With sub-arguments, set the mode of a specific LED for a slot.

Specify *led_sub_arg* as *fault*, *power*, *att*, or *active*.

Specify *mode_sub_arg* as *on*, *off* or *blink*.

Changing the state of the LED does not change the state of the receptacle or occupant. Normally, the LEDs are controlled by the hot plug controller, no user intervention is necessary. Use this command for testing purposes.

Caution: Changing the state of the LED can misrepresent the state of occupant or receptacle.

The following command prints the values of LEDs:

```
example#  cfgadm -x led pci0:hpc0_slot1Ap_Id          Led
pci0:hpc0_slot1  power=on,fault=off,active=off,attn=off
```

The following command turns on the Fault LED:

```
example#  cfgadm -x led=fault,mode=on pci0:hpc0_slot1
```

The following command turns off the Power LED:

```
example# cfgadm -x led=power,mode=off pci0:hpc0_slot0
```

The following command sets the *active* LED to blink to indicate the location of the slot:

```
example# cfgadm -x led=active,mode=on pci0:hpc0_slot3
```

EXAMPLES

EXAMPLE 1 Printing out the Value of Each Slot

The following command prints out the values of each slot:

```
example# cfgadm -l
```

Ap_Id	Type	Receptacle	Occupant	Condition
pci1:hpc0_slot0	unknown	empty	unconfigured	unknown
pci1:hpc0_slot1	unknown	empty	unconfigured	unknown
pci1:hpc0_slot2	unknown	empty	unconfigured	unknown
pci1:hpc0_slot3	HP/SCSI	connected	configured	ok
pci1:hpc0_slot4	unknown	empty	unconfigured	unknown

EXAMPLE 2 Replacing a Card

The following command lists all DR-capable attachment points:

```
example# cfgadm
```

Ap_Id	Type	Receptacle	Occupant	Condition
c0	scsi-bus	connected	configured	unknown
pci_pci0:cpci_slot1	stpcipci/fhs	connected	configured	ok
pci_pci0:cpci_slot	unknown	empty	unconfigured	unknown
pci_pci0:cpci_slot4	stpcipci/fhs	connected	configured	ok
pci_pci0:cpci_slot5	unknown	empty	unconfigured	unknown

The following command unconfigures and electrically disconnects the card:

```
example# cfgadm -c disconnect pci_pci0:cpci_slot4
```

The change can be verified by entering the following command:

```
example# cfgadm
```

Ap_Id	Type	Receptacle	Occupant	Condition
c0	scsi-bus	connected	configured	unknown
pci_pci0:cpci_slot1	stpcipci/fhs	connected	configured	ok
pci_pci0:cpci_slot	unknown	empty	unconfigured	unknown
pci_pci0:cpci_slot4	unknown	disconnected	unconfigured	unknown
pci_pci0:cpci_slot	unknown	empty	unconfigured	unknown

Now the card can be swapped. The following command electrically connects and configures the card:

```
example# cfgadm -c configure pci_pci0:cpci_slot4
```

The change can be verified by entering the following command:

```
# cfgadm
```

Ap_Id	Type	Receptacle	Occupant	Condition
c0	scsi-bus	connected	configured	unknown

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EXAMPLE 2 Replacing a Card *(Continued)*

```
pci_pci0:cpci_slot1    stpcipci/fhs connected    configured    ok
pci_pci0:cpci_slot2    unknown        empty          unconfigured  unknown
pci_pci0:cpci_slot4    stpcipci/fhs connected    configured    ok
pci_pci0:cpci_slot5    unknown        empty          unconfigured  unknown
```

FILES /usr/lib/cfgadm/pci.so.1 Hardware specific library for PCI hot plugging.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkvm.u

SEE ALSO cfgadm(1M), config_admin(3CFGADM), libcfgadm(3LIB)attributes(5)
System Administration Guide: Basic Administration

NAME	cfgadm_sbd – cfgadm commands for system board administration						
SYNOPSIS	<pre> cfgadm -l [-a] [-o parsable] <i>ap_id...</i> cfgadm -c <i>function</i> [-f] [-y -n] [-o unassign nopoweroff] [-v] <i>ap_id...</i> cfgadm -t [-v] <i>ap_id...</i> cfgadm -x [-f] [-v] <i>function ap_id...</i> </pre>						
DESCRIPTION	The <code>cfgadm_sbd</code> plugin provides dynamic reconfiguration functionality for connecting, configuring, unconfiguring, and disconnecting class <code>sb</code> system boards. It also enables you to connect or disconnect a system board from a running system without having to reboot the system. The <code>cfgadm</code> command resides in <code>/usr/sbin</code>. See <code>cfgadm(1M)</code>. The <code>cfgadm_sbd</code> plugin resides <code>/usr/platform/sun4u/lib/cfgadm</code>. Each board slot appears as a single attachment point in the device tree. Each component appears as a dynamic attachment point. You can view the type, state, and condition of each component, and the states and condition of each board slot by using the <code>-a</code> option. The <code>cfgadm</code> options perform differently depending on the platform. Additionally, the form of the attachment points is different depending on the platform. See the Platform Notes section for more information.						
Component Conditions	The following are the names and descriptions of the component conditions: <table> <tr> <td>failed</td><td>The component failed testing.</td></tr> <tr> <td>ok</td><td>The component is operational.</td></tr> <tr> <td>unknown</td><td>The component has not been tested.</td></tr> </table>	failed	The component failed testing.	ok	The component is operational.	unknown	The component has not been tested.
failed	The component failed testing.						
ok	The component is operational.						
unknown	The component has not been tested.						
Component States	The following is the name and description of the receptacle state for components: <table> <tr> <td>connected</td><td>The component is connected to the board slot.</td></tr> </table> The following are the names and descriptions of the occupant states for components: <table> <tr> <td>configured</td><td>The component is available for use by the Solaris operating environment.</td></tr> <tr> <td>unconfigured</td><td>The component is not available for use by the Solaris operating environment.</td></tr> </table>	connected	The component is connected to the board slot.	configured	The component is available for use by the Solaris operating environment.	unconfigured	The component is not available for use by the Solaris operating environment.
connected	The component is connected to the board slot.						
configured	The component is available for use by the Solaris operating environment.						
unconfigured	The component is not available for use by the Solaris operating environment.						
Board Conditions	The following are the names and descriptions of the board conditions. <table> <tr> <td>failed</td><td>The board failed testing.</td></tr> <tr> <td>ok</td><td>The board is operational.</td></tr> <tr> <td>unknown</td><td>The board has not been tested.</td></tr> </table>	failed	The board failed testing.	ok	The board is operational.	unknown	The board has not been tested.
failed	The board failed testing.						
ok	The board is operational.						
unknown	The board has not been tested.						

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	unusable	The board slot is unusable.
Board States	Inserting a board changes the receptacle state from empty to disconnected. Removing a board changes the receptacle state from disconnected to empty.	
	Caution: Removing a board that is in the connected state or that is powered on and in the disconnected state crashes the operating system and can result in permanent damage to the system.	
	The following are the names and descriptions of the receptacle states for boards:	
	connected	The board is powered on and connected to the system bus. You can view the components on a board only after it is in the connected state.
	disconnected	The board is disconnected from the system bus. A board can be in the disconnected state without being powered off. However, a board must be powered off and in the disconnected state before you remove it from the slot.
	empty	A board is not present.
	The occupant state of a disconnected board is always unconfigured. The following table contains the names and descriptions of the occupant states for boards:	
	configured	At least one component on the board is configured.
	unconfigured	All of the components on the board are unconfigured.
Dynamic System Domains	Platforms based on dynamic system domains (DSDs, referred to as domains in this document) divide the slots in the chassis into electrically isolated hardware partitions (that is, DSDs). Platforms that are not based on DSDs assign all slots to the system permanently.	
	A slot can be empty or populated, and it can be assigned or available to any number of domains. The number of slots available to a given domain is controlled by an available component list (ACL) that is maintained on the system controller. The ACL is not the access control list provided by the Solaris operating environment.	
	A slot is visible to a domain only if the slot is in the domain’s ACL and if it is not assigned to another domain. An unassigned slot is visible to all domains that have the slot in their ACL. After a slot has been assigned to a domain, the slot is no longer visible to any other domain.	
	A slot that is visible to a domain, but not assigned, must first be assigned to the domain before any other state changing commands are applied. The assign can be done explicitly using <code>-x assign</code> or implicitly as part of a connect. A slot must be unassigned from a domain before it can be used by another domain. The unassign is always explicit, either directly using <code>-x unassign</code> or as an option to disconnect using <code>-o unassign</code> .	

State Change Functions	Functions that change the state of a board slot or a component on the board can be issued concurrently against any attachment point. Only one state changing operation is permitted at a given time. A Y in the Busy field in the state changing information indicates an operation is in progress. The following list contains the functions that change the state: ■ configure ■ unconfigure ■ connect ■ disconnect
Availability Change Functions	Commands that change the availability of a board can be issued concurrently against any attachment point. Only one availability change operation is permitted at a given time. These functions also change the information string in the <code>cfgadm -l</code> output. A Y in the Busy field indicates that an operation is in progress. The following list contains the functions that change the availability: ■ assign ■ unassign
Condition Change Functions	Functions that change the condition of a board slot or a component on the board can be issued concurrently against any attachment point. Only one condition change operation is permitted at a given time. These functions also change the information string in the <code>cfgadm -l</code> output. A Y in the Busy field indicates an operation is in progress. The following list contains the functions that change the condition: ■ poweron ■ poweroff ■ test
Unconfigure Process	This section contains a description of the unconfigure process, and illustrates the states of source and target boards at different stages during the process of moving permanent memory. In the following code examples, the permanent memory on board 0 must be moved to another board in the domain. Thus, board 0 is the source, and board 1 is the target. A status change operation cannot be initiated on a board while it is marked as busy. For brevity, the CPU information has been removed from the code examples. The process is started with the following command: <pre># cfgadm -c unconfigure -y SB0::memory &</pre>

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First, the memory on board 1 in the same address range as the permanent memory on board 0 must be deleted. During this phase, the source board, the target board, and the memory attachment points are marked as busy. You can display the status with the following command:

```
# cfgadm -a -s cols=ap_id:type:receptacle:occupant:busy SB0 SB1
```

Ap_Id	Type	Receptacle	Occupant	Busy
SB0	CPU	connected	configured	y
SB0::memory	memory	connected	configured	y
SB1	CPU	connected	configured	y
SB1::memory	memory	connected	configured	y

After the memory has been deleted on board 1, it is marked as unconfigured. The memory on board 0 remains configured, but it is still marked as busy, as in the following example.

Ap_Id	Type	Receptacle	Occupant	Busy
SB0	CPU	connected	configured	y
SB0::memory	memory	connected	configured	y
SB1	CPU	connected	configured	y
SB1::memory	memory	connected	unconfigured	n

The memory from board 0 is then copied to board 1. After it has been copied, the occupant state for the memory is switched. The memory on board 0 becomes unconfigured, and the memory on board 1 becomes configured. At this point in the process, only board 0 remains busy, as in the following example.

Ap_Id	Type	Receptacle	Occupant	Busy
SB0	CPU	connected	configured	y
SB0::memory	memory	connected	unconfigured	n
SB1	CPU	connected	configured	n
SB1::memory	memory	connected	configured	n

After the entire process has been completed, the memory on board 0 remains unconfigured, and the attachment points are not busy, as in the following example.

Ap_Id	Type	Receptacle	Occupant	Busy
SB0	CPU	connected	configured	n
SB0::memory	memory	connected	unconfigured	n
SB1	CPU	connected	configured	n
SB1::memory	memory	connected	configured	n

The permanent memory has been moved, and the memory on board 0 has been unconfigured. At this point, you can initiate a new state changing operation on either board.

Platform-Specific Options

You can specify platform-specific options that follow the options interpreted by the system board plugin. All platform-specific options must be preceded by the `platform` keyword. The following example contains the general format of a command with platform-specific options:

```
command -o sbd_options,platform=platform_options
```

OPTIONS

This man page does not include the `-v`, `-a`, `-s`, or `-h` options for the `cfgadm` command. See `cfgadm(1M)` for descriptions of those options. The following options are supported by the `cfgadm_sbd` plugin:

`-c function`

Performs a state change function. You can use the following functions:

`unconfigure`

Changes the occupant state to unconfigured. This function applies to system board slots and to all of the components on the system board.

The `unconfigure` function removes the CPUs from the CPU list and deletes the physical memory from the system memory pool. If any device is still in use, the `cfgadm` command fails and reports the failure to the user. You can retry the command as soon as the device is no longer busy. If a CPU is in use, you must ensure that it is off line before you proceed. See `pbind(1M)`, `psradm(1M)` and `psrinfo(1M)`.

The `unconfigure` function moves the physical memory to another system board before it deletes the memory from the board you want to unconfigure. Depending of the type of memory being moved, the command fails if it cannot find enough memory on another board or if it cannot find an appropriate physical memory range.

For permanent memory, the operating system must be suspended (that is, quiesced) while the memory is moved and the memory controllers are reprogrammed. If the operating system must be suspended, you will be prompted to proceed with the operation. You can use the `-y` or `-n` options to always answer yes or no respectively.

Moving memory can take several minutes to complete, depending on the amount of memory and the system load. You can monitor the progress of the operation by issuing a `status` command against the memory attachment point. You can also interrupt the memory operation by stopping the `cfgadm` command. The deleted memory is returned to the system memory pool.

disconnect

Changes the receptacle state to disconnected. This function applies only to system board slots.

If the occupant state is configured, the `disconnect` function attempts to unconfigure the occupant. It then powers off the system board. At this point, the board can be removed from the slot.

This function leaves the board in the assigned state on platforms that support dynamic system domains.

If you specify `-o nopoweroff`, the `disconnect` function leaves the board powered on. If you specify `-o unassign`, the `disconnect` function unassigns the board from the domain.

If you unassign a board from a domain, you can assign it to another domain. However, if it is assigned to another domain, it is not available to the domain from which it was unassigned.

configure

Changes the occupant state to configured. This function applies to system board slots and to any components on the system board.

If the receptacle state is disconnected, the `configure` function attempts to connect the receptacle. It then walks the tree of devices that is created by the `connect` function, and attaches the devices if necessary. Running this function configures all of the components on the board, except those that have already been configured.

For CPUs, the `configure` function adds the CPUs to the CPU list. For memory, the `configure` function ensures that the memory is initialized then adds the memory to the system memory pool. The CPUs and the memory are ready for use after the `configure` function has been completed successfully.

For I/O devices, you must use the `mount` and the `ifconfig` commands before the devices can be used. See `ifconfig(1M)` and `mount(1M)`.

connect

Changes the receptacle state to connected. This function applies only to system board slots.

If the board slot is not assigned to the domain, the `connect` function attempts to assign the slot to the domain. Next, it powers on and tests the board, then it connects the board electronically to the system bus and probes the components.

After the `connect` function is completed successfully, you can use the `-a` option to view the status of the components on the board. The `connect` function leaves all of the components in the unconfigured state.

The assignment step applies only to platforms that support dynamic system domains.

`-f` Overrides software state changing constraints.

The `-f` option never overrides fundamental safety and availability constraints of the hardware and operating system.

`-l` Lists the state and condition of attachment points specified in the format controlled by the `-s`, `-v`, and `-a` options as specified in `cfgadm(1M)`. The `cfgadm_sbd` plugin provides specific information in the `info` field as described below. The format of this information might be altered by the `-o parsable` option.

The parsable `info` field is composed of the following:

cpu

The `cpu` type displays the following information:

`cpuid=#[,#...]`

Where `#` is a number, and represents the ID of the CPU. If more than one `#` is present, this CPU has multiple active virtual processors.

`speed=#`

Where `#` is a number and represents the speed of the CPU in MHz.

`ecache=#`

Where `#` is a number and represents the size of the ecache in MBytes. If the CPU has multiple active virtual processors, the ecache could either be shared among the virtual processors, or divided between them.

memory

The `memory` type displays the following information, as appropriate:

`address=#`

Where `#` is a number, representing the base physical address.

`size=#`

Where `#` is a number, representing the size of the memory in KBytes.

`permanent=#`

Where `#` is a number, representing the size of permanent memory in KBytes.

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unconfigurable

An operating system setting that prevents the memory from being unconfigured.

inter-board-interleave

The board is participating in interleaving with other boards.

source=*ap_id*

Represents the source attachment point.

target=*ap_id*

Represents the target attachment point.

deleted=#

Where # is a number, representing the amount of memory that has already been deleted in KBytes.

remaining=#

Where # is a number, representing the amount of memory to be deleted in KBytes.

io

The `io` type displays the following information:

device=*path*

Represents the physical path to the I/O component.

referenced

The I/O component is referenced.

board

The board type displays the following boolean names. If they are not present, then the opposite applies.

assigned

The board is assigned to the domain.

powered-on

The board is powered on.

The same items appear in the `info` field in a more readable format if the `-o parsable` option is not specified.

-o parsable

Returns the information in the `info` field as a boolean *name* or a set of *name=value* pairs, separated by a space character.

The `-o parsable` option can be used in conjunction with the `-s` option. See the `cfgadm(1M)` man page for more information about the `-s` option.

-t

Tests the board.

Before a board can be connected, it must pass the appropriate level of testing.

	Use of this option always attempts to test the board, even if it has already passed the appropriate level of testing. Testing is also performed when a <code>-c connect</code> state change function is issued, in which case the test step can be skipped if the board already shows an appropriate level of testing. Thus the <code>-t</code> option can be used to explicitly request that the board be tested.
<code>-x function</code>	Performs an sbd-class function. You can use the following functions: assign Assigns a board to a domain. The receptacle state must be disconnected or empty. The board must also be listed in the domain available component list. See Dynamic System Domains. unassign Unassigns a board from a domain. The receptacle state must be disconnected or empty. The board must also be listed in the domain available component list. See Dynamic System Domains. poweron Powers the system board on. The receptacle state must be disconnected. poweroff Powers the system board off. The receptacle state must be disconnected.
OPERANDS	The following operands are supported: Receptacle <i>ap_id</i> For the Sun Fire 15K, the receptacle attachment point ID takes the form <code>SBX</code> or <code>IOX</code>, where <code>X</code> equals the slot number. The exact format depends on the platform and typically corresponds to the physical labelling on the machine. See the platform specific information in the NOTES section. Component <i>ap_id</i> The component attachment point ID takes the form <code>component_typeX</code>, where <code>component_type</code> equals one of the component types described in "Component Types" and <code>X</code> equals the component number. The component number is a board-relative unit number.

The above convention does not apply to memory components. Any DR action on a memory attachment point affects all of the memory on the system board.

EXAMPLES The following examples show user input and system output on a Sun Fire 15K system. User input — specifically references to attachment points — and system output might differ on other Sun Fire systems, such as the 6800 and 4810 models. Refer to the Platform Notes for specific information about using the `cfgadm_sbd` plugin on non-15000 models.

EXAMPLE 1 Listing All of the System Board

```
# cfgadm -a -s "select=class(sbd) "
```

Ap_Id	Type	Receptacle	Occupant	Condition
SB0	CPU	connected	configured	ok
SB0::cpu0	cpu	connected	configured	ok
SB0::memory	memory	connected	configured	ok
IO1	HPCI	connected	configured	ok
IO1::pci0	io	connected	configured	ok
IO1::pci1	io	connected	configured	ok
SB2	CPU	disconnected	unconfigured	failed
SB3	CPU	disconnected	unconfigured	unusable
SB4	unknown	empty	unconfigured	unknown

This example demonstrates the mapping of the following conditions:

- The board in Slot 2 failed testing.
- Slot 3 is unusable; thus, you cannot hot plug a board into that slot.

EXAMPLE 2 Listing All of the CPUs on the System Board

```
# cfgadm -a -s "select=class(sbd):type(cpu) "
```

Ap_Id	Type	Receptacle	Occupant	Condition
SB0::cpu0	cpu	connected	configured	ok
SB0::cpu1	cpu	connected	configured	ok
SB0::cpu2	cpu	connected	configured	ok
SB0::cpu3	cpu	connected	configured	ok

EXAMPLE 3 Displaying the CPU Information Field

```
# cfgadm -l -s noheadings,cols=info SB0::cpu0
```

```
cpuid 16, speed 400 MHz, ecache 8 Mbytes
```

EXAMPLE 4 Displaying the CPU Information Field in Parsable Format

```
# cfgadm -l -s noheadings,cols=info -o parsable SB0::cpu0
```

```
cpuid=16 speed=400 ecache=8
```


EXAMPLE 5 Displaying the Devices on an I/O Board

```
# cfgadm -a -s noheadings,cols=ap_id:info -o parsable IO1

IO1          powered-on assigned
IO1::pci0 device=/devices/saf@0/pci@0,2000 referenced
IO1::pci1 device=/devices/saf@0/pci@1,2000 referenced
```

EXAMPLE 6 Monitoring an Unconfigure Operation

In the following example, the memory sizes are displayed in Kbytes.

```
# cfgadm -c unconfigure -y SB0::memory &
# cfgadm -l -s noheadings,cols=info -o parsable SB0::memory SB1::memory

address=0x0 size=2097152 permanent=752592 target=SB1::memory
      deleted=1273680 remaining=823472
address=0x1000000 size=2097152 source=SB0::memory
```

EXAMPLE 7 Assigning a Slot to a Domain

```
# cfgadm -x assign SB2
```

EXAMPLE 8 Unassigning a Slot from a Domain

```
# cfgadm -x unassign SB3
```

ATTRIBUTES

See attributes(5) for a description of the following attribute:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkvm.u
Stability	See below.

The interface stability is evolving. The output stability is unstable.

SEE ALSO

cfgadm(1M), devfsadm(1M), ifconfig(1M), mount(1M), pbind(1M), psradm(1M), psrinfo(1M), config_admin(3CFGADM), attributes(5)

NOTES

This section contains information on how to monitor the progress of a memory delete operation. It also contains platform specific information.

Memory Delete Monitoring

The following shell script can be used to monitor the progress of a memory delete operation.

```
# cfgadm -c unconfigure -y SB0::memory &
# watch_memdel SB0

#!/bin/sh
# This is the watch_memdel script.
```

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```
if [ -z "$1" ]; then
    printf "usage:  %s board_id\n" `basename $0`
    exit 1
fi

board_id=$1

cfgadm_info='cfgadm -s noheadings,cols=info -o parsable'

eval ` $cfgadm_info $board_id::memory `

if [ -z "$remaining" ]; then
    echo no memory delete in progress involving $board_id
    exit 0
fi

echo deleting target $target

while true
do
    eval ` $cfgadm_info $board_id::memory `

    if [ -n "$remaining" -a "$remaining" -ne 0 ]
    then
        echo $deleted KBytes deleted, $remaining KBytes remaining
        remaining=
    else
        echo memory delete is done
        exit 0
    fi
    sleep 1
done
exit 0
```

Sun Enterprise 10000 Platform Notes

The following syntax is used to refer to Platform Notes attachment points on the Sun Enterprise 10000 system:

board::component

where *board* refers to the system board; and *component* refers to the individual component. System boards can range from SB0 (zero) to SB15. A maximum of sixteen system boards are available.

The DR 3.0 model running on a Sun Enterprise 10000 domain supports a limited subset of the functionality provided by the `cfgadm_sbd` plugin. The only supported operation is to view the status of attachment points in the domain. This corresponds to the `-l` option and all of its associated options.

Attempting to perform any other operation from the domain will result in an error that states that the operation is not supported. All operations to add or remove a system board must be initiated from the System Service Processor.

Sun Fire 15K Platform Notes

The following syntax is used to refer to attachment points on the Sun Fire 15K system:

board::component

where *board* refers to the system board or I/O board; and *component* refers to the individual component.

Depending on the system's configuration, system boards can range from SB0 (zero) through SB17, and I/O boards can range from IO0 (IO zero) through IO17. (A maximum of eighteen system and I/O boards are available).

The -t and -x options behave differently on the Sun Fire 15K platform. The following list describes their behavior:

- t The system controller uses a CPU to test system boards by running LPOST, sequenced by the hpost command. To test I/O boards, the driver starts the testing in response to the -t option, and the test runs automatically without user intervention. The driver unconfigures a CPU and a stretch of contiguous physical memory. Then, it sends a command to the system controller to test the board. The system controller uses the CPU and memory to test the I/O board from inside of a transaction/error cage. You can only use CPUs from system boards (not MCPU boards) to test I/O boards.
- x assign | unassign In the Sun Fire 15K system administration model, the platform administrator controls the platform hardware through the use of an available component list for each domain. This information is maintained on the system controller. Only the platform administrator can modify the available component list for a domain.

The domain administrator is only allowed to assign or unassign a board if it is in the available component list for that domain. The platform administrator does not have this restriction, and can assign or unassign a board even if it is not in the available component list for a domain.

Sun Fire 15K Component Types

The following are the names and descriptions of the component types:

cpu	CPU
io	I/O device
memory	Memory

Note: An operation on a memory component affects all of the memory components on the board.

Sun Fire 6800, 4810, 4800 and 3800 Platform Notes

References to attachment points are slightly different on Sun Fire 6800, 4810, 4800, and 3800 systems than on the Sun Fire 15K system. The following syntax is used to refer to attachment points on Sun Fire systems other than the Sun Fire 15K:

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N#.board : :component

where **N#** refers to the node; *board* refers to the system board or I/O board; and *component* refers to the individual component.

Depending on the system's configuration, system boards can range from SB0 through SB5, and I/O boards can range from IB6 through IB9. (A maximum of six system and four I/O boards are available).

**Sun Fire 6800,
4810, 4800 and 3800
Component Types**

The following are the names and descriptions of the component types:

cpu	CPU
pci	I/O device
memory	Memory

Note: An operation on a memory component affects all of the memory components on the board.

NAME	cfgadm_scsi – SCSI hardware specific commands for cfgadm
SYNOPSIS	<pre> /usr/sbin/cfgadm [-f] [-y -n] [-v] [-o hardware_option] -c function ap_id... /usr/sbin/cfgadm [-f] [-y -n] [-v] [-o hardware_option] -x hardware_function ap_id... /usr/sbin/cfgadm [-v] [-a] [-s listing_option] [-o hardware_option] -l [ap_id ap_type ...] /usr/sbin/cfgadm [-v] [-o hardware_option] -t ap_id... /usr/sbin/cfgadm [-v] [-o hardware_option] -h [ap_id...] </pre>
DESCRIPTION	The SCSI hardware specific library <code>/usr/lib/cfgadm/scsi.so.1</code> provides the functionality for SCSI hot-plugging through the <code>cfgadm(1M)</code> command. <code>cfgadm</code> operates on attachment points, which are locations in the system where hardware resources can be dynamically reconfigured. Refer to <code>cfgadm(1M)</code> for information regarding attachment points. For SCSI hot-plugging, each SCSI controller is represented by an attachment point in the device tree. In addition, each SCSI device is represented by a dynamic attachment point. Attachment points are named through <code>ap_ids</code>. Two types of <code>ap_ids</code> are defined: logical and physical. The physical <code>ap_id</code> is based on the physical pathname, whereas the logical <code>ap_id</code> is a shorter more user-friendly name. For SCSI controllers, the logical <code>ap_id</code> is usually the corresponding disk controller number. For example, a typical logical <code>ap_id</code> would be <code>c0</code>. SCSI devices are named relative to the controller <code>ap_id</code>. Thus if a disk device is attached to controller <code>c0</code>, its <code>ap_id</code> can be: <pre>c0::dsk/c0t0d0</pre> where <code>dsk/c0t0d0</code> identifies the specific device. In general, the device identifier is derived from the corresponding logical link for the device in <code>/dev</code>. For example, a SCSI tape drive logical <code>ap_id</code> could be <code>c0::rmt/0</code>. Here <code>c0</code> is the logical <code>ap_id</code> for the SCSI controller and <code>rmt/0</code> is derived from the logical link for the tape drive in <code>/dev/rmt</code>. If an identifier can not be derived from the link in <code>/dev</code>, a unique identifier will be assigned to it. For example, if the tape device has no link in <code>/dev</code>, it can be assigned an <code>ap_id</code> of the form <code>c0::st3</code> where <code>st3</code> is a unique internally generated identifier. A simple listing of attachment points in the system will include attachment points at SCSI controllers but not SCSI devices. Use the <code>-a</code> flag to the list option (<code>-l</code>) to list SCSI devices as well. For example: <pre> # cfgadm -l Ap_Id Type Receptacle Occupant Condition c0 scsi-bus connected configured unknown sysctrl0:slot0 cpu/mem connected configured ok sysctrl0:slot1 sbus-upa connected configured ok </pre>

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To list SCSI devices in addition to SCSI controllers:

```
# cfgadm -al
```

Ap_Id	Type	Receptacle	Occupant	Condition
c0	scsi-bus	connected	configured	unknown
c0::dsk/c0t14d0	disk	connected	configured	unknown
c0::dsk/c0t11d0	disk	connected	configured	unknown
c0::dsk/c0t8d0	disk	connected	configured	unknown
c0::dsk/c0t0d0	disk	connected	configured	unknown
c0::rmt/0	tape	connected	configured	unknown
sysctrl0:slot0	cpu/mem	connected	configured	ok
sysctrl0:slot1	sbus-upa	connected	configured	ok

Refer to `cfgadm(1M)` for more information regarding listing attachment points. The receptacle and occupant state for attachment points at the SCSI controller have the following meanings:

empty

not applicable

disconnected

bus quiesced (I/O activity on bus is suspended)

connected

bus active

configured

one or more devices on the bus is configured

unconfigured

no device on the bus is configured

The corresponding states for individual SCSI devices are:

empty

not applicable

disconnected

bus to which the device is attached is quiesced

connected

bus to which device is attached is active

configured

device is configured

unconfigured

device is not configured

OPTIONS

`cfgadm` defines several types of operations besides listing (-l). These operations include testing, (-t), invoking configuration state changes, (-c), invoking hardware specific functions (-x), and obtaining configuration administration help messages (-h).

-c *function*

The following generic commands are defined for the SCSI hardware specific library:

For SCSI controller attachment points, the following configuration state change operations are supported:

connect	Unquiesce the SCSI bus.
disconnect	Quiesce the bus (suspend I/O activity on bus).
	Incorrect use of this command can cause the system to hang. See NOTES.
configure	Configure new devices on SCSI bus.
unconfigure	Unconfigure all devices connected to bus.

The following generic commands are defined for SCSI devices:

configure	configure a specific device
unconfigure	unconfigure a specific device

-f

When used with the `disconnect` command, forces a quiesce of the SCSI bus, if supported by hardware.

Incorrect use of this command can cause the system to hang. See NOTES.

-h *ap_id*

SCSI specific help can be obtained by using the help option with any SCSI attachment point.

-o *hardware_option*

No hardware specific options are currently defined.

-s *listing_option*

Attachment points of class `scsi` can be listed by using the `select` sub-option. Refer to the `cfgadm(1M)` man page for additional information.

-t *ap_id*

No test commands are available at present.

-x *hardware_function*

Some of the following commands can only be used with SCSI controllers and some only with SCSI devices.

In the following, *controller_ap_id* refers to an *ap_id* for a SCSI controller, for example, `c0`. *device_ap_id* refers to an *ap_id* for a SCSI device, for example: `c0::dsk/c0dt3d0`.

The following hardware specific functions are defined:

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`insert_device controller_ap_id`

Add a new device to the SCSI controller,
controller_ap_id.

This command is intended for interactive use only.

`remove_device device_ap_id`

Remove device *device_ap_id*.

This command is intended for interactive use only.

`replace_device device_ap_id`

Remove device *device_ap_id* and replace it with
another device of the same kind.

This command is intended for interactive use only.

`reset_device device_ap_id`

Reset *device_ap_id*.

`reset_bus controller_ap_id`

Reset bus *controller_ap_id* without resetting any
devices attached to the bus.

`reset_all controller_ap_id`

Reset bus *controller_ap_id* and all devices on the bus.

EXAMPLES

EXAMPLE 1 Configuring a Disk

The following command configures a disk attached to controller c0:

```
# cfgadm -c configure c0::dsk/c0t3d0
```

EXAMPLE 2 Unconfiguring a Disk

The following command unconfigures a disk attached to controller c0:

```
# cfgadm -c unconfigure c0::dsk/c0t3d0
```

EXAMPLE 3 Adding a New Device

The following command adds a new device to controller c0:

```
# cfgadm -x insert_device c0
```

The system responds with the following:

```
Adding device to SCSI HBA: /devices/sbus@1f,0/SUNW,fas@e,8800000
This operation will suspend activity on SCSI bus c0
Continue (yes/no)?
```

Enter:

```
y
```


EXAMPLE 3 Adding a New Device *(Continued)*

The system responds with the following:

```
SCSI bus quiesced successfully.
It is now safe to proceed with hotplug operation.
Enter y if operation is complete or n to abort (yes/no)?
```

Enter:

y

EXAMPLE 4 Replacing a Device

The following command replaces a device attached to controller c0:

```
# cfgadm -x replace_device c0::dsk/c0t3d0
```

The system responds with the following:

```
Replacing SCSI device: /devices/sbus@1f,0/SUNW,fas@e,8800000/sd@3,0
This operation will suspend activity on SCSI bus: c0
Continue (yes/no)?
```

Enter:

y

The system responds with the following:

```
SCSI bus quiesced successfully.
It is now safe to proceed with hotplug operation.
Enter y if operation is complete or n to abort (yes/no)?
```

Enter:

y

EXAMPLE 5 Encountering a Mounted File System While Unconfiguring a Disk

The following command illustrates encountering a mounted file system while unconfiguring a disk:

```
# cfgadm -c unconfigure c1::dsk/clt0d0
```

The system responds with the following:

```
cfgadm: Component system is busy, try again: failed to offline:
/devices/pci@1f,4000/scsi@3,1/sd@1,0
      Resource                      Information
-----
/dev/dsk/clt0d0s0  mounted filesystem "/mnt"
```

FILES /usr/lib/cfgadm/scsi.so.1

hardware specific library for generic SCSI
hot-plugging

cfgadm_scsi(1M)

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcs1 (32-bit)
	SUNWcs1x (64-bit)

SEE ALSO

`cfgadm(1M)`, `luxadm(1M)`, `config_admin(3CFGADM)`,
`libcfgadm(3LIB)`, `attributes(5)`

NOTES

The `disconnect` (`quiesce`) operation is not supported on controllers which control disks containing critical partitions such as `root (/)`, `/usr`, `swap`, or `/var`. The `disconnect` operation should not be attempted on such controllers. Incorrect usage can result in a system hang and require a reboot.

Hotplugging operations are not supported by all SCSI controllers.

WARNINGS

The connectors on some SCSI devices do not confirm to SCSI hotplug specifications. Performing hotplug operations on such devices can cause damage to the hardware on the SCSI bus. Refer to your hardware manual for additional information.

NAME	cfgadm_sysctrl – EXX00 system board administration
SYNOPSIS	<pre> /usr/sbin/cfgadm -c <i>function</i> [-f] [-o disable-at-boot enable-at-boot] [-n -y] sysctrl0:slot# ... /usr/sbin/cfgadm -x quiesce-test sysctrl0:slot# /usr/sbin/cfgadm -x insert-test remove-test sysctrl0:slot# ... /usr/sbin/cfgadm -x set-condition-test=# sysctrl0:slot# ... /usr/sbin/cfgadm [-l] -o disable-at-boot enable-at-boot sysctrl0:slot# ... </pre>
DESCRIPTION	The <code>sysctrl</code> hardware specific library <code>/usr/platform/sun4u/lib/cfgadm/sysctrl.so.1</code> provides dynamic reconfiguration functionality for configuring and disconnecting system boards on E6X00, E5X00, E4X00, and E3X00 systems. You can insert both I/O and CPU boards into a slot on a running system that is configured for Solaris without rebooting. You can also disconnect and remove both types of boards from a running system without rebooting. System slots appear as attachment points in the device tree, one attachment point for each actual slot in the system chassis. If a board is not in a slot, the receptacle state is empty. If a board is powered-off and ready to remove, the receptacle state is disconnected. If a board is powered-on and is connected to the system bus, the receptacle state is connected. The occupant state is unconfigured when the receptacle state is empty or disconnected. The occupant state is either unconfigured or configured when the receptacle state is connected. In the configured state the devices on a board are available for use by Solaris. In the unconfigured state, the devices on the board are not. Inserting a board changes the receptacle state from empty to disconnected. Removing a board changes the receptacle state from disconnected to empty. Removing a board that is in the connected state crashes the operating system and can result in permanent damage to the system.
OPTIONS	Refer to <code>cfgadm(1M)</code> for a more complete description options. The following options are supported: -c <i>function</i> Perform the state change function. Specify <i>function</i> as <code>connect</code>, <code>disconnect</code>, <code>configure</code> or <code>unconfigure</code>. - configure Change the occupant state to configure.

cfgadm_sysctrl(1M)

If the receptacle state is disconnected, the configure function first attempts to connect the receptacle. The configure function walks the OBP device tree created as part of the connect function and creates the Solaris device tree nodes, attaching devices as required. For CPU/Memory boards, configure adds CPUs to the CPU list in the powered-off state. These are visible to the `psrinfo(1M)` and `psradm(1M)` commands. Two memory attachment points are published for CPU/memory boards. Use `mount(1M)` and `ifconfig(1M)` to use I/O devices on the new board. To use CPUs, use `psradm -n` to on-line the new processors. Use `cfgadm_ac(1M)` to test and configure the memory banks.

connect

Change the receptacle state to connected.

Changing the receptacle state requires that the system bus be frozen while the bus signals are connected and the board tested. The bus is frozen by running a quiesce operation which stops all process activity and suspends all drivers. Because the quiesce operation and the subsequent resume can be time consuming, and are not supported by all drivers, the `-x quiesce-test` is provided. While the system bus is frozen, the board being connected is tested by firmware. This operation takes a short time for I/O boards and a significant time for CPU/Memory boards due to CPU external cache testing. This does not provide memory testing. The user is prompted for confirmation before proceeding with the quiesce. Use the `-y` or `-n` option to override the prompt. The connect operation is refused if the board is marked as `disabled-at-boot`, unless either the force flag, `-f`, or the enable at boot flag, `-o enable-at-boot`, is given. See `-l`.

disconnect

Change the receptacle state to disconnected.

If the occupant state is configure, the disconnect function first attempts to unconfigure the occupant. The disconnect operation does not require a quiesce operation and operates quickly. The board is powered-off ready for removal.

unconfigure

Change the occupant state to unconfigured.

Devices on the board are made invisible to Solaris during this process. The I/O devices on an I/O board are removed from the Solaris device tree. Any device that is still in use stops the unconfigure process and be reported as in use. The unconfigure operation must be retried after the device is made non-busy. For CPU/Memory boards, the memory must have been changed to the unconfigured state prior to issuing the board unconfigure operation. The CPUs on the board are off-lined, powered off and removed from the Solaris CPU list. CPUs that have processes bound to them cannot be off-lined. See `psradm(1M)`, `psrinfo(1M)`, `pbind(1M)`, and `p_online(2)` for more information on off-lining CPUs.

- f
Force a block on connecting a board marked as disabled-at-boot in the non-volatile disabled-board-list variable. See *Platform Notes:Sun Enterprise 6x00/5x00/4x00/3x00 Systems*
- l
List options. Supported as described in `cfgadm(1M)``cfgadm(1M)`.

The *type* field can be one of `cpu/mem`, `mem`, `dual-sbus`, `sbus-upa`, `dual-pci`, `soc+sbus`, `soc+upa`, `disk` or `unknown`.

The hardware-specific info field is set as follows: `[disabled at boot]`
`[non-detachable]` `[100 MHz capable]`

For `sbus-upa` and `soc+upa` type boards, the following additional information appears first: `[single buffered ffb|double buffered ffb|no ffb installed]` For disk type boards, the following additional information appears first: `{target: # | no disk}` `{target: # | no disk}`
- o disable-at-boot | enable-at-boot
Modify the state of the non—volatile disabled-board-list variable. Use this the -o option in conjunction with the -c *function* or -l option.

Use -o enable-at-boot with the -c connect to override a block on connecting a disabled-at-boot board.
- x insert-test | remove-test
Perform a test.

Specify `remove-test` to change the driver state for the specified slot from disconnected to empty without the need for physically removing the board during automated test sequences.

Specify `insert-test` to change the driver state of a slot made to appear empty using the `remove-test` command to the disconnected state as if it had been inserted.
- x quiesce-test sysctrl0:slot1
Perform a test.

Allows the quiesce operation required for board connect operations to be exercised. The execution of this test confirms that, with the current software and hardware configuration, it is possible to quiesce the system. If a device or process cannot be quiesced, its name is printed in an error message. Any valid board attachment point can be used with this command, but since all systems have a slot1 the given form is recommended.
- x set-condition-test=#
Perform a test.

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Allows the the condition of a system board attachment point to be set for testing the policy logic for state change commands. The new setting is given as a number indicating one of the following condition values:

- 0 unknown
- 1 ok
- 2 failing
- 3 failed
- 4 unusable

OPERANDS The following operand is supported:

sysctrl0:slot# The attachment points for boards on EXX00 systems are published by instance 0 of the sysctrl driver (sysctrl0). The names of the attachment points are numbered from slot0 through slot15. Specify # as a number between 0 and 15, indicating the slot number. This form conforms to the logical ap_id specification given in cfgadm(1M). The corresponding physical ap_ids are listed in the FILES section.

FILES /usr/platform/sun4u/lib/cfgadm/sysctrl.so.1
Hardware specific library
/devices/central@1f,0/fhc@0,f8800000/clock-board@0,900000:slot*
Attachment Points

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkvm.u

SEE ALSO cfgadm(1M), cfgadm_ac(1M), ifconfig(1M), mount(1M), pbind(1M), psradm(1M), , psrinfo(1M), config_admin(3CFGADM), attributes(5)

Sun Enterprise 6x00, 5x00, 4x00 and 3x00 Systems Dynamic Reconfiguration User's Guide

Platform Notes:Sun Enterprise 6x00/5x00/4x00/3x00 Systems

NOTES Refer to the *Sun Enterprise 6x00, 5x00, 4x00 and 3x00 Systems Dynamic Reconfiguration User's Guide* for additional details regarding dynamic reconfiguration of EXX00 system CPU/Memory boards.

NAME	cfgadm_usb – USB hardware-specific commands for cfgadm
SYNOPSIS	<pre> /usr/sbin/cfgadm [-f] [-y -n] [-v] -c <i>function ap_id...</i> /usr/sbin/cfgadm -f [-y -n] [-v] [-o <i>hardware_options</i>] -x <i>hardware_function ap_id...</i> /usr/sbin/cfgadm -v [-a] [-s <i>listing_option</i>] [-l [<i>ap_id</i> <i>ap_type...</i>]] /usr/sbin/cfgadm -v -h [<i>ap_id...</i>] </pre>
DESCRIPTION	The Universal Serial Bus (USB) hardware-specific library <code>/usr/lib/cfgadm/usb.so.1</code> provides the functionality for administering USB devices via the <code>cfgadm(1M)</code> command. <code>cfgadm</code> operates on attachment points. For details regarding attachment points, refer to <code>cfgadm(1M)</code>. For USB administration, the only attachment points supported are the ports of hubs attached to the USB bus. Attachment points are named through attachment point IDs (<i>ap_ids</i>). The USB bus is hierarchical, so the <i>ap_ids</i> are as well. USB hubs have ports, numbered from 1 to <i>n</i>. All USB <i>ap_ids</i> consist of a string of the following form: <pre>usbN/A[.B[.C[...]]]</pre> where <i>N</i> is the <i>N</i>th USB host controller on the system, <i>A</i> is port #<i>A</i> on the root (top) hub. <i>B</i> is port #<i>B</i> of the hub plugged into port #<i>A</i> of the hub above it. <i>C</i> is port #<i>C</i> of the hub plugged into port #<i>B</i> of the hub above it, and so forth. For example, the first port on the root hub of USB controller 0 (the only controller), has a logical <i>ap_id</i>: <pre>usb0/1</pre> Similarly, the second port on the first external hub plugged into the first port on the root hub of the first USB controller has a logical <i>ap_id</i>: <pre>usb0/1.2</pre> For example, if the <i>ap_id</i> is <code>usb0/1.4.3.4</code>, it represents port 4 of the hub plugged into port 3 of the hub plugged into port 4 of the hub plugged into port 1 of the root hub of the first USB bus controller on the system. The following listing of USB attachment points in the system includes all attachment points for USB ports, even if the port is empty (no device plugged in): <pre> example# cfgadm -l Ap_Id Type Receptacle Occupant Condition usb0/1 USB-hub connected configured ok usb0/2 unknown empty unconfigured ok </pre>

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usb0/1.1	USB-storage	connected	configured	ok
usb0/1.2	unknown	empty	unconfigured	ok
usb0/1.3	unknown	empty	unconfigured	ok
usb0/1.4	USB-composit	connected	configured	ok

The receptacle states for attachment points at the USB port have the following meanings:

connected	USB port is powered on and enabled. A USB device is plugged in to the port. The device is logically connected to the USB bus.
disconnected	USB port is powered on and enabled. A USB device is plugged into the port. The device has been logically disconnected from the USB bus (using the <code>cfgadm -c disconnect</code> command).
empty	USB port is powered on, but no device is plugged in to it.

The occupant states for devices at USB port attachment points at the USB port have the following meanings:

configured

The USB device at the USB port is configured and usable by Solaris.

unconfigured

The USB device at the USB port was explicitly off-lined using `cfgadm -c unconfigure`, or was not successfully configured for use with Solaris, for example, having no driver or a device problem.

The attachment point conditions are:

ok

Normal state - ready for use.

failing

Not used.

failed

Not used.

unusable

The user has physically removed a device while an application had the device open (there may be outstanding I/O). Users need to reinsert the same physical device and close the application properly before removing the device again. The port cannot configure other inserted devices until this is done.

If the original device cannot be reinserted into the port, see the *System Administration Guide, Volume 1* for instructions for clearing this attachment point condition.

unknown

Not used.

A USB device can be hotplugged or hotunplugged at any time, and the system detects the event and takes the appropriate action.

It is not necessary to transition a receptacle to the `disconnected` state before removing its device from the USB. However, it is not recommended to hot-remove devices currently in use (such as removable disks currently opened by volume manager (see `vold(1M)`) or some other application).

OPTIONS

`cfgadm` defines several types of operations. These operations include invoking configuration state changes (`-c`), invoking hardware-specific functions (`-x`), and obtaining configuration administration help messages (`-h`).

If any of these operations fail, the device and attachment point may not be in the expected state. Use the `cfgadm -l` command to display the device's current status.

All other options have the same meaning as defined in `cfgadm(1M)`.

The following options are supported:

-c function

The following generic commands are defined for the USB hardware specific library. The following configuration state change operations are supported:

`configure`

If there is a USB device plugged into the port, this command attempts to configure it and set everything up so that it is usable by Solaris. This command does an implied connect (reverse of `disconnect`) if necessary. This command accomplishes nothing, and returns an error message, if the device at that port is already configured. After successful execution of this command, the device is ready for use under Solaris.

`disconnect`

Performs an `unconfigure` on the *ap_id* (if it is not already `unconfigured`), and then transitions the receptacle to the `disconnected` state, even though a device will still be plugged into the port. Issuing a `cfgadm -c configure`, or physically hotplugging the device, will bring the device back to the `connected` receptacle state, and to the `configured` occupant state, assuming a driver can be found and there are no problems enumerating and configuring the device.

`unconfigure`

Makes the device plugged into the port unusable by Solaris (offline it). If successful, `cfgadm` will now report this *ap_id*'s occupant state as `unconfigured`. Issuing a `configure` to the *ap_id* (if successful) will

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	bring its occupant back to the configured (online) condition, as will physically hotplugging the device on the port.
-f	Not supported.
-h <i>ap_id</i>	USB specific help may be obtained by using the help option with any USB attachment point.
-l[v]	The -l option works as described in <code>cfgadm(1M)</code>. When paired with the -v option, the Information field contains the following USB-specific information: ■ Mfg: manufacturer string (iManufacturer) ■ Product: product string (iProduct) ■ NConfigs: total number of configurations the device supports (bNumConfigurations). ■ Config: current configuration setting in decimal (configuration index, not configuration value). ■ The configuration string descriptor for the current configuration (iConfiguration) See the Universal Serial Bus specification for a description of these fields.
-o <i>hardware_options</i>	Hardware options are only supported for the hardware-specific command, -x <code>usb_config</code> . See the description of that command below for an explanation of the options available.
-s <i>listing_options</i>	Attachment points of class USB may be listed by using the <code>select</code> sub-option. See <code>cfgadm(1M)</code> .
-x <i>hardware_function</i>	The following hardware-specific functions are defined: <code>usb_config -o config=<i>n</i></code> This command requires the mandatory <code>config</code> value to be specified using the -o option. Sets the USB configuration of a multi-configuration USB device at <i>ap_id</i> to configuration index <i>n</i>. The device is set to this configuration henceforth and this setting persists across reboots, hot-removes, and unconfigure/configure of the device. Valid values of <i>n</i> range from 0 to (Nconfigs -1). The device is reset by a disconnect followed by a configure. The configure causes the device to be configured to the new configuration setting.

If any of these steps fail, the configuration file and the device are restored to their previous state and an error message is issued.

usb_reset

Performs a software reset (re-enumeration) of the device. This is the equivalent of removing the device and inserting it back again. The port on the hub will be power cycled if the hub supports power cycling of individual ports.

If the connected device is a hub, this function has the effect of resetting that hub and any devices down the tree of which it is the root.

If any of these steps fail, the device is restored to its previous state and an error message is issued.

State table: attachment points state versus commands:

Valid states:

empty/unconfigured	→ no device connected
disconnected/unconfigured	→ logically disconnected, unavailable, devinfo node removed, device physically connected
connected/unconfigured	→ logically connected, unavailable, devinfo node present
connected/configured	→ connected, available

The table below clarifies the state transitions resulting from actions or commands:

current state	operation	new state
-----	-----	-----
empty/ unconfigured:		
	device plugged in:	connected/configured or connected/unconfigured (if enumeration failed)
	device removed:	n/a
	cfgadm -c unconfigure:	empty/unconfigured
	cfgadm -c configure:	empty/unconfigured
	cfgadm -c disconnect:	empty/unconfigured (no-op and error)
disconnected/ unconfigured:		
	device plugged in:	n/a
	device removed:	empty/unconfigured
	cfgadm -c unconfigure:	disconnected/unconfigured
	cfgadm -c configure:	connected/configured, or connected/unconfigured

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```

                                (if reenumeration failed)
                                disconnected/unconfigured
                                connected/unconfigured:
                                device plugged in:      n/a
                                device removed:         empty/unconfigured
                                cfgadm -c unconfigure:   connected/unconfigured
                                cfgadm -c configure:      connected/configured, or
                                                        connected/unconfigured
                                                        (if reenumeration failed)
                                cfgadm -c disconnect:    disconnected/unconfigured

                                connected/configured:
                                device plugged in:      n/a
                                device removed:         empty/unconfigured or
                                                        connected/configured,
                                                        but with ap condition
                                                        'unusable' if device
                                                        was open when removed
                                cfgadm -c unconfigure:   connected/unconfigured
                                cfgadm -c configure:     connected/configured
                                cfgadm -c disconnect:    disconnected/unconfigured

```

EXAMPLES

EXAMPLE 1 Listing the status of all USB devices

The following command lists the status of all USB devices on the system:

```

# cfgadm
Ap_Id      Type      Receptacle  Occupant    Condition
usb0/1     USB-hub    connected   configured   ok
usb0/2     unknown    empty       unconfigured ok
usb0/1.1   USB-storage connected   configured   ok
usb0/1.2   unknown    empty       unconfigured ok
usb0/1.3   unknown    empty       unconfigured ok
usb0/1.4   USB-composit connected   configured   ok

```

Notice that `cfgadm` treats the *composite* device at `ap_id usb0/1.4` as a single unit, since it cannot currently control individual interfaces.

EXAMPLE 2 Listing the status of a port with no device plugged in

The following command lists the status of a port with no device plugged in:

```

example# cfgadm -l usb0/1.3
Ap_Id      Type      Receptacle  Occupant    Condition
usb0/1.3   unknown    empty       unconfigured ok

```

EXAMPLE 3 Listing the status of the same port with a device plugged in

The following command lists the status of the same port after physically plugging in a device that configures without problems:

```

example# cfgadm -l usb0/1.3
Ap_Id      Type      Receptacle  Occupant    Condition
usb0/1.3   USB-hub    connected   configured   ok

```

EXAMPLE 4 Unconfiguring an existing USB device

The following command unconfigures the USB device attached to `usb0/1.3`, then displays the status of the `ap_id`:

```
example# cfgadm -c unconfigure usb0/1.3
Unconfigure the device: /devices/pci@0,0/pci8086,7112@7,2/hub@2:2.3
This operation will suspend activity on the USB device
Continue (yes/no)?
```

Enter:

y

```
example# cfgadm -l usb0/1.3
```

Ap_Id	Type	Receptacle	Occupant	Condition
usb0/1.3	unknown	connected	unconfigured	ok

EXAMPLE 5 Unconfiguring and logically disconnecting an existing USB device

The following command unconfigures and logically disconnects a USB device attached to `usb0/1.3`:

```
example# cfgadm -c disconnect usb0/1.3
Disconnect the device: /devices/pci@0,0/pci8086,7112@7,2/hub@2:2.3
This operation will suspend activity on the USB device
Continue (yes/no)?
```

Enter:

y

```
example# cfgadm -l usb0/1.3
```

Ap_Id	Type	Receptacle	Occupant	Condition
usb0/1.3	unknown	disconnected	unconfigured	ok

A `disconnect` implies that `cfgadm` does an `unconfigure` first. The receptacle status now shows `disconnected`, even though the device is still physically connected. In this case, a physical hotplug or using the `cfgadm -c configure` on the `ap_id` will bring it back on-line.

EXAMPLE 6 Configuring a previously unconfigured USB device

The following command configures a USB device that was previously attached to `usb0/1.3`:

```
example # cfgadm -yc configure usb0/1.3
example# cfgadm -l usb0/1.3
```

Ap_Id	Type	Receptacle	Occupant	Condition
usb0/1.3	unknown	connected	configured	ok

EXAMPLE 7 Resetting a USB device

The following command resets a USB device:

EXAMPLE 7 Resetting a USB device *(Continued)*

```
example# cfgadm -x usb_reset usb0/1.3
Reset the device: /devices/pci@0,0/pci8086,7112@7,2/hub@2:2.3
This operation will suspend activity on the USB device
Continue (yes/no)?
```

Enter:

y

EXAMPLE 8 Displaying detailed information about a USB device

The following command displays detailed information about a USB device. This device shows the following USB-specific information in the 'Information' field:

- Manufacturer string: Iomega
- Product string: USB Zip 250
- Number of configurations supported: 1
- Configuration currently active: 0
- Configuration string descriptor for configuration 0: Default

```
example# cfgadm -lv usb0/1.5
Ap_Id          Receptacle  Occupant    Condition  Information
When          Type        Busy        Phys_Id
usb0/1.5      connected   configured   ok         Mfg:"Io
mega" Product:"USB Zip 250" NConfigs:1 Config:0 : Default
```

```
example# cfgadm -l -s "cols=ap_id:info" usb0/1.5
Ap_Id          Information
usb0/1.5      Mfg:"Iomega" Product:"USB Zip 250"
NConfigs:1 Config:0 : Default
```

EXAMPLE 9 Displaying detailed information about all USB devices on the system

The following command displays detailed information about all USB devices on the system:

```
example# cfgadm -l -s "select=class(usb),cols=ap_id:info"
Ap_Id          Information
usb0/1          Mfg:<undefined> Product:<undefined>
NConfigs:1 Config:0 <no cfg str descr>
usb0/2
usb0/1.1        Mfg:<undefined> Product:<undefined>
NConfigs:1 Config:0 <no cfg str descr>
usb0/1.2
usb0/1.3
usb0/1.4        Mfg:"Wizard" Product:"Modem/ISDN"
NConfigs:3 Config:1 : V.90 Analog Modem
usb0/1.5        Mfg:"Iomega" Product:"USB Zip 250"
NConfigs:1 Config:0 : Default
usb0/1.6        Mfg:"SOLID YEAR" Product:"SOLID YEAR
USB"NConfigs:1 Config:0 <no cfg str descr>
usb0/1.7
```

EXAMPLE 9 Displaying detailed information about all USB devices on the system
(Continued)

Lines containing only an `ap_id` are empty ports. These can be filtered out. This example only lists USB `ap_ids` with connected devices, and information about those devices.

```
example# cfgadm -l -s "select=class(usb),cols=ap_id:info" | grep Mfg
usb0/1                               Mfg:<undefined>  Product:<undefined>
NConfigs:1  Config:0 <no cfg str descr>
usb0/1.1                             Mfg:<undefined>  Product:<undefined>
NConfigs:1  Config:0 <no cfg str descr>
usb0/1.4                             Mfg:"Wizard"    Product:"Modem/ISDN"
NConfigs:3  Config:1 : V.90 Analog Modem
usb0/1.5                             Mfg:"Iomega"    Product:"USB Zip 250"
NConfigs:1  Config:0 : Default
usb0/1.6                             Mfg:"SOLID YEAR" Product:"SOLID YEAR USB"
Config:0 <no cfg str descr>
```

EXAMPLE 10 Listing information about a multi-configuration USB device

The following example lists information about a multi-configuration USB device.

Notice the `NConfigs` field: the configurations available for this device are 0, 1, and 2 (0 to (`NConfigs`-1)).

```
example# cfgadm -l -s "cols=ap_id:info" usb0/1.4
Ap_Id                               Information
usb0/1.4                           Mfg:"Wizard"    Product:"Modem/ISDN"
NConfigs:3  Config:1 V.90 Analog Modem"
```

EXAMPLE 11 Setting the current configuration of a multi-configuration USB device

The following example sets the current configuration of a multi-configuration USB device:

```
example# cfgadm -o config=2 -x usb_config usb0/1.4
Setting the device: /devices/pci@1f,2000/usb@1/device@3
to USB configuration 2
This operation will suspend activity on the USB device
Continue (yes/no)?
```

Enter:

y

USB configuration changed successfully.

The device path should be checked to ensure that the right instance of a device is being referred to, in the case where multiple devices of the exact same type are on the same bus. This information is available in the 'Information' field.

FILES /usr/lib/cfgadm/usb.so.1

Hardware specific library for generic USB device administration

cfgadm_usb(1M)

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsl (32-bit)
	SUNWcslx (64-bit)

SEE ALSO

`cfgadm(1M)`, `vold(1M)`, `config_admin(3CFGADM)`, `attributes(5)`, `scsa2usb(7D)`, `usba(7D)`

Universal Serial Bus 1.1 Specification (www.usb.org)

System Administration Guide, Volume 1

NOTES

`cfgadm(1M)` can not unconfigure, disconnect, reset, or change the configuration of any USB device currently opened by `vold(1M)` or any other application. These operations also fail on a hub if a device in its hierarchy is opened by an application. See `scsa2usb(7D)` for unconfiguring a USB mass-storage device that is being used by `vold(1M)`.

Only super-users can execute any functions on an attachment point. However, one need not be a super-user to list the attachment points.

NAME	cfsadmin – administer disk space used for caching file systems with the Cache File-System (CacheFS)
SYNOPSIS	<pre> cfsadmin -c [-o <i>cacheFS-parameters</i>] <i>cache_directory</i> cfsadmin -d {<i>cache_ID</i> <i>all</i>} <i>cache_directory</i> cfsadmin -l <i>cache_directory</i> cfsadmin -s {<i>mntpt1 ...</i>} <i>all</i> cfsadmin -u [-o <i>cacheFS-parameters</i>] <i>cache_directory</i> </pre>
DESCRIPTION	The cfsadmin command provides the following functions: ■ cache creation ■ deletion of cached file systems ■ listing of cache contents and statistics ■ resource parameter adjustment when the file system is unmounted. You must always supply an option for cfsadmin. For each form of the command except -s, you must specify a cache directory, that is, the directory under which the cache is actually stored. A path name in the front file system identifies the cache directory. For the -s form of the command, you must specify a mount point. You can specify a cache ID when you mount a file system with CacheFS, or you can let the system generate one for you. The -l option includes the cache ID in its listing of information. You must know the cache ID to delete a cached file system.
OPTIONS	<pre> -c [-o <i>cacheFS-parameters</i>] <i>cache_directory</i> Create a cache under the directory specified by <i>cache_directory</i>. This directory must not exist prior to cache creation. -d { <i>cache_ID</i> <i>all</i> } <i>cache_directory</i> Remove the file system whose cache ID you specify and release its resources, or remove all file systems in the cache by specifying <i>all</i>. After deleting a file system from the cache, you must run the fsck_cacheFs(1M) command to correct the resource counts for the cache. As indicated by the syntax above, you must supply either a <i>cache_ID</i> or <i>all</i>, in addition to <i>cache_directory</i>. -l <i>cache_directory</i> List file systems stored in the specified cache, as well as statistics about them. Each cached file system is listed by cache ID. The statistics document resource utilization and cache resource parameters. -s { <i>mntpt1 ...</i> } <i>all</i> Request a consistency check on the specified file system (or all <i>cacheFs</i> mounted file systems). The -s option will only work if the cache file system was mounted with demandconst enabled (see mount_cacheFs(1M)). Each file in the specified cache file system is checked for consistency with its corresponding file in the back file system. Note that the consistency check is performed file by file as files are </pre>

CacheFS Resource Parameters

accessed. If no files are accessed, no checks are performed. Use of this option does not result in a sudden "storm" of consistency checks.

As indicated by the syntax above, you must supply one or more mount points, or all.

`-u [ -o cacheFS-parameters ] cache_directory`

Update resource parameters of the specified cache directory. Parameter values can only be increased. To decrease the values, you must remove the cache and recreate it. All file systems in the cache directory must be unmounted when you use this option. Changes will take effect the next time you mount any file system in the specified cache directory. The `-u` option with no `-o` option sets all parameters to their default values.

You can specify the following CacheFS resource parameters as arguments to the `-o` option. Separate multiple parameters with commas.

<code>maxblocks=<i>n</i></code>	Maximum amount of storage space that CacheFS can use, expressed as a percentage of the total number of blocks in the front file system. If CacheFS does not have exclusive use of the front file system, there is no guarantee that all the space the <code>maxblocks</code> parameter allows will be available. The default is 90.
<code>minblocks=<i>n</i></code>	Minimum amount of storage space, expressed as a percentage of the total number of blocks in the front file system, that CacheFS is always allowed to use without limitation by its internal control mechanisms. If CacheFS does not have exclusive use of the front file system, there is no guarantee that all the space the <code>minblocks</code> parameter attempts to reserve will be available. The default is 0.
<code>threshblocks=<i>n</i></code>	A percentage of the total blocks in the front file system beyond which CacheFS cannot claim resources once its block usage has reached the level specified by <code>minblocks</code> . The default is 85.
<code>maxfiles=<i>n</i></code>	Maximum number of files that CacheFS can use, expressed as a percentage of the total number of inodes in the front file system. If CacheFS does not have exclusive use of the front file system, there is no guarantee that all the inodes the <code>maxfiles</code> parameter allows will be available. The default is 90.
<code>minfiles=<i>n</i></code>	Minimum number of files, expressed as a percentage of the total number of inodes in the front file system, that CacheFS is always allowed to use without limitation by its internal control mechanisms. If CacheFS does not have exclusive use of the front file system, there is no

		guarantee that all the inodes the <code>minfiles</code> parameter attempts to reserve will be available. The default is 0.
	<code>threshfiles=<i>n</i></code>	A percentage of the total inodes in the front file system beyond which CacheFS cannot claim inodes once its usage has reached the level specified by <code>minfiles</code> . The default is 85.
	<code>maxfilesize=<i>n</i></code>	Largest file size, expressed in megabytes, that CacheFS is allowed to cache. The default is 3. You cannot decrease the block or inode allotment for a cache. To decrease the size of a cache, you must remove it and create it again with different parameters.
		Currently <code>maxfilesize</code> is ignored by <code>cachefs</code> , therefore, setting it will have no effect.
OPERANDS	<code>cache_directory</code>	The directory under which the cache is actually stored.
	<code>mntpt1</code>	The directory where the CacheFS is mounted.
USAGE	See <code>largefile(5)</code> for the description of the behavior of <code>cfsadmin</code> when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).	
EXAMPLES	EXAMPLE 1 Creating a cache directory. The following example creates a cache directory named <code>/cache</code>: <pre>example# cfsadmin -c /cache</pre> EXAMPLE 2 Creating a cache specifying <code>maxblocks</code>, <code>minblocks</code> and <code>threshblocks</code>. The following example creates a cache named <code>/cache1</code> that can claim a maximum of 60 percent of the blocks in the front file system, can use 40 percent of the front file system blocks without interference by CacheFS internal control mechanisms, and has a threshold value of 50 percent. The threshold value indicates that after CacheFS reaches its guaranteed minimum, it cannot claim more space if 50 percent of the blocks in the front file system are already used. <pre>example# cfsadmin -c -o maxblocks=60,minblocks=40, threshblocks=50 /cache1</pre> EXAMPLE 3 Changing the <code>maxfilesize</code> parameter. The following example changes the <code>maxfilesize</code> parameter for the cache directory <code>/cache2</code> to 2 megabytes: <pre>example# cfsadmin -u -o maxfilesize=2 /cache2</pre>	

cfsadmin(1M)

EXAMPLE 3 Changing the `maxfilesize` parameter. *(Continued)*

EXAMPLE 4 Listing the contents of a cache directory.

The following example lists the contents of a cache directory named `/cache3` and provides statistics about resource utilization:

```
example# cfsadmin -l /cache3
```

EXAMPLE 5 Removing a cached file system.

The following example removes the cached file system with cache ID 23 from the cache directory `/cache3` and frees its resources (the cache ID is part of the information returned by `cfsadmin -l`):

```
example# cfsadmin -d 23 /cache3
```

EXAMPLE 6 Removing all cached file systems.

The following example removes all cached file systems from the cache directory `/cache3`:

```
example# cfsadmin -d all /cache3
```

EXAMPLE 7 Checking for consistency in file systems.

The following example checks for consistency all file systems mounted with `demandconst` enabled. No errors will be reported if no `demandconst` file systems were found.

```
example# cfsadmin -s all
```

EXIT STATUS The following exit values are returned:

0	Successful completion.
1	An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `cachefslog(1M)`, `cachefsstat(1M)`, `cachefswssize(1M)`, `fsck_cachefs(1M)`, `mount_cachefs(1M)`, `attributes(5)`, `largefile(5)`

NAME	cg14config – configure the cgfourteen device
SYNOPSIS	<code>/usr/platform/ platform-name /sbin/cg14config [-d device] [-r resolution] [-g gammavalue] [-G gammafile] [-u degammavalue] [-U degammafile]</code>
DESCRIPTION	<code>cg14config</code> sets up state on the selected cgfourteen device. <i>platform-name</i> can be found using the <code>-i</code> option of <code>uname(1)</code>. <code>cg14config</code> is supported only on Desktop SPARCsystems with SX graphics option. The interface, output, and command location are uncommitted and subject to change in future releases.
OPTIONS	<code>-d device</code> Use <i>device</i> as the cgfourteen device to configure. Default is <code>/dev/fb</code>. <code>-r resolution</code> Use <i>resolution</i> as the desired screen resolution. Resolution is specified in terms of screen width and height (in pixels), and vertical refresh (in hz). Available resolutions are: <pre> 1024x768@60 1024x768@66 1024x768@70 1152x900@66 1152x900@76 1280x1024@66 1280x1024@76 1600x1280@66 1920x1080@72 </pre> The default is the value read from the monitor sense codes. Note that some or all of the resolutions above may not be supported by any given monitor. If a programmed resolution is outside of the range of allowable values for a monitor, unpredictable results can occur, including damage to the monitor. Thus, care should be taken when programming the resolution. See <i>Openboot Command Reference</i> for a description of how to reset the console device to the default value if it becomes unusable from programming an unsupported resolution. The <code>-r</code> option is not available when the window system is running. <code>-g gammavalue</code> Each entry of the gamma lookup table will be loaded with $\text{entry}^{(1/\text{gammavalue})}$. The gamma lookup table has 256 entries. Default <i>gammavalue</i> is 2.2. <code>-G filename</code> Initialize the gamma lookup table with the contents of <i>filename</i>. The format of <i>filename</i> is 256 triplets (red green

cg14config(1M)

blue) of non-negative integers separated by NEWLINE characters. The integers must be in the range 0 to 1023, inclusive.

-u *degammavalue* Each entry of the degamma lookup table will be loaded with entry^(*degammavalue*). The degamma lookup table has 256 entries. Default *degammavalue* is 2 . 2.

-U *filename* Initialize the degamma lookup table with the contents of *filename*. The format of *filename* is 256 entries of non-negative integers separated by NEWLINE characters. The integers must be in the range 0 to 255, inclusive.

EXIT STATUS cg14config returns 0 on success and a positive integer on failure.

- 1 Selected device is not a cgfourteen device.
- 2 Requested action failed.
- 3 Unsupported resolution.
- 4 Gamma or degamma value out of range.

FILES /platform/*platform-name*/kernel/drv/cgfourteen
cgfourteen device driver

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkvm

SEE ALSO uname(1), init(1M), mmap(2), attributes(5)

Platform Notes: SPARCstation 10SX System Configuration Guide

Openboot Command Reference

NAME	chat – automated conversational exchange tool
SYNOPSIS	chat [<i>options</i>] <i>script</i>
DESCRIPTION	The chat program implements a conversational text-based exchange between the computer and any serial device, including (but not limited to) a modem, an ISDN TA, and the remote peer itself, establishing a connection between the Point-To-Point Protocol daemon (pppd) and the remote pppd process.
OPTIONS	The chat command supports the following options: -f <<i>chat file</i>> Read the chat script from the chat file. This option is mutually exclusive with the chat script parameters. You must have read access to use the file. Multiple lines are permitted in the file. Use the space or horizontal tab characters to separate the strings. -t <<i>timeout</i>> Set the timeout for the expected string to be received. If the string is not received within the time limit, the reply string is not sent. If specified, a 'subexpect' (alternate reply) string can be sent. Otherwise, if no alternate reply strings remain, the chat script fails.. A failed script will cause the chat program to terminate with a non-zero error code. -r <<i>report file</i>> Set the file for output of the report strings. If you use the keyword REPORT, the resulting strings are written to this file. If the -r option is not used and you use the REPORT keyword, the stderr file is used for the report strings. -e Start with the echo option turned on. You turn echo on or off at specific points in the chat script using the ECHO keyword. When echoing is enabled, all output from the modem is echoed to stderr. -E Enables environment variable substitution within chat scripts using the standard \$xxx syntax. -v Request that the chat script execute in a verbose mode. The chat program logs the execution state of the chat script as well as all text received from the modem and output strings sent to the modem. The default is to log through syslog(3C) with facility local2; the logging method is alterable using the -s and -s options. -V Request that the chat script be executed in a stderr verbose mode. The chat program logs all text received from the modem and output strings sent to the modem

chat(1M)

	to <code>stderr</code> . <code>stderr</code> is usually the local console at the station running the <code>chat</code> or <code>pppd</code> program.
<code>-s</code>	Use <code>stderr</code> . Log messages from <code>-v</code> and error messages are sent to <code>stderr</code> .
<code>-S</code>	Do not use <code>syslog</code> . By default, error messages are set to <code>syslog</code> . This option prevents log messages from <code>-v</code> and error messages from being sent to <code>syslog</code> .
<code>-T <phone number></code>	Pass in an arbitrary string (usually a telephone number) that will be substituted for the <code>\T</code> substitution metacharacter in a send string.
<code>-U <phone number 2></code>	Pass in a second string (usually a telephone number) that will be substituted for the <code>\U</code> substitution metacharacter in a send string. This is useful when dialing an ISDN terminal adapter that requires two numbers.
<code>script</code>	If the script is not specified in a file with the <code>-f</code> option, the script is included as parameters to the <code>chat</code> program.

EXTENDED DESCRIPTION

Chat Script

The `chat` script defines communications. A script consists of one or more "expect-send" pairs of strings separated by spaces, with an optional "subexpect-subsend" string pair, separated by a dash (as in the following example:)

```
ogin:-BREAK-ogin: ppp ssword: hello2u2
```

The example indicates that the `chat` program should expect the string "ogin:". If it fails to receive a login prompt within the time interval allotted, it sends a break sequence to the remote and then expects the string "ogin:". If the first "ogin:" is received, the break sequence is not generated.

Upon receiving the login prompt, the `chat` program sends the string "ppp" and then expects the prompt "ssword:". When the password prompt is received, it sends the password hello2u2.

A carriage return is normally sent following the reply string. It is not expected in the "expect" string unless it is specifically requested by using the `\r` character sequence.

The expect sequence should contain only what is needed to identify the received data. Because it's stored on a disk file, it should not contain variable information. Generally it is not acceptable to look for time strings, network identification strings, or other variable pieces of data as an expect string.

To correct for characters that are corrupted during the initial sequence, look for the string "ogin:" rather than "login:". The leading "l" character may be received in error, creating problems in finding the string. For this reason, scripts look for "ogin:" rather than "login:" and "ssword:" rather than "password:".

An example of a simple script follows:

```
ogin: ppp ssword: hello2u2
```

The example can be interpreted as: expect ogin:, send ppp, expect ...ssword:, send hello2u2.

When login to a remote peer is necessary, simple scripts are rare. At minimum, you should include sub-expect sequences in case the original string is not received. For example, consider the following script:

```
ogin:--ogin: ppp ssword: hello2u2
```

This script is more effective than the simple one used earlier. The string looks for the same login prompt; however, if one is not received, a single return sequence is sent and then the script looks for login: again. If line noise obscures the first login prompt, send the empty line to generate a login prompt again.

Comments

Comments can be embedded in the chat script. Comment lines are ignored by the chat program. A comment starts with the hash ("#") character in column one. If a # character is expected as the first character of the expect sequence, quote the expect string. If you want to wait for a prompt that starts with a # character, write something like this:

```
# Now wait for the prompt and send logout string
'# ' logout
```

Sending Data From A File

If the string to send begins with an at sign ("@"), the remainder of the string is interpreted as the name of the file that contains the string. If the last character of the data read is a newline, it is removed. The file can be a named pipe (or fifo) instead of a regular file. This enables chat to communicate with another program, for example, a program to prompt the user and receive a password typed in.

Abort

Many modems report the status of a call as a string. These status strings are often "CONNECTED" or "NO CARRIER" or "BUSY." If the modem fails to connect to the remote, you can terminate the script. Abort strings may be specified in the script using the ABORT sequence. For example:

```
ABORT BUSY ABORT 'NO CARRIER' '' ATZ OK ATDT5551212 CONNECT
```

This sequence expects nothing and sends the string ATZ. The expected response is the string OK. When OK is received, the string ATDT5551212 dials the telephone. The expected string is CONNECT. If CONNECT is received, the remainder of the script is

chat(1M)

	executed. When the modem finds a busy telephone, it sends the string BUSY, causing the string to match the abort character sequence. The script fails because it found a match to the abort string. If the NO CARRIER string is received, it aborts for the same reason.
Clr_Abort	The CLR_ABORT sequence clears previously set ABORT strings. ABORT strings are kept in an array of a pre-determined size; CLR_ABORT reclaims the space for cleared entries, enabling new strings to use that space.
Say	The SAY string enables the script to send strings to a user at a terminal via standard error. If chat is being run by pppd and pppd is running as a daemon (detached from its controlling terminal), standard error is normally redirected to the <code>/etc/ppp/connect-errors</code> file. SAY strings must be enclosed in single or double quotes. If carriage return and line feed are required for the output, you must explicitly add them to your string. The SAY string can provide progress messages to users even with "ECHO OFF." For example, add a line similar to the following to the script: <pre>ABORT BUSY ECHO OFF SAY "Dialing your ISP...\n" '' ATDT5551212 TIMEOUT 120 SAY "Waiting up to 2 minutes for connection ..." CONNECT '' SAY "Connected, now logging in ...\n" ogin: account ssword: pass \$ \c SAY "Logged in OK ... \n"</pre> This sequence hides script detail while presenting the SAY string to the user. In this case, you will see: <pre>Dialing your ISP... Waiting up to 2 minutes for connection...Connected, now logging in... Logged in OK ...</pre>
Report	REPORT is similar to the ABORT string. With REPORT, however, strings and all characters to the next control character (such as a carriage return), are written to the report file. REPORT strings can be used to isolate a modem's transmission rate from its CONNECT string and return the value to the chat user. Analysis of the REPORT string logic occurs in conjunction with other string processing, such as looking for the expect string. It's possible to use the same string for a REPORT and ABORT sequence, but probably not useful.

Report strings may be specified in the script using the REPORT sequence. For example:

```
REPORT CONNECT
ABORT BUSY
ATDT5551212 CONNECT
ogin: account
```

The above sequence expects nothing, then sends the string ATDT5551212 to dial the telephone. The expected string is CONNECT. If CONNECT is received, the remainder of the script is executed. In addition, the program writes the string CONNECT to the report file (specified by -r) in addition to any characters that follow.

Clr_Report CLR_REPORT clears previously set REPORT strings. REPORT strings are kept in an array of a pre-determined size; CLR_REPORT reclaims the space for cleared entries so that new strings can use that space.

Echo ECHO determines if modem output is echoed to `stderr`. This option may be set with the -e option, but can also be controlled by the ECHO keyword. The "expect-send" pair ECHO ON enables echoing, and ECHO OFF disables it. With ECHO, you can select which parts of the conversation should be visible. In the following script:

```
ABORT 'BUSY'
ABORT 'NO CARRIER'
"" AT&F
OK\r\n ATD1234567
\r\n \c
ECHO ON
CONNECT \c
ogin: account
```

All output resulting from modem configuration and dialing is not visible, but output is echoed beginning with the CONNECT (or BUSY) message.

Hangup The HANGUP option determines if a modem hangup is considered as an error. HANGUP is useful for dialing systems that hang up and call your system back. HANGUP can be ON or OFF. When HANGUP is set to OFF and the modem hangs up (for example, following the first stage of logging in to a callback system), chat continues running the script (for example, waiting for the incoming call and second stage login prompt). When the incoming call is connected, use the HANGUP ON string to reinstall normal hang up signal behavior. An example of a simple script follows:

```
ABORT 'BUSY'
"" AT&F
OK\r\n ATD1234567
\r\n \c
CONNECT \c
'Callback login:' call_back_ID
HANGUP OFF
ABORT "Bad Login"
'Callback Password:' Call_back_password
TIMEOUT 120
```

chat(1M)

	<pre>CONNECT \c HANGUP ON ABORT "NO CARRIER" ogin:--BREAK--ogin: real_account</pre>						
Timeout	The initial timeout value is 45 seconds. Use the <code>-t</code> parameter to change the initial timeout value. To change the timeout value for the next expect string, the following example can be used: <pre>' "'AT&F OK ATDT5551212 CONNECT \c TIMEOUT 10 ogin:--ogin: username TIMEOUT 5 assword: hello2u2</pre> The example changes the timeout to ten seconds when it expects the login: prompt. The timeout is changed to five seconds when it looks for the password prompt. Once changed, the timeout value remains in effect until it is changed again.						
EOT	The EOT special reply string instructs the <code>chat</code> program to send an EOT character to the remote. This is equivalent to using <code>^D\c</code> as the reply string. The EOT string normally indicates the end-of-file character sequence. A return character is not sent following the EOT. The EOT sequence can be embedded into the send string using the sequence <code>^D</code>.						
BREAK	The BREAK special reply string sends a break condition. The break is a special transmitter signal. Many UNIX systems handle break by cycling through available bit rates, and sending break is often needed when the remote system does not support autobaud. BREAK is equivalent to using <code>\K\c</code> as the reply string. You embed the break sequence into the send string using the <code>\K</code> sequence.						
Escape Sequences	Expect and reply strings can contain escape sequences. Reply strings accept all escape sequences, while expect strings accept most sequences. A list of escape sequences is presented below. Sequences that are not accepted by expect strings are indicated. <table><tr><td><code>' '</code></td><td>Expects or sends a null string. If you send a null string, <code>chat</code> sends the return character. If you expect a null string, <code>chat</code> proceeds to the reply string without waiting. This sequence can be a pair of apostrophes or quote mark characters.</td></tr><tr><td><code>\b</code></td><td>Represents a backspace character.</td></tr><tr><td><code>\c</code></td><td>Suppresses the newline at the end of the reply string. This is the only method to send a string without a trailing return character. This sequence must be at the end of the send string. For example, the sequence <code>hello\c</code> will simply send the characters <code>h, e, l, l, o</code>. (Not valid in expect.)</td></tr></table>	<code>' '</code>	Expects or sends a null string. If you send a null string, <code>chat</code> sends the return character. If you expect a null string, <code>chat</code> proceeds to the reply string without waiting. This sequence can be a pair of apostrophes or quote mark characters.	<code>\b</code>	Represents a backspace character.	<code>\c</code>	Suppresses the newline at the end of the reply string. This is the only method to send a string without a trailing return character. This sequence must be at the end of the send string. For example, the sequence <code>hello\c</code> will simply send the characters <code>h, e, l, l, o</code> . (Not valid in expect.)
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<code>\b</code>	Represents a backspace character.						
<code>\c</code>	Suppresses the newline at the end of the reply string. This is the only method to send a string without a trailing return character. This sequence must be at the end of the send string. For example, the sequence <code>hello\c</code> will simply send the characters <code>h, e, l, l, o</code> . (Not valid in expect.)						

	<code>\d</code> Delay for one second. The program uses <code>sleep(1)</code> which delays to a maximum of one second. (Not valid in expect.) <code>\K</code> Insert a BREAK. (Not valid in expect.) <code>\n</code> Send a newline or linefeed character. <code>\N</code> Send a null character. The same sequence may be represented by <code>\0</code>. (Not valid in expect.) <code>\p</code> Pause for 1/10th of a second. (Not valid in expect.) <code>\q</code> Suppress writing the string to syslog. The string <code>?????</code> is written to the log in its place. (Not valid in expect.) <code>\r</code> Send or expect a carriage return. <code>\s</code> Represents a space character in the string. Can be used when it is not desirable to quote the strings which contains spaces. The sequence <code>'HI TIM'</code> and <code>HI\sTIM</code> are the same. <code>\t</code> Send or expect a tab character. <code>\T</code> Send the phone number string as specified with the <code>-T</code> option. (Not valid in expect.) <code>\U</code> Send the phone number 2 string as specified with the <code>-U</code> option. (Not valid in expect.) <code>\\</code> Send or expect a backslash character. <code>\ddd</code> Collapse the octal digits (<code>ddd</code>) into a single ASCII character and send that character. (<code>\000</code> is not valid in an expect string.) <code>^C</code> Substitute the sequence with the control character represented by <code>C</code>. For example, the character DC1 (17) is shown as <code>^Q</code>. (Some characters are not valid in expect.)
ENVIRONMENT VARIABLES	Environment variables are available within <code>chat</code> scripts if the <code>-E</code> option is specified on the command line. The metacharacter <code>\$</code> introduces the name of the environment variable to substitute. If the substitution fails because the requested environment variable is not set, nothing is replaced for the variable.
EXIT STATUS	The <code>chat</code> program terminates with the following completion codes: 0 Normal program termination. Indicates that the script was executed without error to normal conclusion. 1 One or more of the parameters are invalid or an expect string was too large for the internal buffers. Indicates that the program was not properly executed. 2 An error occurred during the execution of the program. This may be due to a read or write operation failing or <code>chat</code> receiving a signal such as SIGINT.

chat(1M)

- 3 A timeout event occurred when there was an expect string without having a "-subsend" string. This indicates that you may not have programmed the script correctly for the condition or that an unexpected event occurred and the expected string could not be found.
- 4 The first string marked as an ABORT condition occurred.
- 5 The second string marked as an ABORT condition occurred.
- 6 The third string marked as an ABORT condition occurred.
- 7 The fourth string marked as an ABORT condition occurred.
- . . . The other termination codes are also strings marked as an ABORT condition.

To determine which event terminated the script, use the termination code. It is possible to decide if the string "BUSY" was received from the modem versus "NO DIALTONE." While the first event may be retried, the second probably will not succeed during a retry.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpppdu
Interface Stability	Evolving

SEE ALSO

`sleep(1)`, `uucp(1C)`, `pppd(1M)`, `uucico(1M)`, `syslog(3C)`, `attributes(5)`

Additional information on chat scripts are available with UUCP documentation. The chat script format was taken from scripts used by the `uucico` program.

NAME	check-hostname – check if sendmail can determine the system’s fully-qualified host name						
SYNOPSIS	/usr/lib/mail/sh/check-hostname						
DESCRIPTION	The check-hostname script is a migration aid for sendmail(1M). This script tries to determine the local host’s fully-qualified host name (FQHN) in a manner similar to sendmail(1M). If check-hostname is able to determine the FQHN of the local host, it reports success. Otherwise, check-hostname reports how to reconfigure the system so that the FQHN can be properly determined.						
FILES	<table> <tr> <td>/etc/hosts</td><td>host name database</td></tr> <tr> <td>/etc/nsswitch.conf</td><td>name service switch configuration file</td></tr> <tr> <td>/etc/resolv.conf</td><td>configuration file for name server routines</td></tr> </table>	/etc/hosts	host name database	/etc/nsswitch.conf	name service switch configuration file	/etc/resolv.conf	configuration file for name server routines
/etc/hosts	host name database						
/etc/nsswitch.conf	name service switch configuration file						
/etc/resolv.conf	configuration file for name server routines						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:						
	<table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWsndmu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWsndmu		
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWsndmu						
SEE ALSO	sendmail(1M), hosts(4), attributes(5)						

check-permissions(1M)

NAME	check-permissions – check permissions on mail rerouting files				
SYNOPSIS	/usr/lib/mail/sh/check-permissions [<i>login</i>]				
DESCRIPTION	The check-permissions script is intended as a migration aid for sendmail(1M). It checks the /etc/mail/sendmail.cf file for all configured alias files, and checks the alias files for :include: files. It also checks for certain .forward files. For each file that check-permissions checks, it verifies that none of the parent directories are group- or world-writable. If any directories are overly permissive, it is reported. Otherwise it reports that no unsafe directories were found. As to which .forward files are checked, it depends on the arguments included on the command line. If no argument is given, the current user's home directory is checked for the presence of a .forward file. If any arguments are given, they are assumed to be valid logins, and the home directory of each one is checked. If the special argument ALL is given, the passwd entry in the /etc/nsswitch.conf file is checked, and all password entries that can be obtained through the switch file are checked. In large domains, this can be time-consuming.				
OPERANDS	The following operands are supported: <table><tr><td><i>login</i></td><td>Where <i>login</i> is a valid user name, checks the home directory for <i>login</i>.</td></tr><tr><td>ALL</td><td>Checks the home directory of <i>all</i> users.</td></tr></table>	<i>login</i>	Where <i>login</i> is a valid user name, checks the home directory for <i>login</i> .	ALL	Checks the home directory of <i>all</i> users.
<i>login</i>	Where <i>login</i> is a valid user name, checks the home directory for <i>login</i> .				
ALL	Checks the home directory of <i>all</i> users.				
FILES	<table><tr><td>/etc/mail/sendmail.cf</td><td>defines environment for sendmail</td></tr><tr><td>/etc/mail/aliases</td><td>ascii mail aliases file</td></tr></table>	/etc/mail/sendmail.cf	defines environment for sendmail	/etc/mail/aliases	ascii mail aliases file
/etc/mail/sendmail.cf	defines environment for sendmail				
/etc/mail/aliases	ascii mail aliases file				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWsndmu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWsndmu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWsndmu				
SEE ALSO	getent(1M), sendmail(1M), aliases(4), attributes(5)				

NAME	chown – change owner				
SYNOPSIS	/usr/ucb/chown [-f] [-R] <i>owner</i> [<i>group</i>] <i>filename...</i>				
DESCRIPTION	chown changes the owner of the <i>filenames</i> to <i>owner</i>. The owner may be either a decimal user ID (UID) or a login name found in the password file. An optional <i>group</i> may also be specified. The group may be either a decimal group ID (GID) or a group name found in the GID file. Only the super-user of the machine where the file is physically located can change owner, in order to simplify accounting procedures.				
OPTIONS	-f Do not report errors. -R Recursively descend into directories setting the ownership of all files in each directory encountered. When symbolic links are encountered, their ownership is changed, but they are not traversed.				
FILES	/etc/passwd password file				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	chgrp(1), chown(2), group(4), passwd(4), attributes(5)				

chroot(1M)

NAME	chroot – change root directory for a command				
SYNOPSIS	<code>/usr/sbin/chroot newroot command</code>				
DESCRIPTION	The <code>chroot</code> utility causes <i>command</i> to be executed relative to <i>newroot</i>. The meaning of any initial slashes (<code> </code>) in the path names is changed to <i>newroot</i> for <i>command</i> and any of its child processes. Upon execution, the initial working directory is <i>newroot</i>. Notice that redirecting the output of <i>command</i> to a file, <pre>chroot newroot command >x</pre> will create the file <code>x</code> relative to the original root of <i>command</i>, not the new one. The new root path name is always relative to the current root. Even if a <code>chroot</code> is currently in effect, the <i>newroot</i> argument is relative to the current root of the running process. This command can be run only by the super-user.				
RETURN VALUES	The exit status of <code>chroot</code> is the return value of <i>command</i> .				
EXAMPLES	EXAMPLE 1 Using the <code>chroot</code> utility. The <code>chroot</code> utility provides an easy way to extract <code>tar</code> files (see <code>tar(1)</code>) written with absolute filenames to a different location: <pre>example# cp /usr/sbin/static/tar /tmp example# dd if=/dev/nrst0 chroot /tmp tar xvf -</pre> Note that <code>tar</code> is statically linked, so it is not necessary to copy any shared libraries to the <i>newroot</i> filesystem.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>cd(1)</code> , <code>tar(1)</code> , <code>chroot(2)</code> , <code>ttyname(3C)</code> , <code>attributes(5)</code>				
NOTES	Exercise extreme caution when referencing device files in the new root file system. References by routines such as <code>ttyname(3C)</code> to <code>stdin</code>, <code>stdout</code>, and <code>stderr</code> will find that the device associated with the file descriptor is unknown after <code>chroot</code> is run.				

NAME	cimworkshop – start the Sun WBEM CIM WorkShop application								
SYNOPSIS	/usr/sadm/bin/cimworkshop								
DESCRIPTION	The <code>cimworkshop</code> command starts Sun WBEM CIM WorkShop, a graphical user interface that enables you to create, modify, and view the classes and instances that describe the managed resources on your system. Managed resources are described using a standard information model called Common Information Model (CIM). A CIM class is a computer representation, or model, of a type of managed resource, such as a printer, disk drive, or CPU. A CIM instance is a particular managed resource that belongs to a particular class. Instances contain actual data. Objects can be shared by any WBEM-enabled system, device, or application. CIM objects are grouped into meaningful collections called schema. One or more schemas can be stored in directory-like structures called namespaces. The CIM WorkShop application displays a Login dialog box. Context help is displayed on the left side of the CIM WorkShop dialog boxes. When you click on a field, the help content changes to describe the selected field. By default, CIM WorkShop uses the RMI protocol to connect to the CIM Object Manager on the local host, in the default namespace, <code>root\cimv2</code>. You can select HTTP if you want to communicate to a CIM Object Manager using the standard XML/HTTP protocol from the Desktop Management Task Force. When a connection is established, all classes contained in the default namespace are displayed in the left side of the CIM WorkShop window. The name of the current namespace is listed in the tool bar. All programming operations are performed within a namespace. Four namespaces are created in a <code>root</code> namespace during installation: <table> <tr> <td><code>cimv2</code></td><td>Contains the default CIM classes that represent managed resources on your system.</td></tr> <tr> <td><code>security</code></td><td>Contains the security classes used by the CIM Object Manager to represent access rights for users and namespaces.</td></tr> <tr> <td><code>system</code></td><td>Contains properties for configuring the CIM Object Manager.</td></tr> <tr> <td><code>snmp</code></td><td>Contains pre-defined SNMP-related classes and all SNMP MOF files that are compiled.</td></tr> </table> The <code>cimworkshop</code> application allows you to perform the following tasks: Create, view, and change namespaces. Use the CIM WorkShop application to view all namespaces. A namespace is a directory-like structure that can store CIM classes and instances. Create, delete, and view CIM classes. You cannot modify the unique attributes of the classes that make up the CIM and Solaris Schema. You can create a new instance or subclass of the class and modify the desired attributes in that instance or subclass.	<code>cimv2</code>	Contains the default CIM classes that represent managed resources on your system.	<code>security</code>	Contains the security classes used by the CIM Object Manager to represent access rights for users and namespaces.	<code>system</code>	Contains properties for configuring the CIM Object Manager.	<code>snmp</code>	Contains pre-defined SNMP-related classes and all SNMP MOF files that are compiled.
<code>cimv2</code>	Contains the default CIM classes that represent managed resources on your system.								
<code>security</code>	Contains the security classes used by the CIM Object Manager to represent access rights for users and namespaces.								
<code>system</code>	Contains properties for configuring the CIM Object Manager.								
<code>snmp</code>	Contains pre-defined SNMP-related classes and all SNMP MOF files that are compiled.								

cimworkshop(1M)

Create, modify, delete, and view CIM instances.

You can add instances to a class and modify its inherited properties or create new properties. You can also change the property values of a CIM instance.

Invoke methods.

You can set input values for a parameter of a method and invoke the method.

When CIM WorkShop connects to the CIM Object Manager in a particular namespace, all subsequent operations occur within that namespace. When you connect to a namespace, you can access the classes and instances in that namespace (if they exist) and in any namespaces contained in that namespace.

When you use CIM WorkShop to view CIM data, the WBEM system validates your login information on the current host. By default, a validated WBEM user is granted read access to the CIM Schema. The CIM Schema describes managed objects on your system in a standard format that all WBEM-enabled systems and applications can interpret.

Read Only	Allows read-only access to CIM Schema objects. Users with this privilege can retrieve instances and classes, but cannot create, delete, or modify CIM objects.

Read/Write	Allows full read, write, and delete access to all CIM classes and instances.

Write	Allows write and delete, but not read access to all CIM classes and instances.

None	Allows no access to CIM classes and instances.

USAGE The `cimworkshop` command is not a tool for a distributed environment. Rather, this command is used for local administration on the machine on which the CIM Object Manager is running.

EXIT STATUS The `cimworkshop` utility terminates with exit status 0.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwbdev

SEE ALSO `mofcomp(1M)`, `wbemlogviewer(1M)`, `init.wbem(1M)`, `attributes(5)`

NAME	clear_locks – clear locks held on behalf of an NFS client				
SYNOPSIS	/usr/sbin/clear_locks [-s] <i>hostname</i>				
DESCRIPTION	The <code>clear_locks</code> command removes all file, record, and share locks created by the <i>hostname</i> and held on the current host, regardless of which process created or owns the locks. This command can be run only by the super-user. This command should only be used to repair the rare case of a client crashing and failing to clear held locks. Clearing locks held by an active client may cause applications to fail in an unexpected manner.				
OPTIONS	-s Remove all locks created by the current machine and held by the server <i>hostname</i>.				
OPERANDS	The following operands are supported: <i>hostname</i> name of host server				
EXIT STATUS	0 Successful operation. 1 If not root. 2 Usage error. 3 If unable to contact server (RPC).				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>fcntl(2)</code> , <code>attributes(5)</code>				

clinfo(1M)

NAME	clinfo – display cluster information				
SYNOPSIS	clinfo [-nh]				
DESCRIPTION	The <code>clinfo</code> command displays cluster configuration information about the node from which the command is executed. Without arguments, <code>clinfo</code> returns an exit status of 0 if the node is configured and booted as part of a cluster. Otherwise, <code>clinfo</code> returns an exit status of 1.				
OPTIONS	The following options are supported: -h Displays the highest node number allowed to be configured. This is different from the maximum number of nodes supported in a given cluster. The current highest configured node number can change immediately after the command returns since new nodes can be dynamically added to a running cluster. For example, <code>clinfo -h</code> might return 64, meaning that the highest number you can use to identify a node is 64. See the <i>Sun Cluster 3.0 System Administration Guide</i> for a description of utilities you can use to determine the number of nodes in a cluster. -n Prints the number of the node from which <code>clinfo</code> is executed.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. 1 An error occurred. This is usually because the node is not configured or booted as part of a cluster.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>attributes(5)</code>				

NAME	clri, dcopy – clear inode				
SYNOPSIS	clri [-F <i>FSType</i>] [-V] <i>special i-number</i> dcopy [-F <i>FSType</i>] [-V] <i>special i-number</i>				
DESCRIPTION	clri writes zeros on the inodes with the decimal <i>i-number</i> on the file system stored on <i>special</i>. After clri, any blocks in the affected file show up as missing in an fsck(1M) of <i>special</i>. Read and write permission is required on the specified file system device. The inode becomes allocatable. The primary purpose of this routine is to remove a file that for some reason appears in no directory. If it is used to zap an inode that does appear in a directory, care should be taken to track down the entry and remove it. Otherwise, when the inode is reallocated to some new file, the old entry will still point to that file. At that point, removing the old entry will destroy the new file. The new entry will again point to an unallocated inode, so the whole cycle is likely to be repeated again and again. dcopy is a symbolic link to clri.				
OPTIONS	-F <i>FSType</i> Specify the <i>FSType</i> on which to operate. The <i>FSType</i> should either be specified here or be determinable from /etc/vfstab by matching <i>special</i> with an entry in the table, or by consulting /etc/default/fs. -V Echo the complete command line, but do not execute the command. The command line is generated by using the options and arguments provided by the user and adding to them information derived from /etc/vfstab. This option should be used to verify and validate the command line.				
USAGE	See largefile(5) for the description of the behavior of clri and dcopy when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).				
FILES	/etc/default/fs Default local file system type /etc/vfstab List of default parameters for each file system				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	fsck(1M), vfstab(4), attributes(5), largefile(5)				
NOTES	This command might not be supported for all <i>FSTypes</i> .				

consadm(1m)

NAME	consadm – select or display devices used as auxiliary console devices						
SYNOPSIS	<pre>/usr/sbin/consadm /usr/sbin/consadm [-a <i>device</i> . . .] [-p] /usr/sbin/consadm [-d <i>device</i> . . .] [-p] /usr/sbin/consadm [-p]</pre>						
DESCRIPTION	consadm selects the hardware <i>device</i> or devices to be used as auxiliary console devices, or displays the current device. Only superusers are allowed to make or display auxiliary console device selections. Auxiliary console devices receive copies of <code>console</code> messages, and can be used as the console during single user mode. In particular, they receive kernel messages and messages directed to <code>/dev/sysmsg</code>. On Solaris or x86 based systems they can also be used for interaction with the bootstrap. By default, selecting a display device to be used as an auxiliary console device selects that device for the duration the system remains up. If the administrator needs the selection to persist across reboots the <code>-p</code> option can be specified. consadm runs a daemon in the background, monitoring auxiliary console devices. Any devices that are disconnected (hang up, lose carrier) are removed from the auxiliary console device list, though not from the persistent list. While auxiliary console devices may have been removed from the device list receiving copies of <code>console</code> messages, those messages will always continue to be displayed by the default console device. The daemon will not run if it finds there are not any auxiliary devices configured to monitor. Likewise, after the last auxiliary console is removed, the daemon will shut itself down. Therefore the daemon persists for only as long as auxiliary console devices remain active.						
OPTIONS	The following options are supported: <table><tr><td><code>-a <i>device</i></code></td><td>Adds <i>device</i> to the list of auxiliary console devices. Specify <i>device</i> as the path name to the device or devices to be added to the auxiliary console device list.</td></tr><tr><td><code>-d <i>device</i></code></td><td>Removes <i>device</i> from the list of auxiliary console devices. Specify <i>device</i> as the path name to the device or devices to be removed from the auxiliary console device list.</td></tr><tr><td><code>-p</code></td><td>Prints the list of auxiliary consoles that will be auxiliary across reboots.</td></tr></table> When invoked with the <code>-a</code> or <code>-d</code> options , tells the application to make the change persist across reboot.	<code>-a <i>device</i></code>	Adds <i>device</i> to the list of auxiliary console devices. Specify <i>device</i> as the path name to the device or devices to be added to the auxiliary console device list.	<code>-d <i>device</i></code>	Removes <i>device</i> from the list of auxiliary console devices. Specify <i>device</i> as the path name to the device or devices to be removed from the auxiliary console device list.	<code>-p</code>	Prints the list of auxiliary consoles that will be auxiliary across reboots.
<code>-a <i>device</i></code>	Adds <i>device</i> to the list of auxiliary console devices. Specify <i>device</i> as the path name to the device or devices to be added to the auxiliary console device list.						
<code>-d <i>device</i></code>	Removes <i>device</i> from the list of auxiliary console devices. Specify <i>device</i> as the path name to the device or devices to be removed from the auxiliary console device list.						
<code>-p</code>	Prints the list of auxiliary consoles that will be auxiliary across reboots.						

EXAMPLES**EXAMPLE 1** Adding to the list of devices that will receive console messages

The following command adds `/dev/term/a` to the list of devices that will receive console messages.

```
example# consadm -a /dev/term/a
```

EXAMPLE 2 Removing from the list of devices that will receive console messages

The following command removes `/dev/term/a` from the list of devices that will receive console messages. This includes removal from the persistent list.

```
example# consadm -d -p /dev/term/a
```

EXAMPLE 3 Printing the list of devices selected as auxiliary console devices

The following command prints the name or names of the device or devices currently selected as auxiliary console devices.

```
example# consadm
```

ENVIRONMENT VARIABLES

See `environ(5)` for descriptions of the following environment variables that affect the execution of `consadm`: `LC_CTYPE`, `LC_MESSAGES`, and `NLSPATH`.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
>0	An error occurred.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Stability Level	Evolving

SEE ALSO

`eeprom(1M)`, `syslogd(1M)`, `kadb(1M)`, `environ(5)`, `attributes(5)`, `sysmsg(7d)`, `console(7d)`

NOTES

Auxiliary console devices are not usable for `kadb` or firmware I/O, do not receive panic messages, and do not receive output directed to `/dev/console`.

conv_lp(1M)

NAME	conv_lp – convert LP configuration				
SYNOPSIS	conv_lp [-d <i>dir</i>] [-f <i>file</i>]				
DESCRIPTION	conv_lp reads LP printer configuration information from a directory and converts it to an output file for use with print client software.				
OPTIONS	The following options are supported: -d <i>dir</i> The root (' / ') directory from which LP configuration information is read. The default is root (' / '). -f <i>file</i> The output file to which conv_lp writes the converted LP configuration information. The default is /etc/printers.conf.				
EXAMPLES	EXAMPLE 1 Converting LP Configuration Information from the Default Directory and File The following example converts LP configuration information from directory root (/) to file /etc/printers.conf. <pre>% conv_lp</pre> EXAMPLE 2 Converting LP Configuration Information From a Specified Directory and File The following example converts LP configuration information from directory /export/root/client to file /export/root/client/etc/printers.conf. <pre>% conv_lp -d /export/root/client -f /export/root/client/etc/printers.conf</pre>				
EXIT STATUS	The following exit values are returned: 0 Successful completion. non-zero An error occurred.				
FILES	/etc/printers.conf System printer configuration database.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWpcu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWpcu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWpcu				
SEE ALSO	lpset(1M), printers.conf(4), attributes(5)				

NAME	conv_lpd – convert LPD configuration				
SYNOPSIS	conv_lpd [-c printers -c printcap] [-n] <i>file</i>				
DESCRIPTION	conv_lpd converts LPD printer configuration information from <i>file</i> to a printers.conf or a printcap file (see printers.conf(4)). <i>file</i> specifies the name of the input file, and can be either in printers.conf or printcap format. If <i>file</i> is in printers.conf format, it converts it to a printcap file. If <i>file</i> is in printcap format, it converts it to a printers.conf file.				
OPTIONS	The following options are supported: <table> <tr> <td>-c printers -c printcap</td><td>Specifies the type of output file produced by the conversion. -c printers converts to a printers.conf file. -c printcap converts to a printcap file. -c printers is the default.</td></tr> <tr> <td>-n</td><td>Preserves the namelist during the conversion.</td></tr> </table>	-c printers -c printcap	Specifies the type of output file produced by the conversion. -c printers converts to a printers.conf file. -c printcap converts to a printcap file. -c printers is the default.	-n	Preserves the namelist during the conversion.
-c printers -c printcap	Specifies the type of output file produced by the conversion. -c printers converts to a printers.conf file. -c printcap converts to a printcap file. -c printers is the default.				
-n	Preserves the namelist during the conversion.				
OPERANDS	The following operands are supported: <table> <tr> <td><i>file</i></td><td>The file to be converted.</td></tr> </table>	<i>file</i>	The file to be converted.		
<i>file</i>	The file to be converted.				
EXAMPLES	EXAMPLE 1 Converting a printcap file to a printers.conf file. The following example converts a printcap file to a printers.conf file. <pre>example% conv_lpd /etc/printcap</pre> EXAMPLE 2 Converting a printcap file to a printers.conf file and preserving the namelist. The following example converts a printcap file to a printers.conf file and preserves the namelist. <pre>example% conv_lpd -c printers -n /etc/printcap</pre> EXAMPLE 3 Converting a printers.conf file to a printcap file and preserving the namelist. The following example converts a printers.conf file to a printcap file and preserves the namelist. <pre>example% conv_lpd -c printcap -n /etc/printers.conf</pre>				
EXIT STATUS	The following exit values are returned: <table> <tr> <td>0</td><td>Successful completion.</td></tr> <tr> <td>non-zero</td><td>An error occurred.</td></tr> </table>	0	Successful completion.	non-zero	An error occurred.
0	Successful completion.				
non-zero	An error occurred.				

conv_lpd(1M)

FILES `/etc/printers.conf` System printer configuration database.
 `/etc/printcap` SunOS 4.x printer capability database.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpcu

SEE ALSO `lpset(1M)`, `printers.conf(4)`, `attributes(5)`

NAME	coreadm – core file administration
SYNOPSIS	coreadm [-g <i>pattern</i>] [-i <i>pattern</i>] [-d <i>option...</i>] [-e <i>option...</i>] coreadm [-p <i>pattern</i>] [<i>pid...</i>] coreadm -u
DESCRIPTION	The coreadm command is used to specify the name and location of core files produced by abnormally-terminating processes. See core(4). The first form shown in the synopsis can be executed only by the super-user and is used to configure system-wide core file options, including a global core file name pattern and a per-process core file name pattern for the init(1M) process. All such settings are saved in coreadm's configuration file <code>/etc/coreadm.conf</code> for setting on reboot. See init(1M). The second form can be executed by non-privileged users and is used to specify the file name pattern to be used by the operating system when generating a per-process core file. The third form can be executed only by the super-user and is used to update all system-wide core file options based on the contents of <code>/etc/coreadm.conf</code>. Normally this option is used only on reboot by the startup script <code>/etc/init.d/coreadm</code>. A core file name pattern is a normal file system path name with embedded variables, specified with a leading <code>%</code> character, that are expanded from values in effect when a core file is generated by the operating system. The possible variables are: <code>%p</code> process-ID <code>%u</code> effective user-ID <code>%g</code> effective group-ID <code>%f</code> executable file name, up to a maximum of <code>MAXCOMLEN</code> characters <code>%n</code> system node name (<code>uname -n</code>) <code>%m</code> machine name (<code>uname -m</code>) <code>%t</code> decimal value of <code>time(2)</code> <code>%%</code> literal <code>%</code> For example, the core file name pattern: <pre>/var/core/core.%f.%p</pre> would result, for command <code>foo</code> with process-ID 1234, in the core file name: <pre>/var/core/core.foo.1234</pre> The coreadm command with no arguments reports the current system configuration, for example:

coreadm(1M)

```
$ coreadm
  global core file pattern: /var/core/core.%f.%p
  init core file pattern: core
    global core dumps: enabled
  per-process core dumps: enabled
  global setid core dumps: enabled
per-process setid core dumps: disabled
  global core dump logging: disabled
```

The `coreadm` command with only a list of process-IDs reports each process's per-process core file name pattern, for example:

```
$ coreadm 278 5678
  278:   core.%f.%p
  5678: /home/george/cores/%f.%p.%t
```

Only the owner of a process or the super-user can interrogate a process in this manner.

When a process is dumping core, the operating system will generate two possible core files, the global core file and the per-process core file. Both files, one or the other, or no file will be generated, based on the system options in effect at the time.

When generated, a global core file will be created mode 600 and will be owned by the super-user. Non-privileged users cannot examine such files.

Ordinary per-process core files are created mode 600 under the credentials of the process. The owner of the process can examine such files.

A process that is or ever has been `setuid` or `setgid` since its last `exec(2)`, including a process that began life with super-user privileges and gave up that privilege by way of `setuid(2)`, presents security issues with respect to dumping core, as it may contain sensitive information in its address space to which the current non-privileged owner of the process should not have access. If setid core files are enabled, they will be created mode 600 and will be owned by the super-user.

OPTIONS

The following options are supported:

<code>-d option...</code>	Disable the specified core file option. See the <code>-e option</code> for descriptions of possible options.						
	Multiple <code>-e</code> and <code>-d</code> options can be specified on the command line. Only super-users can use this option.						
<code>-e option...</code>	Enable the specified core file option. Specify <i>option</i> as one of the following:						
	<table><tr><td>global</td><td>Allow core dumps using global core pattern</td></tr><tr><td>process</td><td>Allow core dumps using per-process core pattern</td></tr><tr><td>global-setid</td><td>Allow set-id core dumps using global core pattern</td></tr></table>	global	Allow core dumps using global core pattern	process	Allow core dumps using per-process core pattern	global-setid	Allow set-id core dumps using global core pattern
global	Allow core dumps using global core pattern						
process	Allow core dumps using per-process core pattern						
global-setid	Allow set-id core dumps using global core pattern						

	proc-setid	Allow set-id core dumps using per-process core pattern
	log	Generate a syslog(3C) message when generation of a global core file is attempted. Multiple -e and -d options can be specified on the command line. Only super-users can use this option.
	-g <i>pattern</i>	Set the global core file name pattern to <i>pattern</i> . The pattern must start with a / and can contain any of the special % variables described in the DESCRIPTION. Only super-users can use this option.
	-i <i>pattern</i>	Set the per-process core file name <i>pattern</i> for init(1M) to <i>pattern</i> . This is the same as coreadm -p <i>pattern</i> 1 except that the setting will be persistent across reboot. Only super-users can use this option.
	-p <i>pattern</i>	Set the per-process core file name pattern to <i>pattern</i> for each of the specified process-IDs. The pattern can contain any of the special % variables described in the DESCRIPTION and need not begin with /. If it does not begin with /, it will be evaluated relative to the current directory in effect when the process generates a core file. A non-privileged user can apply the -p option only to processes owned by that user. The super-user can apply it to any process. The per-process core file name pattern will be inherited by future child processes of the affected processes. See fork(2).
	-u	Update system-wide core file options from the contents of the configuration file /etc/coreadm.conf. If the configuration file is missing or contains invalid values, default values are substituted. Following the update, the configuration file is resynchronized with the system core file configuration. Only super-users can use this option.
OPERANDS	The following operands are supported:	
	<i>pid</i>	process-ID
EXIT STATUS	The following exit values are returned:	
	0	Successful completion.

coreadm(1M)

- 1 A fatal error occurred while either obtaining or modifying the system core file configuration.
- 2 Invalid command line options were specified.

EXAMPLES

EXAMPLE 1 Setting the core file name pattern

When executed from a user's `$HOME/.profile` or `$HOME/.login`, the following command sets the core file name pattern for all processes run during the login session:

```
example$ coreadm -p core.%f.%p $$
```

`$$` is the process-id of the currently running shell. The per-process core file name pattern is inherited by all child processes.

EXAMPLE 2 Dumping user's files into a subdirectory

The following command dumps all of the user's core dumps into the `corefiles` subdirectory of the home directory, discriminated by the system node name. This is useful for users who use many different machines but have a shared home directory.

```
example$ coreadm -p $HOME/corefiles/%n.%f.%p $$
```

FILES

`/etc/init.d/coreadm`

`/etc/coreadm.conf`

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

`gcore(1)`, `init(1M)`, `exec(2)`, `fork(2)`, `setuid(2)`, `time(2)`, `syslog(3C)`, `core(4)`, `attributes(5)`

NAME	cpustat – monitor system behavior using CPU performance counters
SYNOPSIS	cpustat -c <i>eventspec</i> [-c <i>eventspec</i>]... [-ntD] [<i>interval</i> [<i>count</i>]] cpustat -h
DESCRIPTION	The cpustat utility allows CPU performance counters to be used to monitor the overall behavior of the CPUs in the system. If <i>interval</i> is specified, cpustat samples activity every <i>interval</i> seconds, repeating forever. If a <i>count</i> is specified, the statistics are repeated <i>count</i> times. If neither are specified, an interval of five seconds is used, and there is no limit to the number of samples that will be taken.
OPTIONS	The following options are supported: -c <i>eventspec</i> Specifies a set of events for the CPU performance counters to monitor. The syntax of these event specification can be determined using the -h option to cause the usage message to be generated. The semantics of these event specifications can be determined by reading the CPU manufacturers documentation for the events. See <code>cpc_strtoevent(3CPC)</code> for a description of the syntax. - Multiple -c options can be specified, in which case the command cycles between the different event settings on each sample. -D Enables debug mode. -h Prints an extensive help message on how to use the utility and how to program the processor-dependent counters. -n Omits all header output (useful if cpustat is the beginning of a pipeline). -t Prints an additional column of processor cycle counts, if available on the current architecture.
USAGE	A closely related utility, <code>cputrack(1)</code>, can be used to monitor the behavior of individual applications with little or no interference from other activities on the system. The cpustat utility must be run by the super-user, as there is an intrinsic conflict between the use of the CPU performance counters system-wide by cpustat and the use of the CPU performance counters to monitor an individual process (for example, by cputrack.) Once any instance of this utility has started, no further per-process or per-LWP use of the counters is allowed until the last instance of the utility terminates.

cpustat(1M)

The times printed by the command correspond to the wallclock time when the hardware counters were actually sampled, instead of when the program told the kernel to sample them. The time is derived from the same timebase as `gethrtime(3C)`.

The processor cycle counts enabled by the `-t` option always apply to both user and system modes, regardless of the settings applied to the performance counter registers.

On some hardware platforms, the counters are implemented using 32-bit registers. While the kernel attempts to catch all overflows to synthesize 64-bit counters, because of hardware implementation restrictions, overflows can be lost unless the sampling interval is kept short enough. The events most prone to wrap are those that count processor clock cycles. If such an event is of interest, sampling should occur frequently so that less than 4 billion clock cycles can occur between samples.

The output of `cpustat` is designed to be readily parseable by `nawk(1)` and `perl(1)`, thereby allowing performance tools to be composed by embedding `cpustat` in scripts. Alternatively, tools can be constructed directly using the same APIs that `cpustat` is built upon using the facilities of `libcpc(3LIB)`. See `cpc(3CPC)`.

The `cpustat` utility only monitors the CPUs that are accessible to it in the current processor set. Thus, several instances of the utility can be running on the CPUs in different processor sets. See `psrset(1M)` for more information about processor sets.

Because `cpustat` uses LWPs bound to CPUs, the utility might have to be terminated before the configuration of the relevant processor can be changed.

WARNINGS

By running the `cpustat` command, the super-user will forcibly invalidate all existing performance counter context. This can in turn cause all invocations of the `cpustrack` command, and other users of performance counter context, to exit prematurely with unspecified errors.

If `cpustat` is invoked on a system that has CPU performance counters, but on which the packages containing the kernel support for those counters is not installed, the following message appears:

```
cpustat: CPU performance counters are inaccessible on this machine
```

This error message implies that `cpc_access()` has failed and is documented in `cpc_access(3CPC)`. Review this documentation for more information about the problem and possible solutions.

If a short interval is requested, `cpustat` might not be able to keep up with the desired sample rate. In this case, some samples might be dropped.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

cpustat(1M)

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcpcu
Interface Stability	Evolving

SEE ALSO

cputrack(1), nawk(1), perl(1), iostat(1M), prstat(1M), psrset(1M),
vmstat(1M), cpc(3CPC), cpc_access(3CPC), cpc_strtoevent(3CPC),
gethrtime(3C), libcpc(3LIB), attributes(5)

Sun Microelectronics UltraSPARC I&II User's Manual, January 1997, STP1031,
<http://www.sun.com/sparc>

Intel Architecture Software Developer's Manual, Volume 3: System Programmers Guide,
243192, <http://developer.intel.com>

cron(1M)

NAME	cron – clock daemon
SYNOPSIS	/usr/sbin/cron
DESCRIPTION	cron starts a process that executes commands at specified dates and times. You can specify regularly scheduled commands to cron according to instructions found in crontab files in the directory <code>/var/spool/cron/crontabs</code>. Users can submit their own crontab file using the <code>crontab(1)</code> command. Commands which are to be executed only once can be submitted using the <code>at(1)</code> command. cron only examines crontab or at command files during its own process initialization phase and when the crontab or at command is run. This reduces the overhead of checking for new or changed files at regularly scheduled intervals. As cron never exits, it should be executed only once. This is done routinely by way of the <code>/etc/rc2.d/S75cron</code> file at system boot time. The file <code>/etc/cron.d/FIFO</code> file is used as a lock file to prevent the execution of more than one instance of cron. cron captures the output of the job's <code>stdout</code> and <code>stderr</code> streams, and, if it is not empty, mails the output to the user. If the job does not produce output, no mail is sent to the user. An exception is if the job is an <code>at(1)</code> job and the <code>-m</code> option was specified when the job was submitted. cron and at jobs are not executed if your account is locked. Jobs and processes execute. The <code>shadow(4)</code> file defines which accounts are not locked and will have their jobs and processes executed.
Setting cron Jobs Across Timezones	The timezone of the cron daemon sets the system-wide timezone for cron entries. This, in turn, is by set by default system-wide using <code>/etc/default/init</code>. If some form of <i>daylight savings</i> or <i>summer/winter time</i> is in effect, then jobs scheduled during the switchover period could be executed once, twice, or not at all.
Setting cron Defaults	To keep a log of all actions taken by cron, you must specify <code>CRONLOG=YES</code> in the <code>/etc/default/cron</code> file. If you specify <code>CRONLOG=NO</code>, no logging is done. Keeping the log is a user configurable option since cron usually creates huge log files. You can specify the <code>PATH</code> for user cron jobs by using <code>PATH=</code> in <code>/etc/default/cron</code>. You can set the <code>PATH</code> for root cron jobs using <code>SUPATH=</code> in <code>/etc/default/cron</code>. Carefully consider the security implications of setting <code>PATH</code> and <code>SUPATH</code>. Example <code>/etc/default/cron</code> file: <pre>CRONLOG=YES PATH=/usr/bin:/usr/ucb:</pre> This example enables logging and sets the default <code>PATH</code> used by non-root jobs to <code>/usr/bin:/usr/ucb:</code>. Root jobs continue to use <code>/usr/sbin:/usr/bin</code>. The cron log file is periodically rotated by <code>logadm(1M)</code>.

FILES	/etc/cron.d	Main cron directory
	/etc/cron.d/FIFO	Lock file
	/etc/default/cron	cron default settings file
	/var/cron/log	cron history information
	/var/spool/cron	Spool area
	/etc/cron.d/queuedefs	Queue description file for at, batch, and cron
	/etc/logadm.conf	Configuration file for logadm

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO at(1), crontab(1), sh(1), logadm(1M), queuedefs(4), shadow(4), attributes(5)

DIAGNOSTICS A history of all actions taken by cron is stored in /var/cron/log and possibly in /var/cron/olog.

cvcd(1M)

NAME	cvcd – virtual console daemon						
SYNOPSIS	/platform/platform_name/cvcd						
DESCRIPTION	The virtual console daemon, <i>cvcd</i>, is a server process that supports the network console provided on some platforms. The <i>cvcd</i> daemon accepts network console connections from a remote host (only one host at any given time). Console input is read from this connection and forwarded to <i>cvc(7D)</i> by way of <i>cvcredir(7D)</i>. Similarly, console output is read from <i>cvcredir(7D)</i> and forwarded across the network console connection. If <i>cvcd</i> dies, console traffic is automatically rerouted through an internal hardware interface. The <i>cvcd</i> daemon normally starts at system boot time. Each domain supports only one <i>cvcd</i> process at a time. Caution: On Sun Enterprise 10000 domains, <i>cvcd</i> uses a configuration file (<i>/etc/ssphostname</i>) to determine the name of the host from which network console connections are allowed. If the remote console host is renamed, you must edit the configuration file to reflect that change.						
OPERANDS	The following operands are supported: <table><tr><td><i>platform_name</i></td><td>The official Sun platform name used in packaging and code. For example, for Sun Fire 15K servers, the <i>platform_name</i> would be <i>SUNW,Sun-Fire-15000</i>.</td></tr></table>	<i>platform_name</i>	The official Sun platform name used in packaging and code. For example, for Sun Fire 15K servers, the <i>platform_name</i> would be <i>SUNW,Sun-Fire-15000</i> .				
<i>platform_name</i>	The official Sun platform name used in packaging and code. For example, for Sun Fire 15K servers, the <i>platform_name</i> would be <i>SUNW,Sun-Fire-15000</i> .						
ATTRIBUTES	See <i>attributes(5)</i> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Architecture</td><td>Sun Enterprise 10000 servers Sun Fire 15K servers</td></tr><tr><td>Availability</td><td>SUNWcvc.u</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Architecture	Sun Enterprise 10000 servers Sun Fire 15K servers	Availability	SUNWcvc.u
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Architecture	Sun Enterprise 10000 servers Sun Fire 15K servers						
Availability	SUNWcvc.u						
SEE ALSO	<i>services(4)</i>, <i>attributes(5)</i>, <i>cvc(7D)</i>, <i>cvcredir(7D)</i> <i>Sun Enterprise 10000 SSP Reference Manual</i> <i>Sun System Management Services (SMS) Reference Manual</i>						

NAME	dcs – domain configuration server				
SYNOPSIS	/usr/lib/dcs [-s <i>sessions</i>]				
DESCRIPTION	The Domain Configuration Server (DCS) is a daemon process that runs on Sun servers that support remote Dynamic Reconfiguration (DR) clients. It is started by <code>inetd(1M)</code> when the first DR request is received from a client connecting to the network service <code>sun-dr</code>. After the DCS accepts a DR request, it uses the <code>libcfgadm(3LIB)</code> interface to execute the DR operation. After the operation is performed, the results are returned to the client. The DCS listens on the network service labeled <code>sun-dr</code>. Its underlying protocol is TCP, and it is invoked as an <code>inetd</code> server using the TCP transport. The entries for the DCS in the <code>/etc/inet/inetd.conf</code> file are as follows: <pre>sun-dr stream tcp wait root /usr/lib/dcs dcs sun-dr stream tcp6 wait root /usr/lib/dcs dcs</pre> These entries enable remote DR operations. If you remove the entries, DR operations initiated from a remote host fail. There is no negative impact on the server. If you are using a Sun Fire 15K/12K server and IPsec is configured on the <code>sun-dr</code> port (port 665), you must also remove the policies in <code>/etc/inet/ipsecinit.conf</code> that reference the <code>sun-dr</code> port, then use the <code>ipseccnf(1M)</code> command with appropriate options to flush the policies. If you remove the <code>sun-dr</code> entries from <code>/etc/inet/inetd.conf</code> without deleting and flushing the corresponding entries from <code>/etc/inet/ipsecinit.conf</code>, any process that attempts to use the <code>sun-dr</code> port will hang. This is because the IPsec policy is still in effect for that port.				
OPTIONS	The following options are supported: -s <i>sessions</i> Set the number of active sessions that the DCS allows at any one time. When the limit is reached, the DCS stops accepting connections until active sessions complete the execution of their DR operation. If this option is not specified, a default value of 128 is used.				
ERRORS	The DCS uses <code>syslog(3C)</code> to report status and error messages. All of the messages are logged with the <code>LOG_DAEMON</code> facility. Error messages are logged with the <code>LOG_ERR</code> and <code>LOG_NOTICE</code> priorities, and informational messages are logged with the <code>LOG_INFO</code> priority. The default entries in the <code>/etc/syslog.conf</code> file log all of the DCS error messages to the <code>/var/adm/messages</code> log.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWdcsu, SUNWdcsr</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWdcsu, SUNWdcsr
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWdcsu, SUNWdcsr				

dcx(1M)

SEE ALSO cfigadm_sbd(1M), inetd(1M), ipsecconf(1M), syslog(3C),
config_admin(3CFGADM), libcfigadm(3LIB), inetd.conf(4), syslog.conf(4),
attributes(5), dr(7D)

NAME	dd – convert and copy a file
SYNOPSIS	<code>/usr/bin/dd</code> [<i>operand=value...</i>]
DESCRIPTION	The dd utility copies the specified input file to the specified output with possible conversions. The standard input and output are used by default. The input and output block sizes may be specified to take advantage of raw physical I/O. Sizes are specified in bytes; a number may end with k, b, or w to specify multiplication by 1024, 512, or 2, respectively. Numbers may also be separated by x to indicate multiplication. The dd utility reads the input one block at a time, using the specified input block size. dd then processes the block of data actually returned, which could be smaller than the requested block size. dd applies any conversions that have been specified and writes the resulting data to the output in blocks of the specified output block size. cbs is used only if ascii, asciib, unblock, ebcdic, ebcdicb, ibm, ibmb, or block conversion is specified. In the first two cases, cbs characters are copied into the conversion buffer, any specified character mapping is done, trailing blanks are trimmed, and a NEWLINE is added before sending the line to output. In the last three cases, characters up to NEWLINE are read into the conversion buffer and blanks are added to make up an output record of size cbs. ASCII files are presumed to contain NEWLINE characters. If cbs is unspecified or 0, the ascii, asciib, ebcdic, ebcdicb, ibm, and ibmb options convert the character set without changing the input file's block structure. The unblock and block options become a simple file copy. After completion, dd reports the number of whole and partial input and output blocks.
OPERANDS	The following operands are supported: <i>if=file</i> Specifies the input path. Standard input is the default. <i>of=file</i> Specifies the output path. Standard output is the default. If the <i>seek=expr</i> conversion is not also specified, the output file will be truncated before the copy begins, unless <i>conv=notrunc</i> is specified. If <i>seek=expr</i> is specified, but <i>conv=notrunc</i> is not, the effect of the copy will be to preserve the blocks in the output file over which dd seeks, but no other portion of the output file will be preserved. (If the size of the seek plus the size of the input file is less than the previous size of the output file, the output file is shortened by the copy.) <i>ibs=n</i> Specifies the input block size in <i>n</i> bytes (default is 512). <i>obs=n</i> Specifies the output block size in <i>n</i> bytes (default is 512). <i>bs=n</i> Sets both input and output block sizes to <i>n</i> bytes, superseding <i>ibs=</i> and <i>obs=</i>. If no conversion other than <i>sync</i>, <i>noerror</i>, and <i>notrunc</i> is specified, each input block is copied to the output as a single block without aggregating short blocks.

dd(1M)

cbs=*n*

Specifies the conversion block size for **block** and **unblock** in bytes by *n* (default is 0). If **cbs=** is omitted or given a value of 0, using **block** or **unblock** produces unspecified results.

This option is used only if ASCII or EBCDIC conversion is specified. For the **ascii** and **asciib** operands, the input is handled as described for the **unblock** operand except that characters are converted to ASCII before the trailing **SPACE** characters are deleted. For the **ebcdic**, **ebcdicb**, **ibm**, and **ibmb** operands, the input is handled as described for the **block** operand except that the characters are converted to EBCDIC or IBM EBCDIC after the trailing **SPACE** characters are added.

files=*n*

Copies and concatenates *n* input files before terminating (makes sense only where input is a magnetic tape or similar device).

skip=*n*

Skips *n* input blocks (using the specified input block size) before starting to copy. On seekable files, the implementation reads the blocks or seeks past them. On non-seekable files, the blocks are read and the data is discarded.

iseek=*n*

Seeks *n* blocks from beginning of input file before copying (appropriate for disk files, where **skip** can be incredibly slow).

oseek=*n*

Seeks *n* blocks from beginning of output file before copying.

seek=*n*

Skips *n* blocks (using the specified output block size) from beginning of output file before copying. On non-seekable files, existing blocks are read and space from the current end-of-file to the specified offset, if any, is filled with null bytes. On seekable files, the implementation seeks to the specified offset or reads the blocks as described for non-seekable files.

count=*n*

Copies only *n* input blocks.

conv=*value*[, *value*. . .]

Where *values* are comma-separated symbols from the following list:

ascii	Converts EBCDIC to ASCII.
asciib	Converts EBCDIC to ASCII using BSD-compatible character translations.
ebcdic	Converts ASCII to EBCDIC. If converting fixed-length ASCII records without NEWLINES, sets up a pipeline with dd conv=unblock beforehand.

dd(1M)

ebcdicb	Converts ASCII to EBCDIC using BSD-compatible character translations. If converting fixed-length ASCII records without NEWLINES, sets up a pipeline with dd conv=unblock beforehand.
ibm	Slightly different map of ASCII to EBCDIC. If converting fixed-length ASCII records without NEWLINES, sets up a pipeline with dd conv=unblock beforehand.
ibmb	Slightly different map of ASCII to EBCDIC using BSD-compatible character translations. If converting fixed-length ASCII records without NEWLINES, sets up a pipeline with dd conv=unblock beforehand.

The ascii (or asciiib), ebcdic (or ebcdicb), and ibm (or ibmb) values are mutually exclusive.

block	Treats the input as a sequence of NEWLINE-terminated or EOF-terminated variable-length records independent of the input block boundaries. Each record is converted to a record with a fixed length specified by the conversion block size. Any NEWLINE character is removed from the input line. SPACE characters are appended to lines that are shorter than their conversion block size to fill the block. Lines that are longer than the conversion block size are truncated to the largest number of characters that will fit into that size. The number of truncated lines is reported.
unblock	Converts fixed-length records to variable length. Reads a number of bytes equal to the conversion block size (or the number of bytes remaining in the input, if less than the conversion block size), delete all trailing SPACE characters, and append a NEWLINE character.

The block and unblock values are mutually exclusive.

lcase	Maps upper-case characters specified by the LC_CTYPE keyword tolower to the corresponding lower-case character. Characters for which no mapping is specified are not modified by this conversion.
ucase	Maps lower-case characters specified by the LC_CTYPE keyword toupper to the corresponding upper-case character. Characters for which no mapping is specified are not modified by this conversion.

The lcase and ucase symbols are mutually exclusive.

swab	Swaps every pair of input bytes. If the current input record is an odd number of bytes, the last byte in the input record is ignored.

dd(1M)

noerror	Does not stop processing on an input error. When an input error occurs, a diagnostic message is written on standard error, followed by the current input and output block counts in the same format as used at completion. If the <code>sync</code> conversion is specified, the missing input is replaced with null bytes and processed normally. Otherwise, the input block will be omitted from the output.
notrunc	Does not truncate the output file. Preserves blocks in the output file not explicitly written by this invocation of <code>dd</code> . (See also the preceding <code>of=file</code> operand.)
sync	Pads every input block to the size of the <code>ibs=</code> buffer, appending null bytes. (If either <code>block</code> or <code>unblock</code> is also specified, appends <code>SPACE</code> characters, rather than null bytes.)

If operands other than `conv=` are specified more than once, the last specified operand=*value* is used.

For the `bs=`, `cbs=`, `ibs=`, and `obs=` operands, the application must supply an expression specifying a size in bytes. The expression, `expr`, can be:

1. a positive decimal number
2. a positive decimal number followed by `k`, specifying multiplication by 1024
3. a positive decimal number followed by `b`, specifying multiplication by 512
4. two or more positive decimal numbers (with or without `k` or `b`) separated by `x`, specifying the product of the indicated values.

All of the operands will be processed before any input is read.

USAGE See `largefile(5)` for the description of the behavior of `dd` when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).

EXAMPLES **EXAMPLE 1** Copying from one tape drive to another

The following example copies from tape drive 0 to tape drive 1, using a common historical device naming convention.

```
example% dd if=/dev/rmt/0h of=/dev/rmt/1h
```

EXAMPLE 2 Stripping the first 10 bytes from standard input

The following example strips the first 10 bytes from standard input:

```
example% dd ibs=10 skip=1
```

EXAMPLE 3 Reading a tape into an ASCII file

This example reads an EBCDIC tape blocked ten 80-byte EBCDIC card images per block into the ASCII file x:

```
example% dd if=/dev/tape of=x ibs=800 cbs=80 conv=ascii,lcase
```

EXAMPLE 4 Using conv=sync to write to tape

The following example uses conv=sync when writing to a tape:

```
example% tar cvf - . | compress | dd obs=1024k of=/dev/rmt/0 conv=sync
```

ENVIRONMENT VARIABLES

See [environ\(5\)](#) for descriptions of the following environment variables that affect the execution of dd: LANG, LC_ALL, LC_CTYPE, LC_MESSAGES, and NLSPATH.

EXIT STATUS

The following exit values are returned:

0 The input file was copied successfully.
>0 An error occurred.

If an input error is detected and the noerror conversion has not been specified, any partial output block will be written to the output file, a diagnostic message will be written, and the copy operation will be discontinued. If some other error is detected, a diagnostic message will be written and the copy operation will be discontinued.

ATTRIBUTES

See [attributes\(5\)](#) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	Standard

SEE ALSO

[cp\(1\)](#), [sed\(1\)](#), [tr\(1\)](#), [attributes\(5\)](#), [environ\(5\)](#), [largefile\(5\)](#), [standards\(5\)](#)

DIAGNOSTICS

f+p records in(out) numbers of full and partial blocks read(written)

NOTES

Do not use dd to copy files between file systems having different block sizes.

Using a blocked device to copy a file will result in extra nulls being added to the file to pad the final block to the block boundary.

When dd reads from a pipe, using the ibs=X and obs=Y operands, the output will always be blocked in chunks of size Y. When bs=Z is used, the output blocks will be whatever was available to be read from the pipe at the time.

dd(1M)

When using `dd` to copy files to a tape device, the file size must be a multiple of the device sector size (for example, 512 Kbyte). To copy files of arbitrary size to a tape device, use `tar(1)` or `cpio(1)`.

For `SIGINT`, `dd` writes status information to standard error before exiting. It takes the standard action for all other signals.

NAME	devattr – display device attributes				
SYNOPSIS	devattr [-v] <i>device</i> [<i>attribute...</i>]				
DESCRIPTION	devattr displays the values for a device's attributes. The display can be presented in two formats. Used without the -v option, only the attribute values are shown. Used with the -v option, the attributes are shown in an <i>attribute=value</i> format. When no attributes are given on the command line, all attributes for the specified device are displayed in alphabetical order by attribute name. If attributes are given on the command line, only those attributes are shown, displayed in command line order.				
OPTIONS	The following options are supported: -v Specifies verbose format. Attribute values are displayed in an <i>attribute=value</i> format.				
OPERANDS	The following operands are supported: <i>attribute</i> Defines which attribute, or attributes, should be shown. Default is to show all attributes for a device. See the putdev(1M) manual page for a complete listing and description of available attributes. <i>device</i> Defines the device whose attributes should be displayed. Can be the pathname of the device or the device alias.				
EXIT STATUS	The following exit values are returned: 0 successful completion. 1 Command syntax was incorrect, invalid option was used, or an internal error occurred. 2 Device table could not be opened for reading. 3 Requested device could not be found in the device table. 4 Requested attribute was not defined for the specified device.				
FILES	/etc/device.tab				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	getdev(1M), putdev(1M), attributes(5)				

devfree(1M)

NAME	devfree – release devices from exclusive use								
SYNOPSIS	devfree <i>key</i> [<i>device</i> ...]								
DESCRIPTION	devfree releases devices from exclusive use. Exclusive use is requested with the command devreserv. When devfree is invoked with only the <i>key</i> argument, it releases all devices that have been reserved for that <i>key</i>. When called with <i>key</i> and <i>device</i> arguments, devfree releases the specified devices that have been reserved with that <i>key</i>.								
OPERANDS	The following operands are supported: <table><tr><td><i>device</i></td><td>Defines device that this command will release from exclusive use. <i>device</i> can be the pathname of the device or the device alias.</td></tr><tr><td><i>key</i></td><td>Designates the unique key on which the device was reserved.</td></tr></table>	<i>device</i>	Defines device that this command will release from exclusive use. <i>device</i> can be the pathname of the device or the device alias.	<i>key</i>	Designates the unique key on which the device was reserved.				
<i>device</i>	Defines device that this command will release from exclusive use. <i>device</i> can be the pathname of the device or the device alias.								
<i>key</i>	Designates the unique key on which the device was reserved.								
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>1</td><td>Command syntax was incorrect, an invalid option was used, or an internal error occurred.</td></tr><tr><td>2</td><td>Device table or device reservation table could not be opened for reading.</td></tr><tr><td>3</td><td>Reservation release could not be completely fulfilled because one or more of the devices was not reserved or was not reserved on the specified key.</td></tr></table>	0	Successful completion.	1	Command syntax was incorrect, an invalid option was used, or an internal error occurred.	2	Device table or device reservation table could not be opened for reading.	3	Reservation release could not be completely fulfilled because one or more of the devices was not reserved or was not reserved on the specified key.
0	Successful completion.								
1	Command syntax was incorrect, an invalid option was used, or an internal error occurred.								
2	Device table or device reservation table could not be opened for reading.								
3	Reservation release could not be completely fulfilled because one or more of the devices was not reserved or was not reserved on the specified key.								
FILES	/etc/device.tab /etc/devlkfile								
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu				
ATTRIBUTE TYPE	ATTRIBUTE VALUE								
Availability	SUNWcsu								
SEE ALSO	devreserv(1M), attributes(5)								
NOTES	The commands devreserv and devfree are used to manage the availability of devices on a system. These commands do not place any constraints on the access to the device. They serve only as a centralized bookkeeping point for those who wish to use them. Processes that do not use devreserv may concurrently use a device with a process that has reserved that device.								

NAME	devfsadm, devfsadmd – administration command for /dev and /devices
SYNOPSIS	<pre> /usr/sbin/devfsadm [-C] [-c device_class] [-i driver_name] [-n] [-r root_dir] [-s] [-t table_file] [-v] /usr/lib/devfsadm/devfsadmd </pre>
DESCRIPTION	devfsadm(1M) maintains the /dev and /devices namespaces. It replaces the previous suite of devfs administration tools including drvconfig(1M), disks(1M), tapes(1M), ports(1M), audlinks(1M), and devlinks(1M). The default operation is to attempt to load every driver in the system and attach to all possible device instances. devfsadm then creates device special files in /devices and logical links in /dev. devfsadmd(1M) is the daemon version of devfsadm(1M). The daemon is started by the /etc/rc* scripts during system startup and is responsible for handling both reconfiguration boot processing and updating /dev and /devices in response to dynamic reconfiguration event notifications from the kernel. For compatibility purposes, drvconfig(1M), disks(1M), tapes(1M), ports(1M), audlinks(1M), and devlinks(1M) are implemented as links to devfsadm. In addition to managing /dev and /devices, devfsadm also maintains the path_to_inst(4) database.
OPTIONS	The following options are supported: -C Cleanup mode. Prompt devfsadm to cleanup dangling /dev links that are not normally removed. If the -c option is also used, devfsadm only cleans up for the listed devices' classes. -c <i>device_class</i> Restrict operations to devices of class <i>device_class</i>. Solaris defines the following values for <i>device_class</i>: disk, tape, port, audio, and pseudo. This option may be specified more than once to specify multiple device classes. -i <i>driver_name</i> Configure only the devices for the named driver, <i>driver_name</i>. -n Do not attempt to load drivers or add new nodes to the kernel device tree. -s Suppress any changes to /dev or /devices. This is useful with the -v option for debugging. -t <i>table_file</i> Read an alternate devlink.tab file. devfsadm normally reads /etc/devlink.tab.

devfsadm(1M)

-r *root_dir* Presume that the `/dev` and `/devices` directory trees are found under *root_dir*, not directly under `root (/)`. No other use or assumptions are made about *root_dir*.

-v Print changes to `/dev` and `/devices` in verbose mode.

EXIT STATUS The following exit values are returned:

0 Successful completion.

1 An error occurred.

FILES

<code>/devices</code>	device nodes directory
<code>/dev</code>	logical symbolic links to <code>/devices</code>
<code>/usr/lib/devfsadm/devfsadmd</code>	devfsadm daemon
<code>/etc/init.d/devfsadm</code>	daemon start/stop script
<code>/etc/rcS.d/S50devfsadm</code>	link to init.d script
<code>/etc/rc0.d/K83devfsadm</code>	link to init.d script
<code>/dev/.devfsadm_dev.lock</code>	update lock file
<code>/dev/.devfsadm_daemon.lock</code>	daemon lock file

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `add_drv(1M)`, `devlinks(1M)`, `disks(1M)`, `drvconfig(1M)`, `modinfo(1M)`, `modload(1M)`, `modunload(1M)`, `ports(1M)`, `rem_drv(1M)`, `tapes(1M)`, `path_to_inst(4)`, `attributes(5)`

NOTES This document does not constitute an API. The `/devices` directory might not exist or might have different contents or interpretations in a future release. The existence of this notice does not imply that any other documentation that lacks this notice constitutes an API.

NAME	devinfo – print device specific information				
SYNOPSIS	<pre>/usr/sbin/devinfo -i device</pre> <pre>/usr/sbin/devinfo -p device</pre>				
DESCRIPTION	The devinfo command is used to print device specific information about disk devices on standard out. The command can only be used by the superuser.				
OPTIONS	-i Prints the following device information: ■ Device name ■ Software version (not supported and prints as 0) ■ Drive id number (not supported and prints as 0) ■ Device blocks per cylinder ■ Device bytes per block ■ Number of device partitions with a block size greater than zero -p Prints the following device partition information: ■ Device name ■ Device major and minor numbers (in hexadecimal) ■ Partition start block ■ Number of blocks allocated to the partition ■ Partition flag ■ Partition tag This command is used by various other commands to obtain device specific information for the making of file systems and determining partition information. If the device cannot be opened, an error message is reported.				
OPERANDS	<i>device</i> Device name.				
EXIT STATUS	0 Successful operation. 2 Operation failed.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	prtvto(1M), attributes(5)				

devlinks(1M)

NAME	devlinks – adds /dev entries for miscellaneous devices and pseudo-devices								
SYNOPSIS	/usr/sbin/devlinks [-d] [-r <i>rootdir</i>] [-t <i>table-file</i>]								
DESCRIPTION	devfsadm(1M) is now the preferred command for /dev and /devices and should be used instead of devlinks. devlinks creates symbolic links from the /dev directory tree to the actual block- and character-special device nodes under the /devices directory tree. The links are created according to specifications found in the <i>table-file</i> (by default /etc/devlink.tab). devlinks is called each time the system is reconfiguration-booted, and can only be run after drvconfig(1M) is run, since drvconfig(1M) builds the kernel data structures and the /devices tree. The <i>table-file</i> (normally /etc/devlink.tab) is an ASCII file, with one line per record. Comment lines, which must contain a hash character ('#') as their first character, are allowed. Each entry must contain at least two fields, but may contain three fields. Fields are separated by single TAB characters. The fields are: <table> <tr> <td><i>devfs-spec</i></td><td>Specification of devinfo nodes that will have links created for them. This specification consists of one or more keyword-value pairs, where the keyword is separated from the value by an equal-sign ('='), and keyword-value pairs are separated from one another by semicolons.</td></tr> </table> The possible keywords are: <table> <tr> <td><i>type</i></td><td>The devinfo device type. Possible values are specified in ddi_create_minor_node(9F)</td></tr> <tr> <td><i>name</i></td><td>The name of the node. This is the portion of the /devices tree entry name that occurs before the first '@' or ':' character.</td></tr> <tr> <td><i>addr[n]</i></td><td>The address portion of a node name. This is the portion of a node name that occurs between the '@' and the ':' characters. It is possible that a node may have a name without an address part, which is the case for many of the pseudo-device nodes. If a number is given after the <i>addr</i> it specifies a match of a particular</td></tr> </table>	<i>devfs-spec</i>	Specification of devinfo nodes that will have links created for them. This specification consists of one or more keyword-value pairs, where the keyword is separated from the value by an equal-sign ('='), and keyword-value pairs are separated from one another by semicolons.	<i>type</i>	The devinfo device type. Possible values are specified in ddi_create_minor_node(9F)	<i>name</i>	The name of the node. This is the portion of the /devices tree entry name that occurs before the first '@' or ':' character.	<i>addr[n]</i>	The address portion of a node name. This is the portion of a node name that occurs between the '@' and the ':' characters. It is possible that a node may have a name without an address part, which is the case for many of the pseudo-device nodes. If a number is given after the <i>addr</i> it specifies a match of a particular
<i>devfs-spec</i>	Specification of devinfo nodes that will have links created for them. This specification consists of one or more keyword-value pairs, where the keyword is separated from the value by an equal-sign ('='), and keyword-value pairs are separated from one another by semicolons.								
<i>type</i>	The devinfo device type. Possible values are specified in ddi_create_minor_node(9F)								
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devlinks(1M)

comma-separated subfield of the address field: *addr1* matches the first subfield, *addr2* matches the second, and so on. *addr0* is the same as *addr* and matches the whole field.

minor[*n*] The minor portion of a node name – the portion of the name after the ‘:’. As with *addr* above, a number after the *minor* keyword specifies a subfield to match.

Of these four specifications, only the *type* specification must always be present.

name

Specification of the /dev links that correspond to the devinfo nodes. This field allows devlinks to determine matching /dev names for the /devices nodes it has found. The specification of this field uses escape-sequences to allow portions of the /devices name to be included in the /dev name, or to allow a counter to be used in creating node names. If a counter is used to create a name, the portion of the name before the counter must be specified absolutely, and all names in the /dev/-subdirectory that match (up to and including the counter) are considered to be subdevices of the same device. This means that they should all point to the same directory, name and address under the /devices/-tree

The possible escape-sequences are:

- \D Substitute the device-name (name) portion of the corresponding devinfo node-name.
- \An Substitute the *n*th component of the address component of the corresponding devinfo node name. Sub-components are separated by commas, and sub-component 0 is the whole address component.
- \Mn Substitute the *n*th sub-component of the minor component of the corresponding devinfo node name. Sub-components are separated by commas, and sub-component 0 is the whole minor component.

devlinks(1M)

		<code>\Nm</code>	Substitute the value of a 'counter' starting at <i>n</i> . There can be only one counter for each dev-spec, and counter-values will be selected so they are as low as possible while not colliding with already-existing link names.
			In a dev-spec the counter sequence should not be followed by a digit, either explicitly or as a result of another escape-sequence expansion. If this occurs, it would not be possible to correctly match already-existing links to their counter entries, since it would not be possible to unambiguously parse the already-existing /dev-name.
	<i>extra-dev-link</i>		Optional specification of an extra /dev link that points to the initial /dev link (specified in field 2). This field may contain a counter escape-sequence (as described for the <i>dev-spec</i> field) but may not contain any of the other escape-sequences. It provides a way to specify an alias of a particular /dev name.
OPTIONS	<code>-d</code>		Debugging mode – print out all devinfo nodes found, and indicate what links would be created, but do not do anything.
	<code>-r rootdir</code>		Use <i>rootdir</i> as the root of the /dev and /devices directories under which the device nodes and links are created. Changing the root directory does not change the location of the /etc/devlink.tab default table, nor is the root directory applied to the filename supplied to the <code>-t</code> option.
	<code>-t table-file</code>		Set the table file used by devlinks to specify the links that must be created. If this option is not given, /etc/devlink.tab is used. This option gives a way to instruct devlinks just to perform a particular piece of work, since just the links-types that devlinks is supposed to create can be specified in a command-file and fed to devlinks.
ERRORS			If devlinks finds an error in a line of the <i>table-file</i> it prints a warning message on its standard output and goes on to the next line in the <i>table-file</i> without performing any of the actions specified by the erroneous rule.
			If it cannot create a link for some filesystem-related reason it prints an error-message and continues with the current rule.
			If it cannot read necessary data it prints an error message and continues with the next <i>table-file</i> line.

EXAMPLES **EXAMPLE 1** Examples of /etc/devlink.tab fields

Example /etc/devlink.tab fields are:

```
type=pseudo;name=win      win\M0
type=ddi_display  framebuffer/\M0    fb\N0
```

The first example states that all devices of type pseudo with a name component of win will be linked to /dev/winx, where *x* is the minor-component of the *devinfo-name* (this is always a single-digit number for the win driver).

The second example states that all devinfo nodes of type ddi_display will be linked to entries under the /dev/framebuffer directory, with names identical to the entire minor component of the /devices name. In addition an extra link will be created pointing from /dev/fbn to the entry under /dev/framebuffer. This entry will use a counter to end the name.

FILES	/dev	entries for the miscellaneous devices for general use
	/devices	device nodes
	/etc/devlink.tab	the default rule-file

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO devfsadm(1M), ddi_create_minor_node(9F), disks(1M), drvconfig(1M), ports(1M), tapes(1M), attributes(5)

BUGS It is very easy to construct mutually-contradictory link specifications, or specifications that can never be matched. The program does not check for these conditions.

devnm(1M)

NAME	devnm – device name				
SYNOPSIS	/usr/sbin/devnm <i>name</i> [<i>name...</i>]				
DESCRIPTION	The devnm command identifies the special file associated with the mounted file system where the argument <i>name</i> resides. One or more <i>name</i> can be specified.				
EXAMPLES	EXAMPLE 1 Using the devnm Command Assuming that /usr is mounted on /dev/dsk/c0t3d0s6, the following command : <pre>/usr/sbin/devnm /usr</pre> produces: <pre>/dev/dsk/c0t3d0s6 /usr</pre>				
FILES	<pre>/dev/dsk/* /etc/mnttab</pre>				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	mnttab(4), attributes(5)				

NAME	devreserv – reserve devices for exclusive use				
SYNOPSIS	devreserv [<i>key</i> [<i>device-list...</i>]]				
DESCRIPTION	devreserv reserves devices for exclusive use. When the device is no longer required, use devfree to release it. devreserv reserves at most one device per <i>device-list</i>. Each list is searched in linear order until the first available device is found. If a device cannot be reserved from each list, the entire reservation fails. When devreserv is invoked without arguments, it lists the devices that are currently reserved and shows to which key it was reserved. When devreserv is invoked with only the <i>key</i> argument, it lists the devices that are currently reserved to that key.				
OPERANDS	The following operands are supported: <table><tr><td><i>device-list</i></td><td>Defines a list of devices that devreserv will search to find an available device. The list must be formatted as a single argument to the shell.</td></tr><tr><td><i>key</i></td><td>Designates a unique key on which the device will be reserved. The key must be a positive integer.</td></tr></table>	<i>device-list</i>	Defines a list of devices that devreserv will search to find an available device. The list must be formatted as a single argument to the shell.	<i>key</i>	Designates a unique key on which the device will be reserved. The key must be a positive integer.
<i>device-list</i>	Defines a list of devices that devreserv will search to find an available device. The list must be formatted as a single argument to the shell.				
<i>key</i>	Designates a unique key on which the device will be reserved. The key must be a positive integer.				
EXAMPLES	EXAMPLE 1 Reserving a Floppy Disk and a Cartridge Tape The following example reserves a floppy disk and a cartridge tape: <pre>\$ key=\$\$ \$ echo "The current Process ID is equal to: \$key" The Current Process ID is equal to: 10658 \$ devreserv \$key diskette1 ctape1</pre> EXAMPLE 2 Listing All Devices Currently Reserved The following example lists all devices currently reserved: <pre>\$ devreserv disk1 2423 diskette1 10658 ctape1 10658</pre> EXAMPLE 3 Listing All Devices Currently Reserved to a Particular Key The following example lists all devices currently reserved to a particular key: <pre>\$ devreserv \$key diskette1 ctape1</pre>				
EXIT STATUS	The following exit values are returned:				

devreserv(1M)

0	Successful completion.
1	Command syntax was incorrect, an invalid was option used, or an internal error occurred.
2	Device table or device reservation table could not be opened for reading.
3	Device reservation request could not be fulfilled.

FILES /etc/device.tab
/etc/devlkfile

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO devfree(1M), attributes(5)

NOTES The commands `devreserv` and `devfree` are used to manage the availability of devices on a system. Their use is on a participatory basis and they do not place any constraints on the actual access to the device. They serve as a centralized bookkeeping point for those who wish to use them. Devices which have been reserved cannot be used by processes which utilize the device reservation functions until the reservation has been canceled. However, processes that do not use device reservation may use a device that has been reserved since such a process would not have checked for its reservation status.

NAME	df – displays number of free disk blocks and files
SYNOPSIS	<pre> /usr/bin/df [-F FSType] [-abeghklntVv] [-o FSType-specific_options] [block_device directory file resource ...] /usr/xpg4/bin/df [-F FSType] [-abeghklnPtV] [-o FSType-specific_options] [block_device directory file resource ...] </pre>
DESCRIPTION	The df utility displays the amount of disk space occupied by mounted or unmounted file systems, the amount of used and available space, and how much of the file system's total capacity has been used. The file system is specified by device, or by referring to a file or directory on the specified file system. Used without operands or options, df reports on all mounted file systems. df may not be supported for all <i>FSTypes</i>. If df is run on a networked mount point that the automounter has not yet mounted, the file system size will be reported as zero. As soon as the automounter mounts the file system, the sizes will be reported correctly.
OPTIONS	The following options are supported for both <code>/usr/bin/df</code> and <code>/usr/xpg4/bin/df</code>: -a Reports on all file systems including ones whose entries in <code>/etc/mnttab</code> (see <code>mnttab(4)</code>) have the <code>ignore</code> option set. -b Prints the total number of kilobytes free. -e Prints only the number of files free. -F <i>FSType</i> Specifies the <i>FSType</i> on which to operate. The <code>-F</code> option is intended for use with unmounted file systems. The <i>FSType</i> should be specified here or be determinable from <code>/etc/vfstab</code> (see <code>vfstab(4)</code>) by matching the <i>directory</i>, <i>block_device</i>, or <i>resource</i> with an entry in the table, or by consulting <code>/etc/default/fs</code>. See <code>default_fs(4)</code>. -g Prints the entire <code>statvfs(2)</code> structure. This option is used only for mounted file systems. It can not be used with the <code>-o</code> option. This option overrides the <code>-b</code>, <code>-e</code>, <code>-k</code>, <code>-n</code>, <code>-P</code>, and <code>-t</code> options. -h Like <code>-k</code>, except that sizes are in a more human readable format. The output consists of one line of information for each specified file system. This information includes the file system name, the total space allocated in the file system, the amount of space allocated to existing files, the total amount of space available for the creation of new files by unprivileged users, and the percentage of

df(1M)

	normally available space that is currently allocated to all files on the file system. All sizes are scaled to a human readable format, for example, 14K, 234M, 2.7G, or 3.0T. Scaling is done by repetitively dividing by 1024.
	This option overrides the -b, -e, -g, -k, -n, -t, and -V options. This option only works on mounted filesystems and can not be used together with -o option.
-k	Prints the allocation in kbytes. The output consists of one line of information for each specified file system. This information includes the file system name, the total space allocated in the file system, the amount of space allocated to existing files, the total amount of space available for the creation of new files by unprivileged users, and the percentage of normally available space that is currently allocated to all files on the file system. This option overrides the -b, -e, -n, and -t options.
-l	Reports on local file systems only. This option is used only for mounted file systems. It can not be used with the -o option.
-n	Prints only the <i>FSType</i> name. Invoked with no operands, this option prints a list of mounted file system types. This option is used only for mounted file systems. It can not be used with the -o option.
-o <i>FSType-specific_options</i>	Specifies <i>FSType-specific</i> options. These options are comma-separated, with no intervening spaces. See the manual page for the <i>FSType-specific</i> command for details.
-t	Prints full listings with totals. This option overrides the -b, -e, and -n options.
-V	Echoes the complete set of file system specific command lines, but does not execute them. The command line is generated by using the options and operands provided by the user and adding to them information derived from <i>/etc/mnttab</i> , <i>/etc/vfstab</i> , or <i>/etc/default/fs</i> . This option may be used to verify and validate the command line.
/usr/bin/df	The following option is supported for <i>/usr/bin/df</i> only:
-v	Like -k, except that sizes are displayed in multiples of the smallest block size supported by each specified file system.

	The output consists of one line of information for each file system. This one line of information includes the following: ■ the file system's mount point ■ the file system's name ■ the total number of blocks allocated to the file system ■ the number of blocks allocated to existing files ■ the number of blocks available for the creation of new files by unprivileged users ■ the percentage of blocks in use by files
/usr/xpg4/bin/df	The following option is supported for <code>/usr/xpg4/bin/df</code> only: <code>-P</code> Same as <code>-k</code> except in 512-byte units.
OPERANDS	The <code>df</code> utility interprets operands according to the following precedence: <i>block_device</i>, <i>directory</i>, <i>file</i>. The following operands are supported: <i>block_device</i> Represents a block special device (for example, <code>/dev/dsk/c1d0s7</code>); the corresponding file system need not be mounted. <i>directory</i> Represents a valid directory name. <code>df</code> reports on the file system that contains <i>directory</i>. <i>file</i> Represents a valid file name. <code>df</code> reports on the file system that contains <i>file</i>. <i>resource</i> Represents an NFS resource name.
USAGE	See <code>largefile(5)</code> for the description of the behavior of <code>df</code> when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).
EXAMPLES	EXAMPLE 1 Writing Portable Information About the <code>/usr</code> File System The following example writes portable information about the <code>/usr</code> file system: <pre>example% /usr/xpg4/bin/df -P /usr</pre> EXAMPLE 2 Writing Portable Information About the <code>/usr/src</code> file System Assuming that <code>/usr/src</code> is part of the <code>/usr</code> file system, the following example writes portable information : <pre>example% /usr/xpg4/bin/df -P /usr/src</pre> EXAMPLE 3 Using <code>df</code> to Display Inode Usage The following example displays inode usage on all <code>ufs</code> file systems: <pre>example% /usr/bin/df -F ufs -o i</pre>

df(1M)

**ENVIRONMENT
VARIABLES**

SYSV3 This variable is used to override the default behavior of `df` and provide compatibility with INTERACTIVE UNIX System and SCO UNIX installation scripts. As the `SYSV3` variable is provided for compatibility purposes only, it should not be used in new scripts.

When set, any header which normally displays “files” will now display “nodes”. See `environ(5)` for descriptions of the following environment variables that affect the execution of `df`: `LANG`, `LC_ALL`, `LC_CTYPE`, `LC_MESSAGES`, and `NLSPATH`.

EXIT STATUS

The following exit values are returned:

0 Successful completion.

>0 An error occurred.

FILES

`/dev/dsk/*` Disk devices

`/etc/default/fs` Default local file system type. Default values can be set for the following flags in `/etc/default/fs`. For example: `LOCAL=ufs`, where `LOCAL` is the default partition for a command if no `FSType` is specified.

`/etc/mnttab` Mount table

`/etc/vfstab` List of default parameters for each file system

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

/usr/bin/df

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

/usr/xpg4/bin/df

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWxcu4
Interface Stability	Standard

SEE ALSO

`find(1)`, `df_ufs(1M)`, `mount(1M)`, `statvfs(2)`, `default_fs(4)`, `mnttab(4)`, `vfstab(4)`, `attributes(5)`, `environ(5)`, `largefile(5)`, `standards(5)`

NOTES

If UFS logging is enabled on a file system, the disk space used for the log is reflected in the `df` report. The log is allocated from free blocks on the file system, and it is sized approximately 1 Mbyte per 1 Gbyte of file system, up to a maximum of 64 Mbytes.

NAME	dfmounts – display mounted resource information									
SYNOPSIS	dfmounts [-F <i>FSType</i>] [-h] [-o <i>specific_options</i>] [<i>restriction...</i>]									
DESCRIPTION	dfmounts shows the local resources shared through a distributed file system <i>FSType</i> along with a list of clients that have the resource mounted. If <i>restriction</i> is not specified, dfmounts shows file systems that are currently shared on any NFS server. <i>specific_options</i> as well as the availability and semantics of <i>restriction</i> are specific to particular distributed file system types. If dfmounts is entered without arguments, all remote resources currently mounted on the local system are displayed, regardless of file system type.									
dfmounts Output	The output of dfmounts consists of an optional header line (suppressed with the -h flag) followed by a list of lines containing whitespace-separated fields. For each resource, the fields are: <i>resource server pathname clients ...</i>where: <table><tr><td><i>resource</i></td><td>Specifies the resource name that must be given to the mount(1M) command.</td></tr><tr><td><i>server</i></td><td>Specifies the system from which the resource was mounted.</td></tr><tr><td><i>pathname</i></td><td>Specifies the pathname that must be given to the share(1M) command.</td></tr><tr><td><i>clients</i></td><td>Is a comma-separated list of systems that have mounted the resource. Clients are listed in the form <i>domain.</i>, <i>domain.system</i>, or <i>system</i>, depending on the file system type.</td></tr></table> A field may be null. Each null field is indicated by a hyphen (–) unless the remainder of the fields on the line are also null; in which case, the hyphen may be omitted. Fields with whitespace are enclosed in quotation marks (" ").		<i>resource</i>	Specifies the resource name that must be given to the mount(1M) command.	<i>server</i>	Specifies the system from which the resource was mounted.	<i>pathname</i>	Specifies the pathname that must be given to the share(1M) command.	<i>clients</i>	Is a comma-separated list of systems that have mounted the resource. Clients are listed in the form <i>domain.</i> , <i>domain.system</i> , or <i>system</i> , depending on the file system type.
<i>resource</i>	Specifies the resource name that must be given to the mount(1M) command.									
<i>server</i>	Specifies the system from which the resource was mounted.									
<i>pathname</i>	Specifies the pathname that must be given to the share(1M) command.									
<i>clients</i>	Is a comma-separated list of systems that have mounted the resource. Clients are listed in the form <i>domain.</i> , <i>domain.system</i> , or <i>system</i> , depending on the file system type.									
OPTIONS	-F <i>FSType</i>	Specify filesystem type. Defaults to the first entry in /etc/dfs/fstypes. Note: currently the only valid <i>FSType</i> is nfs.								
	-h	Suppress header line in output.								
	-o <i>specific_options</i>	Specify options specific to the filesystem provided by the -F option. Note: currently no options are supported.								
FILES	/etc/dfs/fstypes	file system types								

dfmounts(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `dfshares(1M)`, `mount(1M)`, `share(1M)`, `unshare(1M)`, `attributes(5)`

NAME	dfmounts_nfs – display mounted NFS resource information								
SYNOPSIS	dfmounts [-F nfs] [-h] [server...]								
DESCRIPTION	dfmounts shows the local resources shared through NFS, along with the list of clients that have mounted the resource. The -F flag may be omitted if NFS is the only file system type listed in the file /etc/dfs/fstypes. dfmounts without options, displays all remote resources mounted on the local system, regardless of file system type. The output of dfmounts consists of an optional header line (suppressed with the -h flag) followed by a list of lines containing whitespace-separated fields. For each resource, the fields are: <i>resource server pathname clients ...where</i> <table> <tr> <td><i>resource</i></td><td>Does not apply to NFS. Printed as a hyphen (-).</td></tr> <tr> <td><i>server</i></td><td>Specifies the system from which the resource was mounted.</td></tr> <tr> <td><i>pathname</i></td><td>Specifies the pathname that must be given to the share(1M) command.</td></tr> <tr> <td><i>clients</i></td><td>Is a comma-separated list of systems that have mounted the resource.</td></tr> </table>	<i>resource</i>	Does not apply to NFS. Printed as a hyphen (-).	<i>server</i>	Specifies the system from which the resource was mounted.	<i>pathname</i>	Specifies the pathname that must be given to the share(1M) command.	<i>clients</i>	Is a comma-separated list of systems that have mounted the resource.
<i>resource</i>	Does not apply to NFS. Printed as a hyphen (-).								
<i>server</i>	Specifies the system from which the resource was mounted.								
<i>pathname</i>	Specifies the pathname that must be given to the share(1M) command.								
<i>clients</i>	Is a comma-separated list of systems that have mounted the resource.								
OPTIONS	-F nfs Specifies the nfs-FSType. -h Suppress header line in output. <i>server</i> Displays information about the resources mounted from each server, where <i>server</i> can be any system on the network. If no server is specified, the <i>server</i> is assumed to be the local system.								
FILES	/etc/dfs/fstypes								
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:								
	<table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWnfscu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnfscu				
ATTRIBUTE TYPE	ATTRIBUTE VALUE								
Availability	SUNWnfscu								
SEE ALSO	mount(1M), share(1M), unshare(1M), attributes(5)								

dfshares(1M)

NAME	dfshares – list available resources from remote or local systems								
SYNOPSIS	dfshares [-F <i>FSType</i>] [-h] [-o <i>specific_options</i>] [<i>server...</i>]								
DESCRIPTION	dfshares provides information about resources available to the host through a distributed file system of type <i>FSType</i>. <i>specific_options</i> as well as the semantics of <i>server</i> are specific to particular distributed file systems. If dfshares is entered without arguments, all resources currently shared on the local system are displayed, regardless of file system type. The output of dfshares consists of an optional header line (suppressed with the -h flag) followed by a list of lines containing whitespace-separated fields. For each resource, the fields are: <pre>resource server access transport</pre> where <table> <tr> <td><i>resource</i></td><td>Specifies the resource name that must be given to the mount(1M) command.</td></tr> <tr> <td><i>server</i></td><td>Specifies the name of the system that is making the resource available.</td></tr> <tr> <td><i>access</i></td><td>Specifies the access permissions granted to the client systems, either ro (for read-only) or rw (for read/write). If dfshares cannot determine access permissions, a hyphen (-) is displayed.</td></tr> <tr> <td><i>transport</i></td><td>Specifies the transport provider over which the resource is shared.</td></tr> </table> A field may be null. Each null field is indicated by a hyphen (-) unless the remainder of the fields on the line are also null; in which case, the hyphen may be omitted.	<i>resource</i>	Specifies the resource name that must be given to the mount(1M) command.	<i>server</i>	Specifies the name of the system that is making the resource available.	<i>access</i>	Specifies the access permissions granted to the client systems, either ro (for read-only) or rw (for read/write). If dfshares cannot determine access permissions, a hyphen (-) is displayed.	<i>transport</i>	Specifies the transport provider over which the resource is shared.
<i>resource</i>	Specifies the resource name that must be given to the mount(1M) command.								
<i>server</i>	Specifies the name of the system that is making the resource available.								
<i>access</i>	Specifies the access permissions granted to the client systems, either ro (for read-only) or rw (for read/write). If dfshares cannot determine access permissions, a hyphen (-) is displayed.								
<i>transport</i>	Specifies the transport provider over which the resource is shared.								
OPTIONS	-F <i>FSType</i> Specify filesystem type. Defaults to the first entry in /etc/dfs/fstypes. -h Suppress header line in output. -o <i>specific_options</i> Specify options specific to the filesystem provided by the -F option.								
FILES	/etc/dfs/fstypes								
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:								
	<table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu				
ATTRIBUTE TYPE	ATTRIBUTE VALUE								
Availability	SUNWcsu								
SEE ALSO	dfmounts(1M), mount(1M), share(1M), unshare(1M), attributes(5)								

NAME	dfshares_nfs – list available NFS resources from remote systems								
SYNOPSIS	dfshares [-F nfs] [-h] [server...]								
DESCRIPTION	dfshares provides information about resources available to the host through NFS. The -F flag may be omitted if NFS is the first file system type listed in the file /etc/dfs/fstypes. The query may be restricted to the output of resources available from one or more servers. dfshares without arguments displays all resources shared on the local system, regardless of file system type. Specifying <i>server</i> displays information about the resources shared by each server. <i>Server</i> can be any system on the network. If no server is specified, then <i>server</i> is assumed to be the local system. The output of dfshares consists of an optional header line (suppressed with the -h flag) followed by a list of lines containing whitespace-separated fields. For each resource, the fields are: <i>resource server access transport</i> where <table><tr><td><i>resource</i></td><td>Specifies the resource name that must be given to the mount(1M) command.</td></tr><tr><td><i>server</i></td><td>Specifies the system that is making the resource available.</td></tr><tr><td><i>access</i></td><td>Specifies the access permissions granted to the client systems; however, dfshares cannot determine this information for an NFS resource and populates the field with a hyphen (-).</td></tr><tr><td><i>transport</i></td><td>Specifies the transport provider over which the <i>resource</i> is shared; however, dfshares cannot determine this information for an NFS resource and populates the field with a hyphen (-).</td></tr></table> A field may be null. Each null field is indicated by a hyphen (-) unless the remainder of the fields on the line are also null; in which case, the hyphen may be omitted.	<i>resource</i>	Specifies the resource name that must be given to the mount(1M) command.	<i>server</i>	Specifies the system that is making the resource available.	<i>access</i>	Specifies the access permissions granted to the client systems; however, dfshares cannot determine this information for an NFS resource and populates the field with a hyphen (-).	<i>transport</i>	Specifies the transport provider over which the <i>resource</i> is shared; however, dfshares cannot determine this information for an NFS resource and populates the field with a hyphen (-).
<i>resource</i>	Specifies the resource name that must be given to the mount(1M) command.								
<i>server</i>	Specifies the system that is making the resource available.								
<i>access</i>	Specifies the access permissions granted to the client systems; however, dfshares cannot determine this information for an NFS resource and populates the field with a hyphen (-).								
<i>transport</i>	Specifies the transport provider over which the <i>resource</i> is shared; however, dfshares cannot determine this information for an NFS resource and populates the field with a hyphen (-).								
OPTIONS	-F nfs Specify the NFS file system type -h Suppress header line in output.								
FILES	/etc/dfs/fstypes								

dfshares_nfs(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnfscu

SEE ALSO `mount(1M)`, `share(1M)`, `unshare(1M)`, `attributes(5)`

NAME	df_ufs – report free disk space on ufs file systems				
SYNOPSIS	df -F ufs [<i>generic_options</i>] [-o i] [<i>directory</i> <i>special</i>]				
DESCRIPTION	df displays the amount of disk space occupied by ufs file systems, the amount of used and available space, and how much of the file system's total capacity has been used. The amount of space reported as used and available is less than the amount of space in the file system; this is because the system reserves a fraction of the space in the file system to allow its file system allocation routines to work well. The amount reserved is typically about 10%; this may be adjusted using tuneufs(1M). When all the space on the file system except for this reserve is in use, only the superuser can allocate new files and data blocks to existing files. When the file system is overallocated in this way, df may report that the file system is more than 100% utilized. If neither <i>directory</i> nor <i>special</i> is specified, df displays information for all mounted ufs file systems.				
OPTIONS	The following options are supported: <i>generic_options</i> Options supported by the generic df command. See df(1M) for a description of these options. -o Specify ufs file system specific options. The available option is: i Report the number of used and free inodes. This option may not be used with <i>generic_options</i>.				
FILES	/etc/mnttab list of file systems currently mounted				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu, SUNWxcu4</td></tr> </tbody> </table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu, SUNWxcu4
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu, SUNWxcu4				
SEE ALSO	df(1M), tuneufs(1M), mnttab(4), attributes(5), ufs(7FS)				
NOTES	df calculates its results differently for mounted and unmounted file systems. For unmounted systems, the numbers reflect the 10% reservation mentioned above; this reservation is not reflected in df output for mounted file systems. For this reason, the available space reported by the generic command may differ from the available space reported by this module.				

dhcpcagent(1M)

NAME	dhcpcagent – Dynamic Host Configuration Protocol (DHCP) client daemon
SYNOPSIS	dhcpcagent [-a] [-d <i>n</i>] [-f] [-v]
DESCRIPTION	dhcpcagent implements the client half of the Dynamic Host Configuration Protocol (DHCP) for machines running Solaris software. The dhcpcagent daemon obtains configuration parameters for the client (local) machine's network interfaces from a DHCP server. These parameters may include a lease on an IP address, which gives the client machine use of the address for the period of the lease, which may be infinite. If the client wishes to use the IP address for a period longer than the lease, it must negotiate an extension using DHCP. For this reason, dhcpcagent must run as a daemon, terminating only when the client machine powers down. The dhcpcagent daemon is controlled through ifconfig(1M) in much the same way that the init(1M) daemon is controlled by telinit(1M). dhcpcagent may be invoked as a user process, albeit one requiring root privileges, but this is not necessary, as ifconfig(1M) will start it automatically. When invoked, dhcpcagent enters a passive state while it awaits instructions from ifconfig(1M). When it receives a command to configure an interface, it starts DHCP. Once DHCP is complete, dhcpcagent may be queried for the values of the various network parameters. In addition, if DHCP was used to obtain a lease on an address for an interface, the interface is configured and brought up. When a lease is obtained, it is automatically renewed as necessary. If the lease cannot be renewed, dhcpcagent will take the interface down at the end of the lease. If the configured interface is found to have a different IP address, subnet mask or broadcast address from those obtained from DHCP, the interface is abandoned from DHCP control. In addition to DHCP, dhcpcagent also supports BOOTP. See <i>RFC 951, Bootstrap Protocol</i>. Configuration parameters obtained from a BOOTP server are treated identically to those received from a DHCP server, except that the IP address received from a BOOTP server always has an infinite lease. DHCP also acts as a mechanism to configure other information needed by the client, for example, the domain name and addresses of routers. Aside from the IP address, netmask, broadcast address and default router, the agent does not directly configure the workstation, but instead acts as a database which may be interrogated by other programs, and in particular by dhcpcinfo(1). On clients with a single interface, this is quite straightforward. Clients with multiple interfaces may present difficulties, as it is possible that some information arriving on different interfaces may need to be merged, or may be inconsistent. Furthermore, the configuration of the interfaces is asynchronous, so requests may arrive while some or all of the interfaces are still unconfigured. To handle these cases, one interface may be designated as primary, which makes it the authoritative source for the values of DHCP parameters in the case where no specific interface is requested. See dhcpcinfo(1) and ifconfig(1M) for details.

The dhcpcagent daemon can be configured to request a particular host name. See the REQUEST_HOSTNAME description in the FILES section. When first configuring a client to request a host name, you must perform the following steps as root to ensure that the full DHCP negotiation takes place:

```
# pkill dhcpcagent
# rm /etc/dhcp/interface.dhc
# reboot
```

Messages

The dhcpcagent daemon writes information and error messages in five categories:

critical	Critical messages indicate severe conditions that prevent proper operation.
errors	Error messages are important, sometimes unrecoverable events due to resource exhaustion and other unexpected failure of system calls; ignoring errors may lead to degraded functionality.
warnings	Warnings indicate less severe problems, and in most cases, describe unusual or incorrect datagrams received from servers, or requests for service that cannot be provided.
informational	Informational messages provide key pieces of information that can be useful to debugging a DHCP configuration at a site. Informational messages are generally controlled by the -v option. However, certain critical pieces of information, such as the IP address obtained, are always provided.
debug	Debugging messages, which may be generated at two different levels of verbosity, are chiefly of benefit to persons having access to source code, but may be useful as well in debugging difficult DHCP configuration problems. Debugging messages are only generated when using the -d option.

When dhcpcagent is run without the -f option, all messages are sent to the system logger syslog(3C) at the appropriate matching priority and with a facility identifier LOG_DAEMON. When dhcpcagent is run with the -f option, all messages are directed to standard error.

OPTIONS

The following options are supported:

- a Adopt a configured interface. This option is for use with diskless DHCP clients. In the case of diskless DHCP, DHCP has already been performed on the network interface providing the operating system image prior to running dhcpcagent. This option instructs the agent to take over control of the interface. It is intended primarily for use in boot scripts.

dhcpcagent(1M)

	-d <i>n</i> Set debug level to <i>n</i>. Two levels of debugging are currently available, 1 and 2; the latter is more verbose. -f Run in the foreground instead of as a daemon process. When this option is used, messages are sent to standard error instead of to <code>syslog(3C)</code>. -v Provide verbose output useful for debugging site configuration problems.
FILES	<code>/etc/dhcp/if.dhc</code> Contains the configuration for interface. The mere existence of this file does not imply that the configuration is correct, since the lease may have expired. <code>/etc/default/dhcpcagent</code> Contains default values for tunable parameters. All values may be qualified with the interface they apply to by prepending the interface name and a period (".") to the interface parameter name. The parameters include: RELEASE_ON_SIGTERM Indicates that a RELEASE rather than a DROP should be performed on managed interfaces when the agent terminates. OFFER_WAIT Indicates how long to wait between checking for valid OFFERS after sending a DISCOVER. ARP_WAIT Indicates how long to wait for clients to respond to an ARP request before concluding the address in the ARP request is unused. IGNORE_FAILED_ARP Specifies whether or not the agent should assume an address is available, in the unlikely event that ARP cannot be performed on that address. CLIENT_ID Indicates the value that should be used to uniquely identify the client to the server. PARAM_REQUEST_LIST Specifies a list of comma-separated integer values of options for which the client would like values. REQUEST_HOSTNAME Indicates the client requests the DHCP server to map the client's leased IP address to the host name associated with the network interface that performs DHCP on the client. The host name must be specified in the <code>/etc/hostname.interface</code> file for the relevant interface on a line of the form <code>inet <i>hostname</i></code> where <i>hostname</i> is the host name requested.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsr
Interface Stability	Evolving

SEE ALSO dhcpinfo(1), ifconfig(1M), init(1M), syslog(3C), attributes(5), dhcp(5)

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Croft, B. and Gilmore, J., *Bootstrap Protocol (BOOTP)* RFC 951, Network Working Group, September 1985.

Droms, R., *Dynamic Host Configuration Protocol*, RFC 2131, Network Working Group, March 1997.

NOTES Currently, configurations where more than one interface is attached to the same physical network are unsupported. This precludes use of virtual interfaces.

dhcpcfg(1M)

NAME	dhcpcfg – DHCP service configuration utility												
SYNOPSIS	dhcpcfg -D -r <i>resource</i> -p <i>path</i> [-u <i>uninterpreted</i>] [-l <i>lease_length</i>] [-n] [-d <i>DNS_domain</i>] [-a <i>DNS_server_addresses</i>] [-h <i>hosts_resource</i>] [-y <i>hosts_domain</i>] dhcpcfg -R <i>server_addresses</i> dhcpcfg -U [-f] [-x] [-h] dhcpcfg -N <i>network_address</i> [-m <i>subnet_mask</i>] [-b] [-t <i>router_addresses</i>] [-y <i>NIS-domain</i>] [-a <i>NIS_server_addresses</i>] dhcpcfg -C -r <i>resource</i> -p <i>path</i> [-f] [-k] [-u <i>uninterpreted</i>] dhcpcfg -X <i>filename</i> [-m <i>macro_list</i>] [-o <i>option_list</i>] [-a <i>network_addresses</i>] [-f] [-x] dhcpcfg -I <i>filename</i> [-f]												
DESCRIPTION	The <code>dhcpcfg</code> command is used to configure and manage the Dynamic Host Configuration Protocol (DHCP) service or BOOTP relay services. It is intended for use by experienced Solaris system administrators and is designed for ease of use in scripts. The <code>dhcpcmgr</code> utility is recommended for less experienced administrators or those preferring a graphical utility to configure and manage the DHCP service or BOOTP relay service. The <code>dhcpcfg</code> command can be run by root, or by other users assigned to the DHCP Management profile. See <code>rbac(5)</code> and <code>user_attr(4)</code>. <code>dhcpcfg</code> requires one of the following function flags: -D, -R, -U, -N, -C, -X, or -I. The <code>dhcpcfg</code> menu driven mode is supported in Solaris 8 and previous versions of Solaris.												
Where dhcpcfg Obtains Configuration Information	<code>dhcpcfg</code> scans various configuration files on your Solaris machine for information it can use to assign values to options contained in macros it adds to the <code>dhcptab</code> configuration table. The following table lists information <code>dhcpcfg</code> needs, the source used, and how the information is used: <table><tr><th>Information</th><th>Source</th><th>Where Used</th></tr><tr><td>Timezone</td><td>System date, timezone settings</td><td>Locale macro</td></tr><tr><td>DNS parameters</td><td><code>nsswitch.conf</code>, <code>/etc/resolv.conf</code></td><td>Server macro</td></tr><tr><td>NIS parameters</td><td>System domainname, <code>nsswitch.conf</code>, NIS</td><td>Network macros</td></tr></table>	Information	Source	Where Used	Timezone	System date, timezone settings	Locale macro	DNS parameters	<code>nsswitch.conf</code> , <code>/etc/resolv.conf</code>	Server macro	NIS parameters	System domainname, <code>nsswitch.conf</code> , NIS	Network macros
Information	Source	Where Used											
Timezone	System date, timezone settings	Locale macro											
DNS parameters	<code>nsswitch.conf</code> , <code>/etc/resolv.conf</code>	Server macro											
NIS parameters	System domainname, <code>nsswitch.conf</code> , NIS	Network macros											

Subnetmask	Network interface, netmasks table in nameservice	Network macros

If you have not set these parameters on your server machine, you should do so before configuring the DHCP server with `dhcpconfig`. Note that if you specify options with the `dhcpconfig -D` command line, the values you supply override the values obtained from the system files.

OPTIONS

The following options are supported:

`-C`

Convert to using a new data store, recreating the DHCP data tables in a format appropriate to the new data store, and setting up the DHCP server to use the new data store.

The following sub-options are required:

`-p path_to_data`

The paths for `SUNWfiles` and `SUNWbinfiles` must be absolute UNIX pathnames. The path for `SUNWnisplus` must be a fully specified NIS+ directory (including the trailing period.) See `dhcp_modules(5)`.

`-r data_resource`

New data store resource. One of the following must be specified: `SUNWfiles`, `SUNWbinfiles`, or `SUNWnisplus`. See `dhcp_modules(5)`.

The following sub-options are optional:

`-f`

Do not prompt for confirmation. If `-f` is not used, a warning and confirmation prompt are issued before the conversion starts.

`-k`

Keep the old DHCP data tables after successful conversion. If any problem occurs during conversion, tables are not deleted even if `-k` sub-option is not specified.

`-u uninterpreted`

Data which is ignored by `dhcpconfig`, but passed on to the datastore for interpretation. The private layer provides for module-specific configuration information through the use of the `RESOURCE_CONFIG` keyword. Uninterpreted data is stored within `RESOURCE_CONFIG` keyword of `dhcpsvc.conf(4)`. The `-u` sub-option is not used

dhcpconfig(1M)

-D

with the SUNWfiles, SUNWbinfiles, and SUNWnisplus data stores. See dhcp_modules(5).

Configure the DHCP service.

The following sub-options are required:

-r *data_resource*

One of the following must be specified: SUNWfiles, SUNWbinfiles, or SUNWnisplus. Other data stores may be available. See dhcp_modules(5).

-p *path*

The paths for SUNWfiles and SUNWbinfiles must be absolute UNIX pathnames. The path for SUNWnisplus must be a fully specified NIS+ directory (including the tailing period.) . See dhcp_modules(5).

The following sub-options are optional:

-a *DNS_servers*

IP addresses of DNS servers, separated with commas.

-d *DNS_domain*

DNS domain name.

-h *hosts_resource*

Resource in which to place hosts data. Usually, the name service in use on the server. Valid values are nisplus, files, or dns.

-l *seconds*

Lease length used for addresses not having a specified lease length, in seconds.

-n

Non-negotiable leases

-y *hosts_domain*

DNS or NIS+ domain name to be used for hosts data. Valid only if dns or nisplus is specified for -h sub-option.

-u *uninterpreted*

Data which is ignored by dhcpconfig, but passed on to the datastore for interpretation. The private layer provides for module-specific configuration information through the use of the RESOURCE_CONFIG keyword. Uninterpreted data is stored within RESOURCE_CONFIG keyword of dhcpsvc.conf(4). The -u sub-option is not used

dhcpcfg(1M)

	with the SUNWfiles, SUNWbinfiles, and SUNWnisplus data stores. See dhcp_modules(5).
-I <i>filename</i>	Import data from <i>filename</i>, containing data previously exported from a Solaris DHCP server. Note that after importing, you may have to edit macros to specify the correct domain names, and edit network tables to change the owning server of addresses in imported networks. Use dhtadm and pntadm to do this. The following sub-option is supported: -f Replace any conflicting data with the data being imported.
-N <i>net_address</i>	Configure an additional network for DHCP service. The following sub-options are supported: -a <i>NIS_server_addresses</i> List of IP addresses of NIS servers. -b Network is a point-to-point (PPP) network, therefore no broadcast address should be configured. If -b is not used, the network is assumed to be a LAN, and the broadcast address is determined using the network address and subnet mask. -m <i>xxx.xxx.xxx.xxx</i> Subnet mask for the network; if -m is not used, subnet mask is obtained from netmasks. -t <i>router_addresses</i> List of router IP addresses; if not specified, router discovery flag is set. -y <i>NIS_domain_name</i> If NIS is used on this network, specify the NIS domain name.
-R <i>server_addresses</i>	Configure the BOOTP relay service. BOOTP or DHCP requests are forwarded to the list of servers specified. <i>server_addresses</i> is a comma separated list of hostnames and/or IP addresses.
-U	Unconfigure the DHCP service or BOOTP relay service. The following sub-options are supported:

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	-f Do not prompt for confirmation. If -f is not used, a warning and confirmation prompt is issued. -h Delete hosts entries from name service. -x Delete the dhcptab and network tables.
-x <i>filename</i>	Export data from the DHCP data tables, saving to <i>filename</i>, to move the data to another Solaris DHCP server. The following sub-options are optional: -a <i>networks_to_export</i> List of networks whose addresses should be exported, or the keyword ALL to specify all networks. If -a is not specified, no networks are exported. -m <i>macros_to_export</i> List of macros to export, or the keyword ALL to specify all macros. If -m is not specified, no macros are exported. -o <i>options_to_export</i> List of options to export, or the keyword ALL to specify all options. If -o is not specified, no options are exported. -x Delete the data from this server after it is exported. If -x is not specified you are in effect copying the data.

EXAMPLES

EXAMPLE 1 Configuring DHCP Service with Binary Files Data Store

The following command configures DHCP service, using the binary files data store, in the DNS domain `acme.eng`, with a lease time of 28800 seconds (8 hours),

```
example# dhcpconfig -D -r SUNWbinfiles -p /var/dhcp -l 28800 -d acme.eng  
-a 120.30.33.4 -h dns -y acme.eng
```

EXAMPLE 2 Configuring BOOTP Relay Agent

The following command configures the DHCP daemon as a BOOTP relay agent, which forwards BOOTP and DHCP requests to the servers having the IP addresses 120.30.33.7 and 120.30.42.132:

```
example# dhcpconfig -R 120.30.33.7,120.30.42.132
```

EXAMPLE 3 Unconfiguring DHCP Service

The following command unconfigures the DHCP service, with confirmation, and deletes the DHCP data tables and host table entries:

```
example# dhcpconfig -U -x -h
```

EXAMPLE 4 Configuring a Network for DHCP Service

The following command configures an additional LAN network for DHCP service, specifying that clients should use router discovery and providing the NIS domain name and NIS server address:

```
example# dhcpconfig -N 120.30.171.0 -y east.acme.eng.com -a 120.30.33.4
```

EXAMPLE 5 Converting to SUNWnisplus Data Store

The following command converts a DHCP server from using a text or binary files data store to a NIS+ data store, deleting the old data store's DHCP tables:

```
example# dhcpconfig -C -r SUNWnisplus -p whatever.com.
```

EXAMPLE 6 Exporting a Network, Macros, and Options from a DHCP Server

The following command exports one network (120.30.171.0) and its addresses, the macro 120.30.171.0, and the options motd and PSptr from a DHCP server, saves the exported data in file /export/var/120301710_data, and deletes the exported data from the server.

```
example# dhcpconfig -X /var/dhcp/120301710_export
-a 120.30.171.0 -m 120.30.171.0 -o motd,PSptr
```

EXAMPLE 7 Importing Data on a DHCP Server

The following command imports DHCP data from a file, /net/golduck/export/var/120301710_data, containing data previously exported from a Solaris DHCP server, and overwrites any conflicting data on the importing server:

```
example# dhcpconfig -I /net/golduck/export/var/120301710_data -f
```

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWdhcsu
Interface Stability	Evolving

SEE ALSO dhcpmgr(1M), dhtadm(1M), in.dhcpd(1M), pntadm(1M), dhcp_network(4), dhcptab(4), dhcpsvc.conf(4), nsswitch.conf(4), resolv.conf(4), user_attr(4), attributes(5), dhcp(5), dhcp_modules(5), rbac(5)

dhcpconfig(1M)

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NAME	dhcpcmgr – graphical interface for managing DHCP service				
SYNOPSIS	<code>/usr/sadm/admin/bin/dhcpcmgr</code>				
DESCRIPTION	dhcpcmgr is a graphical user interface which enables you to manage the Dynamic Host Configuration Protocol (DHCP) service on the local system. It performs the functions of the <code>dhcpcconfig</code> , <code>dhtadm</code> , and <code>pntadm</code> command line utilities. You must be <code>root</code> to use <code>dhcpcmgr</code> . The <code>dhcpcmgr</code> Help, available from the Help menu, contains detailed information about using the tool.				
USAGE	You can perform the following tasks using <code>dhcpcmgr</code>: Configure DHCP service Use <code>dhcpcmgr</code> to configure the DHCP daemon as a DHCP server, and select the data store to use for storing network configuration tables.. Configure BOOTP relay service Use <code>dhcpcmgr</code> to configure the DHCP daemon as a BOOTP relay. Manage DHCP or BOOTP relay service Use <code>dhcpcmgr</code> to start, stop, enable, disable or unconfigure the DHCP service or BOOTP relay service, or change DHCP server parameters. Manage DHCP addresses Use <code>dhcpcmgr</code> to add, modify, or delete IP addresses leased by the DHCP service. Manage DHCP macros Use <code>dhcpcmgr</code> to add, modify or delete macros used to supply configuration parameters to DHCP clients. Manage DHCP options Use <code>dhcpcmgr</code> to add, modify or delete options used to define parameters deliverable through DHCP. Convert to a new DHCP data store Use <code>dhcpcmgr</code> to configure the DHCP server to use a different data store, and convert the DHCP data to the format used by the new data store. Move DHCP data to another server Use <code>dhcpcmgr</code> to export data from one Solaris DHCP server and import data onto another Solaris DHCP server.				
EXIT STATUS	The following exit values are returned: <table> <tr> <td>0</td><td>Successful completion.</td></tr> <tr> <td>non-zero</td><td>An error occurred.</td></tr> </table>	0	Successful completion.	non-zero	An error occurred.
0	Successful completion.				
non-zero	An error occurred.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:				

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ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWdhcm
Interface Stability	Evolving

SEE ALSO `dhcpconfig(1M)`, `dhtadm(1M)`, `pntadm(1M)`, `in.dhcpd(1M)`, `dhcpsvc.conf(4)`, `dhcp_network(4)`, `dhcptab(4)`, `attributes(5)`, `dhcp(5)`, `dhcp_modules(5)`

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NAME	dhtadm – DHCP configuration table management utility		
SYNOPSIS	dhtadm -C [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] dhtadm -A -s <i>symbol_name</i> -d <i>definition</i> [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] dhtadm -A -m <i>macro_name</i> -d <i>definition</i> [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] dhtadm -M -s <i>symbol_name</i> -d <i>definition</i> [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] dhtadm -M -s <i>symbol_name</i> -n <i>new_name</i> [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] dhtadm -M -m <i>macro_name</i> -n <i>new_name</i> [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] dhtadm -M -m <i>macro_name</i> -d <i>definition</i> [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] dhtadm -M -m <i>macro_name</i> -e <i>symbol=value</i> [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] dhtadm -D -s <i>symbol_name</i> [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] dhtadm -D -m <i>macro_name</i> [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] dhtadm -P [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] dhtadm -R [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] dhtadm -B [-v] [<i>batchfile</i>]		
DESCRIPTION	dhtadm manages the Dynamic Host Configuration Protocol (DHCP) service configuration table, <i>dhcptab</i>. You can use it to add, delete, or modify DHCP configuration macros or options or view the table. For a description of the table format, see <i>dhcptab</i>(4). The dhtadm command can be run by root, or by other users assigned to the DHCP Management profile. See <i>rbac</i>(5) and <i>user_attr</i>(4). After you make changes with dhtadm, you should issue a SIGHUP to the DHCP server, causing it to read the <i>dhcptab</i> and pick up the changes. Use the <i>kill -HUP in.dhcpd</i> command. See <i>in.dhcpd</i>(1M).		
OPTIONS	One of the following function flags must be specified with the dhtadm command: -A, -B, -C, -D, -M, -P or -R. The following options are supported: <table> <tr> <td>-A</td><td>Add a symbol or macro definition to the <i>dhcptab</i> table.</td></tr> </table> The following sub-options are required:	-A	Add a symbol or macro definition to the <i>dhcptab</i> table.
-A	Add a symbol or macro definition to the <i>dhcptab</i> table.		

	-d <i>definition</i> Specify a macro or symbol definition. <i>definition</i> must be enclosed in single quotation marks. For macros, use the form -d 'symbol=value:symbol=value:'. For symbols, the definition is a series of fields that define a symbol's characteristics. The fields are separated by commas. Use the form -d 'context,code,type,granularity,maximum'. See dhcptab(4) for information about these fields. -m <i>macro_name</i> Specify the name of the macro to be added. The -d option must be used with the -m option. The -s option cannot be used with the -m option. -s <i>symbol_name</i> Specify the name of the symbol to be added. The -d option must be used with the -s option. The -m option cannot be used with the -s option.
-B	Batch process dhtadm commands. dhtadm reads from the specified file or from standard input a series of dhtadm commands and execute them within the same process. Processing many dhtadm commands using this method is much faster than running an executable batchfile itself. Batch mode is recommended for using dhtadm in scripts. The following sub-option is optional: -v Display commands to standard output as they are processed.
-C	Create the DHCP service configuration table, dhcptab.
-D	Delete a symbol or macro definition. The following sub-options are required: -m <i>macro_name</i> Delete the specified macro. -s <i>symbol_name</i> Delete the specified symbol.
-M	Modify an existing symbol or macro definition. The following sub-options are required:

	-d <i>definition</i> Specify a macro or symbol definition to modify. The definition must be enclosed in single quotation marks. For macros, use the form -d 'symbol=value:symbol=value:'. For symbols, the definition is a series of fields that define a symbol's characteristics. The fields are separated by commas. Use the form -d 'context,code,type,granularity,maximum'. See <code>dhcptab(4)</code> for information about these fields.
	-e This sub-option uses the <i>symbol =value</i> argument. Use it to edit a <i>symbol/value</i> pair within a macro. To add a symbol which does not have an associate value, enter: <i>symbol=_NULL_VALUE_</i> To delete a symbol definition from a macro, enter: <i>symbol=</i>
	-m This sub-option uses the <i>macro_name</i> argument. The -n, -d, or -e sub-options are legal companions for this sub-option..
	-n This sub-option uses the <i>new_name</i> argument and modifies the name of the object specified by the -m or -s sub-option. It is not limited to macros. . Use it to specify a new macro name or symbol name.
	-s This sub-option uses the <i>symbol_name</i> argument. Use it to specify a symbol. The -d sub-option is a legal companion.
-p <i>path</i>	Override the <code>dhcpsvc.conf(4)</code> configuration value for <code>PATH=</code> with <i>path</i> . See <code>dhcpsvc.conf(4)</code> for more details regarding <i>path</i> . See <code>dhcp_modules(5)</code> for information regarding data storage modules for the DHCP service.
-P	Print (display) the <code>dhcptab</code> table.
-r <i>data_store_resource</i>	Override the <code>dhcpsvc.conf(4)</code> configuration value for <code>RESOURCE=</code> with the <i>data_store_resource</i> specified. See <code>dhcpsvc.conf(4)</code> for more details on resource type. See <i>Solaris DHCP Service Developer's Guide</i> for

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	more information about adding support for other data stores. See <code>dhcp_modules(5)</code> for information regarding data storage modules for the DHCP service.
<code>-R</code>	Remove the <code>dhcptab</code> table.
<code>-u <i>uninterpreted</i></code>	Data which is ignored by <code>dhtadm</code> , but passed to currently configured public module, to be interpreted by the data store. The private layer provides for module-specific configuration information through the use of the <code>RESOURCE_CONFIG</code> keyword. Uninterpreted data is stored within <code>RESOURCE_CONFIG</code> keyword of <code>dhcpsvc.conf(4)</code> . See <code>dhcp_modules(5)</code> for information regarding data storage modules for the DHCP service.

EXAMPLES

EXAMPLE 1 Creating the DHCP Service Configuration Table

The following command creates the DHCP service configuration table, `dhcptab`:

```
# dhtadm -C
```

EXAMPLE 2 Adding a Symbol Definition

The following command adds a Vendor option symbol definition for a new symbol called `MySym` to the `dhcptab` table in the `SUNWfiles` resource in the `/var/mydhcp` directory:

```
# dhtadm -A -s MySym
  -d 'Vendor=SUNW.PCW.LAN,20,IP,1,0'
  -r SUNWfiles -p /var/mydhcp
```

EXAMPLE 3 Adding a Macro Definition

The following command adds the `aruba` macro definition to the `dhcptab` table. Note that symbol/value pairs are bracketed with colons (:).

```
# dhtadm -A -m aruba
  -d ':Timeserv=10.0.0.10 10.0.0.11:DNSServ=10.0.0.1:'
```

EXAMPLE 4 Modifying a Macro Definition

The following command modifies the `Locale` macro definition, setting the value of the `UTCOffset` symbol to 18000 seconds. Note that any macro definition which includes the definition of the `Locale` macro inherits this change.

```
# dhtadm -M -m Locale -e 'UTCOffset=18000'
```

EXAMPLE 4 Modifying a Macro Definition *(Continued)***EXAMPLE 5** Deleting a Symbol

The following command deletes the `Timeserv` symbol from the `aruba` macro. Any macro definition which includes the definition of the `aruba` macro inherits this change.

```
# dhtadm -M -m aruba -e 'Timeserv='
```

EXAMPLE 6 Adding a Symbol to a Macro

The following command adds the `Hostname` symbol to the `aruba` macro. Note that the `Hostname` symbol takes no value, and thus requires the special value `_NULL_VALUE_`. Note also that any macro definition which includes the definition of the `aruba` macro inherits this change.

```
# dhtadm -M -m aruba -e 'Hostname=_NULL_VALUE_'
```

EXAMPLE 7 Renaming a Macro

The following command renames the `Locale` macro to `MyLocale`. Note that any `Include` statements in macro definitions which include the `Locale` macro also need to be changed.

```
# dhtadm -M -m Locale -n MyLocale
```

EXAMPLE 8 Deleting a Symbol Definition

The following command deletes the `MySym` symbol definition. Note that any macro definitions which use `MySym` needs to be modified.

```
# dhtadm -D -s MySym
```

EXAMPLE 9 Removing a `dhcptab`

The following command removes the `dhcptab` table in the NIS+ directory specified.

```
# dhtadm -R -r SUNWnisplus -p Test.Nis.Plus.
```

EXAMPLE 10 Printing a `dhcptab`

The following command prints to standard output the contents of the `dhcptab` that is located in the data store and path indicated in the `dhcpsvc.conf` file.

```
# dhtadm -P
```

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EXAMPLE 10 Printing a dhcptab (Continued)

EXAMPLE 11 Executing dhtadm in Batch Mode

The following command runs a series of dhtadm commands contained in a batch file:

```
# dhtadm -B addmacros
```

EXIT STATUS

0	Successful completion.
1	Object already exists.
2	Object does not exist.
3	Non-critical error.
4	Critical error.

FILES /etc/inet/dhcpsvc.conf

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWdhcsu
Interface Stability	Evolving

SEE ALSO dhcpconfig(1M), dhcpgmr(1M), in.dhcpd(1M), dhcpsvc.conf(4), dhcp_network(4), dhcptab(4), hosts(4), user_attr(4), attributes(5), dhcp(5), dhcp_modules(5)rbac(5)

Solaris DHCP Service Developer's Guide

System Administration Guide: IP Services

Alexander, S., and R. Droms, *DHCP Options and BOOTP Vendor Extensions*, RFC 1533, Lachman Technology, Inc., Bucknell University, October 1993.

Droms, R., *Interoperation Between DHCP and BOOTP*, RFC 1534, Bucknell University, October 1993.

Droms, R., *Dynamic Host Configuration Protocol*, RFC 1541, Bucknell University, October 1993.

Wimer, W., *Clarifications and Extensions for the Bootstrap Protocol*, RFC 1542, Carnegie Mellon University, October 1993.

NAME	dig – send domain name query packets to name servers		
SYNOPSIS	dig [<i>@server</i>] <i>domain</i> [<i>query-type</i>] [<i>query-class</i>] [<i>+query-option</i>] [<i>-dig-option</i>] [<i>%ignored-comment</i>]		
DESCRIPTION	Use dig (“domain information groper”) to gather information from the Domain Name System (“DNS”) servers. dig has two modes, simple interactive mode for a single query, and batch mode, which executes a query for each line in a list of several query lines. All query options are accessible from the command line.		
OPTIONS	The dig utility supports the following options:		
	<i>@server</i>	Either a domain name or a raw IPV4 or IPV6 Internet address. If this field is omitted, dig attempts to use the default name server for the machine. If a domain name is specified, this will be resolved using the domain name system resolver, for example, BIND. If the system does not support DNS, specify a literal IPV4 or IPV6 address. Alternatively, <i>/etc/resolv.conf</i> should be present. It indicates where the default name servers reside, so that server itself can be resolved. See resolver(3RESOLV) for information on <i>/etc/resolv.conf</i> . As an option, set the environment variable LOCALRES to name a file which is to be used instead of the <i>/etc/resolv.conf</i> standard resolver. LOCALRES is specific to the dig resolver and is not referenced by the system resolver. If the LOCALRES variable is not set or the specified file is not readable, then <i>/etc/resolv.conf</i> will be used.	
	<i>-domain</i>	The domain name for which you are requesting information. See the <i>-x</i> option for a convenient way to specify an inverse address query.	
	<i>query-type</i>	The type of information (DNS query type) that you are requesting. If omitted, the default is a (T_A =address). The following types are recognized:	
	<i>a</i>	T_A	network address
	<i>any</i>	T_ANY	any and all information about specified domain
	<i>mx</i>	T_MX	mail exchanger for the domain
	<i>ns</i>	T_NS	name servers

	soa	T_SOA	zone of authority record
	hinfo	T_HINFO	host information
	axfr	T_AXFR	zone transfer (must ask an authoritative server)
	txt	T_TXT	arbitrary number of strings
query-class	See <i>RFC 1035</i> for a complete list of values for query-type. The network class requested in the query. If omitted, the default is in (C_IN=Internet). The following classes are recognized:		
	in	C_IN	Internet class domain
	any	C_ANY	any and all class information
%ignored-comment	See <i>RFC 1035</i> for a complete list of values for query-class. any can be used to specify a class and a type of query. dig parses the first occurrence of any to mean query-type=T_ANY. To specify query-class=C_ANY, either specify any twice, or set query-class using the -c option.		
-dig option	“-” is used to include an argument that is not parsed. This is useful when running dig in batch mode. For example: <pre>example% dig @128.9.0.32 %venera.isi.edu mx isi.edu</pre> “-” is used to specify an option that affects the operation of dig. The following options are currently available: -x <i>dot-notation-address</i> Specify inverse address mapping. Instead of: <pre>example% dig 32.0.9.128.in-addr.arpa</pre> Specify:		

```
example% dig -x 128.9.0.32
```

-x *IPv6-address*

Specify inverse address mapping. Instead of:

```
example% dig 1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0. \
0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0. ip6.arpa
```

Specify:

```
example% dig -x ::1
```

-f *file*

Batch mode. *file* contains a list of query specifications, that is, dig command lines, which are to be executed successively. Lines that begin with ';', '#', or '\n' are ignored. Other options may still appear on command line that will be in effect for each batch query.

-T *time*

Specify the time in seconds between the start of successive queries in batch mode. This option can be used synchronize two or more batch dig commands. The default is zero.

-p *port*

Specify port number. This option allows you to query a name server that listens to a non-standard port number. The default is 53.

-P [*ping-string*]

After query returns, execute a ping(1M) command for response time comparison. This option makes a call to the shell. The last three lines of statistics are printed for the command:

```
example % ping -s -server_name -56 -3
```

If the optional *ping_string* is present, it replaces ping -s in the shell command.

-t *query-type*

Specify type of query. You may specify either an integer value to be included in the type field, or use the abbreviated mnemonic. for example, mx = T_MX.

-c *query-class*

Specify class of query. You may specify either an integer value to be included in the class field, or use the abbreviated mnemonic, for example, in = C_IN.

-k *keydir:keyname*

Sign the query with the TSIG key named *keyname* that is in the directory *keydir*.

-envsav

Specifies that after all of the arguments are parsed, the `dig` environment should be saved to a file to become the default environment. This is useful to bypass the standard set of defaults and use a custom set of options each time `dig` is used. The environment consists of resolver state variable flags, timeout, and retries as well as the flags detailing `dig` output. If the shell environment variable `LOCALDEF` is set to the name of a file, this is where the default `dig` environment is saved. If not, the file `DiG.env` is created in the current working directory.

`LOCALDEF` is specific to the `dig` resolver, and will not affect operation of the standard `resolver()` library.

Each time `dig` is executed, it looks for `./DiG.env` or the file specified by the shell environment variable `LOCALDEF`. If such file exists and is readable, then the environment is restored from this file before any arguments are parsed. The `DiG.env` file contains binary data and should not be modified directly.

-envset

Specifies that after the arguments are parsed, the `dig` environment becomes the default environment for the duration of the batch file, or until the next line that specifies `-envset`. This flag is set by including it in a line in a `dig` batch file. It only affects batch query runs.

- [no] stick

Specifies that the `dig` environment, either as read initially or set by the `-envset` option, is to be restored before each query line in a `dig` batch file. The default `-nostick` means that the `dig` environment does not stick. Hence, options specified on a single line in a `dig` batch file will remain in effect for subsequent lines, that is, they are not restored to the "sticky" default. This option only affects batch query runs.

+*query-option*

"+" is used to specify an option to be changed in the query packet or to change `dig` output specifics. Many

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of these are the same parameters accepted by nslookup(1M). If an option requires a parameter, the form is as follows:

+ keyword [=value]

Most keywords can be abbreviated. The parsing of the “+” options is very simplistic. A value must not be separated from its keyword by white space. The following keywords are currently available:

Keyword	Abbreviation	Meaning [default]
[no] debug	[deb]	Turn on or off debugging mode [deb]
[no] d2		Turn on or off extra debugging mode [nod2]
[no] recurse	[rec]	Use or do not use recursive lookup [rec]
retry=#	[ret]	Set number of retries to # [4]
time=#	[ti]	Set timeout length to # seconds [4]
[no] ko		Keep open option. Implies vc. [noko]
[no] vc		Use or do not use virtual circuit [novc]
[no] defname	[def]	Use or do not use default domain name [def]
[no] search	[sea]	Use or do not use domain search list [sea]
domain=NAME	[do]	Set default domain name to NAME
[no] ignore	[i]	Ignore or do not ignore truncated errors [noi]

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Keyword	Abbreviation	Meaning [default]
[no] primary	[pr]	Use or do not use primary server [nopr]
[no] aaonly	[aa]	Authoritative query only flag [noaa]
[no] cmd		Echo parsed arguments [cmd]
[no] stats	[st]	Print query statistics [st]
[no] Header	[H]	Print basic header [H]
[no] header	[he]	Print header flags [he]
[no] ttlid	[tt]	Print TTLs [tt]
[no] trunc	[tr]	Truncate origin from names [tr]
[no] cl		Print class info [nocl]
[no] qr		Print outgoing query [noqr]
[no] reply	[rep]	Print reply [rep]
[no] ques	[qu]	Print question section [qu]
[no] answer	[an]	Print answer section [an]
[no] author	[au]	Print authoritative section [au]
[no] addit	[ad]	Print additional section [ad]
[no] dnssec	[dn]	Set the DNSSEC OK bit in the OPT pseudo record [nodn]
pfdef		Set to default print flags

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Keyword	Abbreviation	Meaning [default]
pfin		Set to minimal default print flags
pfset=#		Set print flags to #. The value of # can be hex, octal, or decimal.
pfand=#		Bitwise and print flags with #
pfor=#		Bitwise or print flags with #

The `retry` and `time` options affect the retransmission strategy used by the `resolver library()` when sending datagram queries. The algorithm is as follows:

```
for i = 0 to retry - 1
  for j = 1 to num_servers
    send_query
    wait((time * (2**i)) / num_servers)
  end
end
end
```

`dig` always uses a value of 1 for `num_servers`.

ENVIRONMENT VARIABLES

LOCALRES File to use in place of `/etc/resolv.conf`
LOCALDEF default environment file

FILES

`/etc/resolv.conf` Initial domain name and name server addresses
`./DiG.env` Default save file for default options

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	External

SEE ALSO

`in.named(1M)`, `nslookup(1M)`, `resolver(3RESOLV)`, `attributes(5)`

Mockapetris, Paul. *RFC 1035, Domain Names - Implementation and Specification*. Network Working Group. November 1987.

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BUGS	dig does not consistently exit with appropriate status messages when a problem occurs somewhere in the <code>resolver()</code>, although most of the common exit cases are handled. This can be problematic when running in batch mode. If <code>dig</code> exits abnormally and is not caught, the entire batch aborts. When such an event is trapped, <code>dig</code> simply continues with the next query.

NAME	directoryserver – front end for the Directory Server (DS)
SYNOPSIS	<pre> /usr/sbin/directoryserver { setup [-f <i>configuration_file</i>] uninstall} /usr/sbin/directoryserver {start-admin stop-admin restart-admin startconsole} /usr/sbin/directoryserver [{-s -server} server-instance] {start stop restart} /usr/sbin/directoryserver { -s -server } server-instance { monitor saveconfig restoreconfig db2index-task ldif2db-task ldif2db ldif2ldap vlindex db2ldif db2ldif-task db2bak db2bak-task bak2db bak2db-task suffix2instance account-status account-activate account-inactivate } {...} /usr/sbin/directoryserver nativetoascii admin_ip ldif pwdhash idsktune mmlldif keyupg {...} /usr/sbin/directoryserver { magt sagt } {...} /usr/sbin/directoryserver help [<i>subcommand</i>] </pre>
DESCRIPTION	The <code>directoryserver</code> command is a comprehensive, front end to the utility programs provided by the Solaris Directory Server (DS). Options for the <code>directoryserver</code> command itself must appear before the subcommand. Arguments for a subcommand must appear after the subcommand. Subcommands have specific arguments. See SUBCOMMANDS.
SUBCOMMANDS	The following subcommands are supported: <code>account-inactivate <i>args</i></code> Inactivates and locks an entry or group of entries. The <code>account-inactivate</code> subcommand supports the following arguments: <code>[-D <i>rootdn</i>]</code> Directory Server <i>userDN</i> with root permissions, such as Directory Manager. <code>[-h <i>host</i>]</code> Host name of Directory Server. The default value is the full hostname of the machine where Directory Server is installed. <code>-I <i>DN</i></code> Entry DN or role DN to activate. <code>-j <i>file</i></code> Password associated with the user DN. This option allows the password to be stored in clear text in the named file for scripting. This is considered insecure. Use with extreme caution.

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`[-p port]`

Directory Server port. The default value is the LDAP port of Directory Server specified at installation time.

`-w password`

Password associated with the user DN. Supplying the password on the command line is visible using the `/bin/ps` command. This is considered insecure. Use with extreme caution.

The value `-` can be used in place the password. The program prompts the user for a password to be entered from the terminal.

`account-activate args`

Activates an entry or group of entries.

The `account-activate` subcommand supports the following arguments

`-D rootdn`

Directory Server userDN with root permissions, such as Directory Manager.

`-h host`

Host name of Directory Server. The default value is the full hostname of the machine where Directory Server is installed.

`-I DN`

Entry DN or role DN to activate.

`-j file`

Password associated with the user DN. This option allows the password to be stored in clear text in the named file for scripting.

This is considered insecure. Use with extreme caution.

`-p port`

Directory Server port. The default value is the LDAP port of Directory Server specified at installation time.

`-w password`

Password associated with the user DN. Supplying the password on the command line is visible using the `/bin/ps` command. This is considered insecure. Use with extreme caution.

The value `-` can be used in place the password. The program prompts the user for a password to be entered from the terminal.

`account-status args`

Provides account status information to establish whether an entry or group of entries is inactivated or not.

The `account-status` subcommand supports the following arguments:

-D *rootdn*

-h *host*
Host name of Directory Server. The default value is the full hostname of the machine where Directory Server is installed.

-I *DN*
Entry DN or role DN whose status is required.

-j *file*
Password associated with the user DN. This option allows the password to be stored in clear text in the named file for scripting.

This is considered insecure. Use with extreme caution.

-p *port*
Directory Server port. The default value is the LDAP port of Directory Server specified at installation time.

-w *password*
Password associated with the rootDN. Supplying the password on the command line is visible using the `/bin/ps` command. This is considered insecure. Use with extreme caution.

The value `-` can be used in place of the password. The program prompts the user for a password to be entered from the terminal.

admin_ip *args*
Change the IP address of the the administrative server in the configuration.

The `admin_ip` subcommand supports the following arguments:

dir_mgr_DN
Directory Manager's DN.

dir_mgr_password
Directory Manager's password.

old_ip
Old IP.

new_ip
New IP.

port_#
Port number.

bak2db *backup_directory*
Restore the database from the most recent archived backup.

Specify *backup_directory* as the backup directory.

bak2db-task *args*
Restore the data to the database.

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The bak2db-task subcommand supports the following arguments:

[-a *directory*]

Directory where the backup files are stored. By default it is under `/var/ds5/slapd-serverID/bak`

-D *rootDN*

User DN with root permissions, such as Directory Manager. The default is the DN of the directory manager which is read from the `nsslapd-root` attribute under `cn=config`.

-j *file*

Password associated with the user DN. This option allows the password to be stored in clear text in the named file for scripting.

This is considered insecure. Use with extreme caution.

[-t *database_type*]

Database type. The only possible database type is `ldbm`.

[-v]

Verbose mode.

-w *password*

Password associated with the user DN. Supplying the password on the command line is visible using the `/bin/ps` command. This is considered insecure. Use with extreme caution.

The value `-` can be used in place the password. The program prompts the user for a password to be entered from the terminal.

db2bak-task *args*

Back up the contents of the database. It creates an entry in the directory that launches this dynamic task. An entry is generated based upon the values provided for each option.

The db2bak-task subcommand supports the following arguments:

[-a *directory*]

Directory where the backup files are stored. By default it is under `/var/ds5/slapd-serverID/bak`. The backup file is named according to the year-month-day-hour format (`YYYY_MM_DD_hhmmss`).

-D *rootDN*

User DN with root permissions, such as Directory Manager. The default is the DN of the directory manager which is read from the `nsslapd-root` attribute under `cn=config`.

-j *file*

Password associated with the user DN. This option allows the password to be stored in clear text in the named file for scripting.

This is considered insecure. Use with extreme caution.

-t *database_type*

Database type. The only possible database type is `ldbm`.

[-v]

Verbose mode.

-w *password*

Password associated with the user DN. Supplying the password on the command line is visible using the `/bin/ps` command. This is considered insecure. Use with extreme caution.

The value `-` can be used in place the password. The program prompts the user for a password to be entered from the terminal.

db2bak [*backup_directory*]

Create a backup of the current database contents. The server must be stopped to run this subcommand.

The default is `/var/ds5/slapd-serverID/bak`. The backup file is named according to the year-month-day-hour format (`YYYY_MM_DD_hhmmss`).

db2index-text *args*

Create and generate the new set of indexes to be maintained following the modification of indexing entries in the `cn=config` configuration file.

The `db2index-text` subcommand supports the following arguments:

-D *rootdn*

User DN with root permissions, such as Directory Manager.

-j *file*

Password associated with the user DN. This option allows the password to be stored in clear text in the named file for scripting. This is considered insecure. Use with extreme caution.

-n *backend_instance*

Instance to be indexed.

[-t *attributeName*]

Name of the attribute to be indexed. If omitted, all indexes defined for that instance are generated.

[-v]

Verbose mode.

-w *password*

Password associated with the user DN. Supplying the password on the command line is visible using the `/bin/ps` command. This is considered insecure. Use with extreme caution.

The value `-` can be used in place the password. The program prompts the user for a password to be entered from the terminal.

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db2ldif-task *args*

Exports the contents of the database to LDIF. It creates an entry in the directory that launches this dynamic task. The entry is generated based upon the values you provide for each option. To run this subcommand the server must be running and either *-n backend_instance* or *-s include* suffix is required.

The `db2ldif-task` subcommand supports the following arguments:

`[-a outputfile]`

File name of the output LDIF file.

`-C`

Only the main db file is used.

`-D rootDN`

User DN with root permissions, such as Directory Manager.

`-j file`

Password associated with the user DN. This option allows the password to be stored in clear text in the named file for scripting. This is considered insecure. Use with extreme caution.

`[-M]`

Output LDIF is stored in multiple files.

`[-m]`

Minimal base 64 encoding.

`{-n backend_instance}*`

Instance to be exported.

`[-N]`

Minimal base 64 encoding.

`[-o]`

Output LDIF to be stored in one file by default with each instance stored in *instance_file* name.

`[-r]`

Export replica.

`[-s]includesuffix*`

Suffix(es) to be included or to specify the subtrees to be included if *-n* has been used.

`[-u]`

Request that the unique ID is not exported.

`[-U]`

Request that the output LDIF is not folded.

`-w password`

Password associated with the user DN. Supplying the password on the command line is visible using the `/bin/ps` command. This is considered insecure. Use with extreme caution.

The value - can be used in place the password. The program prompts the user for a password to be entered from the terminal.

`{-x excludesuffix}*`
Suffixes to be excluded.

`[-1]`
Delete, for reasons of backward compatibility the first line of the LDIF file that gives the version of the LDIF standard.

db2ldif *args*

Export the contents of the database to LDIF. You must specify either the -n or the -s option or both.

The db2ldif subcommand supports the following options:

`[-a outputfile]`
File name of the output LDIF file.

`[-C]`
Only use the main db file.

`[-m]`
Minimal base64 encoding.

`[-M]`
Use of several files for storing the output LDIF with each instance stored in *instance_file name* (where file name is the file name specified for -a option).

`{-n backemd_instance}*`
Instance to be exported.

`[-N]`
Specify that the entry IDs are not to be included in the LDIF output. The entry IDs are necessary only if the db2ldif output is to be used as input to db2index-text.

`[-r]`
Export replica.

`{-s includesuffix}*`
Suffixes to be included or to specify the subtrees to be included if -n has been used.

`[{-x excludesuffix}]*`
Suffixes to be excluded.

`[-u]`
Request that the unique id is not exported.

`[-U]`
Request that the output LDIF is not folded.

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[-1]

Delete, for reasons of backward compatibility, the first line of the LDIF file which gives the version of the LDIF standard.

help [*subcommand*]

Display `directoryserver` usage message or subcommand specific usage message.

idsktune *args*

Provide an easy and reliable way of checking the patch levels and kernel parameter settings for your system. You must install the Directory Server before you can run `idsktune`. It gathers information about the operating system, kernel, and TCP stack to make tuning recommendations.

The `idsktune` subcommand supports the following arguments:

[-c]

Client-specific tuning: the output only includes tuning recommendations for running a directory client application.

[-D]

Debug mode: the output includes the commands it runs internally, preceded by `DEBUG` heading.

[-i *installdir*]

The install directory.

[-q]

Quiet mode. Output only includes tuning recommendations. OS version statements are omitted.

[-v]

Version. Gives the build date identifying the version of the tool.

keyupg *args*

Upgrade the key from Lite to normal (only one way).

The `keyupg` subcommand supports the following arguments:

-k *key*

The key to be upgraded.

-f *key_file_path*

The key file path.

ldif2db-task *args*

Import data to the directory. It creates an entry in the directory that launches this dynamic task. The entry is generated based upon the values you provide for each option. The server must be running when you run this subcommand.

The `ldif2sb-task` subcommand supports the following arguments:

[-c]

Request that only the core db is created without attribute indexes.

-D rootDN

User DN with root permissions, such as Directory Manager.

[-g *string*]

Generation of a unique ID. Enter *none* for no unique ID to be generated and *deterministic* for the generated unique ID to be name-based. Generates a time based unique ID by default.

If you use the *deterministic* generation to have a name-based unique ID, you can also specify the namespace you want the server to use as follows:

-g *deterministic namespace_id*

where *namespace_id* is a string of characters in the following format

00-xxxxxxxx-xxxxxxxx-xxxxxxxx-xxxxxxxx

Use this option if you want to import the same LDIF file into two different directory servers, and you want the contents of both directories to have the same set of unique IDs. If unique IDs already exist in the LDIF file you are importing, then the existing IDs are imported to the server regardless of the options you have specified.

[-G *namespace_id*]

Generate a namespace ID as a name-based unique ID. This is the same as specifying **-g deterministic**.

{-i *filename* }*

File name of the input LDIF files. When you import multiple files, they are imported in the order in which you specify them on the command line.

-j *file*

Password associated with the user DN. This option allows the password to be stored in clear text in the named file for scripting. This is considered insecure. Use with extreme caution.

-n *backend_instance*

Instance to be imported.

[-O]

Request that only the core db is created without attribute indexes.

{-s *includesuffix* }*

Suffixes to be included. This argument can also be used to specify the subtrees to be included with **-n**.

-w *password*

Password associated with the user DN. Supplying the password on the command line is visible using the `/bin/ps` command. This is considered insecure. Use with extreme caution.

The value **-** can be used in place the password. The program prompts the user for a password to be entered from the terminal.

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[{-x *excludesuffix* }*]

[-v]

Verbose mode.

ldif *args*

Format LDIF files, and create base 64 encoded attribute values. With Base 64 Encoding you can represent binary data, such as a JPEG image, in LDIF by using base 64 encoding. You identify base 64 encoded data by using the :: symbol. The `ldifsubcommand` takes any input and formats it with the correct line continuation and appropriate attribute information. The subcommand also senses whether the input requires base 64 encoding.

The `ldif` subcommand supports the following arguments

[-b]

Interpret the entire input as a single binary value. If `-b` is not present, each line is considered to be a separate input value.

[*attrtype*]

If `-b` is specified, the output is `attrtype:: <base 64 encoded value>`.

ldif2db *args*

Import the data to the directory. To run this subcommand the server must be stopped. Note that `ldif2db` supports LDIF version 1 specifications. You can load an attribute using the URL specifier notation, for example:

```
jpegphoto:file:///tmp/myphoto.jpg
```

[-c]

Merge chunk size.

[-g *string*]

Generation of a unique ID. Type `none` for no unique ID to be generated and deterministic for the generated unique ID to be name-based. By default a time based unique ID is generated.

If you use the deterministic generation to have a name-based unique ID, you can also specify the namespace you want the server to use as follows:

```
-g deterministic namespace_id
```

where *namespace_id* is a string of characters in the following format:

```
00-xxxxxxxx-xxxxxxxx-xxxxxxxx-xxxxxxxx
```

Use this option if you want to import the same LDIF file into two different directory servers, and you want the contents of both directories to have the same set of unique IDs. If unique IDs already exist in the LDIF file you are importing, then the existing IDs are imported to the server regardless of the options you have specified.

`[-G namespace_id]`

Generate a namespace ID as a name-based unique ID. This is the same as specifying the `-g deterministic` option.

`{- filename}*`

File name of the input LDIF file(s). When you import multiple files, they are imported in the order in which you specify them on the command line.

`-n backend_instance`

Instance to be imported.

`[-O]`

Request that only the core db is created without attribute indexes.

`{-s includesuffix}*`

Suffixes to be included or to specify the subtrees to be included if `-n` has been used.

`[{-x excludesuffix}*]`

Suffixes to be excluded

`ldif2ldap rootDN password filename`

Perform an import operation over LDAP to the Directory Server. To run this subcommand the server must be running.

The `ldif2ldap` subcommand supports the following arguments:

rootdn

User DN with root permissions, such as Directory Manager.

password

Password associated with the user DN.

filename

File name of the file to be imported. When you import multiple files, they are imported in the order in which you specify them on the command line.

`magt CONFIG INIT`

Start SNMP master agent. The Config and INIT files are in

`/usr/iplanet/ds5/plugins/snmp/magt`. For more information, see the *iPlanet Directory Server 5.1 Administrator's Guide*.

The `magt` subcommand supports the following options:

CONFIG

The CONFIG file defines the community and the manager that master agent works with. Specify the manager value as a valid system name or an IP address.

INIT

The INIT file is a nonvolatile file that contains information from the MIB-II system group, including system location and contact information. If INIT doesn't already exist, starting the master agent for the first time creates it. An invalid manager name in the CONFIG file causes the master agent start-up to fail.

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monitor

Retrieves performance monitoring information using the `ldapsearch` command-line utility.

mmldif *args*

Combine multiple LDIF files into a single authoritative set of entries. Typically each LDIF file is from a master server cooperating in a multi master replication agreement.[e.g. masters that refuse to sync up for whatever reason]. Optionally, it can generate LDIF change files that could be applied to original to bring it up to date with authoritative. At least two input files must be specified.

The `mmldif` subcommand supports the following arguments:

`[-c inputfile ...]`

Write a change file (.delta) for each input file. Specify *inputfile* as the input LDIF files.

`[-D]`

Print debugging information.

`[-o out.ldif]`

Write authoritative data to this file.

nativetoascii *args*

Convert one language encoding to another. For example, convert a native language to UTF-8 format.

The `nativetoascii` subcommand supports the following options:

`-d Encodings Directory`

Path to the directory which contains the `conv` directory

`[-i input_filename -o output_filename]`

The input file name and output file name.

`-l`

List supported encodings

`-r`

Replace existing files.

`-s suffix`

Suffix to be mapped to the backend.

`-s SourceEncoding`

Source Encoding of input stream.

`-t TargetEncoding`

Target Encoding of output stream.

`-v`

Verbose output.

pwdhash *args*

Print the encrypted form of a password using one of the server's encryption algorithms. If a user cannot log in, you can use this script to compare the user's password to the password stored in the directory.

The pwdhash subcommand supports the following arguments:

-c *comparepwd* | -s *scheme*

The available schemes are SSHA, SHA, CRYPT and CLEARE. It generates the encrypted passwords according to scheme's algorithm. The -c specifies the encrypted password to be compared with. The result of comparison is either OK or doesn't match.

-D *instance-dir*

The instance directory.

[-H]

The passwords are hex-encoded.

password ...

The clear passwords to generate encrypted form from or to be compared with.

restart

Restarts the directory server.

When the -s option is not specified, restarts all instances of servers. When the -s option is specified, restarts the server specified by -s.

restart-admin

Restarts the administration server.

restoreconfig

Restores the most recently saved Administration Server configuration information to the NetscapeRoot partition under /var/ds5/slapd-serverID/confbak.

sagt -c CONFIG

Start proxy SNMP agent. For more information, see the *iPlanet Directory Server 5.1 Administrator's Guide*.

The sagt subcommand supports the following options:

-c *configfile*

The CONFIG file includes the port that the SNMP daemon listens to. It also needs to include the MIB trees and traps that the proxy SNMP agent forwards. Edit the CONFIG file located in /usr/iplanet/ds5/plugins/snmp/sagt.

saveconfig

Saves the administration server configuration information to the /var/ds5/slapd-serverID/confbak directory.

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setup [-f *configuration_file*]

Configures an instance of the directory server or administration server. Creates a basic configuration for the directory server and the administrative server that is used to manage the directory.

The `setup` subcommand has two modes of operation. You can invoke it with a curses-based interaction to gather input. Alternatively, you can provide input in a configuration file using the `-f` option.

The `setup` subcommand supports the following option:

`-f configuration_file`

Specifies the configuration file for silent installation.

start

Starts the directory server. When the `-s` option is not specified, starts servers of all instances. When the `-s` option is specified, starts the server instance specified by `-s`.

start-admin

Starts the directory server.

When the `-s` option is not specified, restarts all instances of servers. When the `-s` option is specified, restarts the server specified by `-s`.

startconsole

Starts the directory console..

stop

Stops the directory server.

When the `-s` option is not specified, restarts all instances of servers. When the `-s` option is specified, restarts the server specified by `-s`.

stop-admin

Stop the administration server.

suffix2instance {-s *suffix*}

Map a suffix to a backend name.

Specify `-s suffix` as the suffix to be mapped to the backend.

uninstall

Uninstalls the directory server and the administration server.

This subcommand stops servers of all instances and removes all the changes created by `setup`.

vlvindex *args*

Create virtual list view (VLV) indexes, known in the Directory Server Console as Browsing Indexes. The server must be stopped beforehand.

The `vlvindex` subcommand supports the following arguments:

- d *debug_level*
Specify the debug level to use during index creation. Debug levels are defined in `nsslapd-errorlog-level` (error Log Level). See the *iPlanet Directory Server 5.1 Configuration, Command, and File Reference*.
- n *backend_instance*
Name of the database containing the entries to index.
- s *suffix*
Name of the suffix containing the entries to index.
- T *VLVTag*
Name of the database containing the entries to index.

OPTIONS Options for the `directoryserver` command itself must appear before the subcommand argument.

The following options are supported:

- s *server-instance*
- server *server-instance* The server instance name. Specify the directory server instance to process the command against. For some of the listed subcommands the server instance is optional and for other subcommands it is a required option.

EXAMPLES **EXAMPLE 1** Starting All Instances of the Directory Servers

The following command starts all the instances of the directory servers:

```
example% directoryserver start
```

EXAMPLE 2 Starting the Instances of myhost of the Directory Server

The following command starts the instances myhost of the directory server.

```
example% directoryserver -s myhost start
```

EXAMPLE 3 Running the Monitor Tool and Outputting the Current Status

The following command runs the monitor tool and output the current status of the ephesus directory instance.

```
example% directoryserver -s ephesus monitor
```

EXAMPLE 4 Running the idsktune Tool and Outputting Performance Tuning Information

The following command runs the idsktune tool and outputs performance tuning information:

```
example% directoryserver idsktune
```

directoryserver(1M)

EXIT STATUS

The following exit values are returned:

0 Successful completion.

non- An error occurred.

zero

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	IPLTdsr, IPLTdsu

SEE ALSO

iPlanet Directory Server 5.1 Administrator's Guide

iPlanet Directory Server 5.1 Configuration, Command, and File Reference

NAME	disks – creates /dev entries for hard disks attached to the system
SYNOPSIS	/usr/sbin/disks [-C] [-r <i>rootdir</i>]
DESCRIPTION	devfsadm(1M) is now the preferred command for /dev and /devices and should be used instead of disks. disks creates symbolic links in the /dev/dsk and /dev/rdisk directories pointing to the actual disk device special files under the /devices directory tree. It performs the following steps: 1. disks searches the kernel device tree to see what hard disks are attached to the system. It notes the /devices pathnames for the slices on the drive and determines the physical component of the corresponding /dev/dsk or /dev/rdisk name. 2. The /dev/dsk and /dev/rdisk directories are checked for disk entries – that is, symbolic links with names of the form <i>cN[tN]dNsN</i>, or <i>cN[tN]dNpN</i>, where <i>N</i> represents a decimal number. <i>cN</i> is the logical controller number, an arbitrary number assigned by this program to designate a particular disk controller. The first controller found on the first occasion this program is run on a system, is assigned number 0. <i>tN</i> is the bus-address number of a subsidiary controller attached to a peripheral bus such as SCSI or IPI (the target number for SCSI, and the facility number for IPI controllers). <i>dN</i> is the number of the disk attached to the controller. <i>sN</i> is the <i>slice</i> number on the disk. <i>pN</i> is the FDISK partition number used by fdisk(1M). (x86 Only) 3. If only some of the disk entries are found in /dev/dsk for a disk that has been found under the /devices directory tree, disks creates the missing symbolic links. If none of the entries for a particular disk are found in /dev/dsk, disks checks to see if any entries exist for other disks attached to the same controller, and if so, creates new entries using the same controller number as used for other disks on the same controller. If no other /dev/dsk entries are found for slices of disks belonging to the same physical controller as the current disk, disks assigns the lowest-unused controller number and creates entries for the disk slices using this newly-assigned controller number. disks is run automatically each time a reconfiguration-boot is performed or when add_drv(1M) is executed. When invoking disks(1M) manually, first run drvconfig(1M) to ensure /devices is consistent with the current device configuration.
Notice to Driver Writers	disks considers all devices with a node type of DDI_NT_BLOCK, DDI_NT_BLOCK_CHAN, DDI_NT_CD, DDI_NT_BLOCK_WWN or DDI_NT_CD_CHAN to be disk devices. disks(1M) requires the minor name of disk devices obey the following format conventions. The minor name for block interfaces consists of a single lowercase ASCII character, a through u. The minor name for character (raw) interfaces consists of a single lowercase ASCII character, a through u, followed by , raw.

disks(1M)

disks translates a through p to s0 through s15, while it translates q through u to p0 through p4. SPARC drivers should only use the first 8 slices: a through h, while x86 drivers can use a through u, with q through u corresponding to fdisk(1M) partitions. q represents the entire disk, while r, s, t, and u represent up to 4 additional partitions.

To prevent disks from attempting to automatically generate links for a device, drivers must specify a private node type and refrain from using a node type: DDI_NT_BLOCK, DDI_NT_BLOCK_CHAN, DDI_NT_CD, or DDI_NT_CD_CHAN when calling ddi_create_minor_node(9F).

OPTIONS

- C Causes disks to remove any invalid links after adding any new entries to /dev/dsk and /dev/rdisk. Invalid links are links which refer to non-existent disk nodes that have been removed, powered off, or are otherwise inaccessible.
- r *rootdir* Causes disks to presume that the /dev/dsk, /dev/rdisk and /devices directory trees are found under *rootdir*, not directly under /.

ERRORS

If disks finds entries of a particular logical controller linked to different physical controllers, it prints an error message and exits without making any changes to the /dev directory, since it cannot determine which of the two alternative logical-to-physical mappings is correct. The links should be manually corrected or removed before another reconfiguration-boot is performed.

EXAMPLES

EXAMPLE 1 Creating The Block And Character Minor Devices From Within The xkdisk Driver's attach(9E) Function.

The following example demonstrates creating the block and character minor devices from within the xkdisk driver's attach(9E) function.

```
#include <sys/dkio.h>
/*
 * Create the minor number by combining the instance number
 * with the slice number.
 */
#define MINOR_NUM(i, s) ((i) << 4 | (s))

int
xkdiskattach(dev_info_t *dip, ddi_attach_cmd_t cmd)
{
    int instance, slice;
    char name[8];

    /* other stuff in attach... */

    instance = ddi_get_instance(dip);
    for (slice = 0; slice < V_NUMLPAR; slice++) {
        /*
         * create block device interface
         */
        sprintf(name, "%c", slice + 'a');
```

EXAMPLE 1 Creating The Block And Character Minor Devices From Within The xkdisk Driver's attach(9E) Function. (Continued)

```

        ddi_create_minor_node(dip, name, S_IFBLK,
                               MINOR_NUM(instance, slice), DDI_NT_BLOCK_CHAN, 0);

/*
 * create the raw (character) device interface
 */
sprintf(name,"%c,raw", slice + 'a');
ddi_create_minor_node(dip, name, S_IFCHR,
                      MINOR_NUM(instance, slice), DDI_NT_BLOCK_CHAN, 0);
    }
}

```

Installing the xkdisk disk driver on a SPARCstation 20, with the driver controlling a SCSI disk (target 3 attached to an esp(7D) SCSI HBA) and performing a reconfiguration-boot (causing disks to be run) creates the following special files in /devices.

```

# ls -l /devices/iommu@f,e0000000/sbus@f,e0001000/espdma@f,400000/esp@f,800000/
brw-r----- 1 root sys  32, 16 Aug 29 00:02 xkdisk@3,0:a
crw-r----- 1 root sys  32, 16 Aug 29 00:02 xkdisk@3,0:a,raw
brw-r----- 1 root sys  32, 17 Aug 29 00:02 xkdisk@3,0:b
crw-r----- 1 root sys  32, 17 Aug 29 00:02 xkdisk@3,0:b,raw
brw-r----- 1 root sys  32, 18 Aug 29 00:02 xkdisk@3,0:c
crw-r----- 1 root sys  32, 18 Aug 29 00:02 xkdisk@3,0:c,raw
brw-r----- 1 root sys  32, 19 Aug 29 00:02 xkdisk@3,0:d
crw-r----- 1 root sys  32, 19 Aug 29 00:02 xkdisk@3,0:d,raw
brw-r----- 1 root sys  32, 20 Aug 29 00:02 xkdisk@3,0:e
crw-r----- 1 root sys  32, 20 Aug 29 00:02 xkdisk@3,0:e,raw
brw-r----- 1 root sys  32, 21 Aug 29 00:02 xkdisk@3,0:f
crw-r----- 1 root sys  32, 21 Aug 29 00:02 xkdisk@3,0:f,raw
brw-r----- 1 root sys  32, 22 Aug 29 00:02 xkdisk@3,0:g
crw-r----- 1 root sys  32, 22 Aug 29 00:02 xkdisk@3,0:g,raw
brw-r----- 1 root sys  32, 23 Aug 29 00:02 xkdisk@3,0:h
crw-r----- 1 root sys  32, 23 Aug 29 00:02 xkdisk@3,0:h,raw

```

/dev/dsk will contain the disk entries to the block device nodes in /devices

```

# ls -l /dev/dsk
/dev/dsk/c0t3d0s0 -> ../../devices/[...]/xkdisk@3,0:a
/dev/dsk/c0t3d0s1 -> ../../devices/[...]/xkdisk@3,0:b
/dev/dsk/c0t3d0s2 -> ../../devices/[...]/xkdisk@3,0:c
/dev/dsk/c0t3d0s3 -> ../../devices/[...]/xkdisk@3,0:d
/dev/dsk/c0t3d0s4 -> ../../devices/[...]/xkdisk@3,0:e
/dev/dsk/c0t3d0s5 -> ../../devices/[...]/xkdisk@3,0:f
/dev/dsk/c0t3d0s6 -> ../../devices/[...]/xkdisk@3,0:g
/dev/dsk/c0t3d0s7 -> ../../devices/[...]/xkdisk@3,0:h

```

and /dev/rdisk will contain the disk entries for the character device nodes in /devices

```

# ls -l /dev/rdisk
/dev/rdisk/c0t3d0s0 -> ../../devices/[...]/xkdisk@3,0:a,raw
/dev/rdisk/c0t3d0s1 -> ../../devices/[...]/xkdisk@3,0:b,raw

```

disks(1M)

EXAMPLE 1 Creating The Block And Character Minor Devices From Within The `xkdisk` Driver's `attach(9E)` Function. (Continued)

```
/dev/rdisk/c0t3d0s2 -> ../../devices/.../xkdisk@3,0:c,raw
/dev/rdisk/c0t3d0s3 -> ../../devices/.../xkdisk@3,0:d,raw
/dev/rdisk/c0t3d0s4 -> ../../devices/.../xkdisk@3,0:e,raw
/dev/rdisk/c0t3d0s5 -> ../../devices/.../xkdisk@3,0:f,raw
/dev/rdisk/c0t3d0s6 -> ../../devices/.../xkdisk@3,0:g,raw
/dev/rdisk/c0t3d0s7 -> ../../devices/.../xkdisk@3,0:h,raw
```

FILES `/dev/dsk/*` disk entries (block device interface)
`/dev/rdisk/*` disk entries (character device interface)
`/devices/*` device special files (minor device nodes)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `add_drv(1M)`, `devfsadm(1M)`, `devlinks(1M)`, `drvconfig(1M)`, `fdisk(1M)`, `ports(1M)`, `tapes(1M)`, `attributes(5)`, `dkio(7I)`, `esp(7D)`, `attach(9E)`, `ddi_create_minor_node(9F)`

Writing Device Drivers

BUGS `disks` silently ignores malformed minor device names.

NAME	diskscan – perform surface analysis						
SYNOPSIS	diskscan [-W] [-n] [-y] <i>raw_device</i>						
DESCRIPTION	diskscan is used by the system administrator to perform surface analysis on a portion of a hard disk. The disk portion may be a raw partition or slice; it is identified using its raw device name. By default, the specified portion of the disk is read (non-destructive) and errors reported on standard error. In addition, a progress report is printed on standard out. The list of bad blocks should be saved in a file and later fed into addbadsec(1M), which will remap them.						
OPTIONS	The following options are supported: -n Causes diskscan to suppress linefeeds when printing progress information on standard out. -W Causes diskscan to perform write and read surface analysis. This type of surface analysis is destructive and should be invoked with caution. -y Causes diskscan to suppress the warning regarding destruction of existing data that is issued when -W is used.						
OPERANDS	The following operands are supported: <i>raw_device</i> The address of the disk drive (see FILES).						
FILES	The raw device should be /dev/rdisk/c? [t?] d? [ps] ?. See disks(1M) for an explanation of SCSI and IDE device naming conventions.						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Architecture</td><td>x86</td></tr> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Architecture	x86	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Architecture	x86						
Availability	SUNWcsu						
SEE ALSO	addbadsec(1M), disks(1M), fdisk(1M), fmthard(1M), format(1M), attributes(5)						
NOTES	The format(1M) utility is available to format, label, analyze, and repair SCSI disks. This utility is included with the diskscan, addbadsec(1M), fdisk(1M), and fmthard(1M) commands available for x86. To format an IDE disk, use the DOS format utility; however, to label, analyze, or repair IDE disks on x86 systems, use the Solaris format(1M) utility.						

dispadmin(1M)

NAME	dispadmin – process scheduler administration
SYNOPSIS	dispadmin -l dispadmin -c <i>class</i> -g [-r <i>res</i>] dispadmin -d [<i>class</i>]
DESCRIPTION	The dispadmin command displays or changes process scheduler parameters while the system is running. dispadmin does limited checking on the values supplied in <i>file</i> to verify that they are within their required bounds. The checking, however, does not attempt to analyze the effect that the new values have on the performance of the system. Inappropriate values can have a negative effect on system performance. (See <i>System Administration Guide: Basic Administration</i>)
OPTIONS	The following options are supported: -c <i>class</i> Specifies the class whose parameters are to be displayed or changed. Valid <i>class</i> values are: RT for the real-time class, TS for the time-sharing class, IA for the inter-active class, FSS for the fair-share class, and FX for the fixed-priority class. The time-sharing and inter-active classes share the same scheduler, so changes to the scheduling parameters of one will change those of the other. -d [<i>class</i>] Sets or displays the name of the default scheduling class to be used on reboot by the startup script <code>/etc/init.d/sysetup</code>. If class name is not specified, the name and description of the current default scheduling class is displayed. If class name is specified and is a valid scheduling class name, then it is saved in dispadmin's private configuration file <code>/etc/dispadmin.conf</code>. Only super-users can set the default scheduling class. -g Gets the parameters for the specified class and writes them to the standard output. Parameters for the real-time class are described in <code>rt_dptbl(4)</code>. Parameters for the time-sharing and inter-active classes are described in <code>ts_dptbl(4)</code>. Parameters for the fair-share class are described in <code>FSS(7)</code>. Parameters for the fixed-priority class are described in <code>fx_dptbl(4)</code>. The -g and -s options are mutually exclusive: you may not retrieve the table at the same time you are overwriting it. -l Lists the scheduler classes currently configured in the system. -r <i>res</i> When using the -g option you may also use the -r option to specify a resolution to be used for outputting the time quantum values. If no resolution is specified, time quantum values are in milliseconds. If <i>res</i> is specified it must be a positive integer between 1 and 1000000000 inclusive, and the resolution used is the

reciprocal of *res* in seconds. For example, a *res* value of 10 yields time quantum values expressed in tenths of a second; a *res* value of 1000000 yields time quantum values expressed in microseconds. If the time quantum cannot be expressed as an integer in the specified resolution, it is rounded up to the next integral multiple of the specified resolution.

-s *file*

Sets scheduler parameters for the specified class using the values in *file*. These values overwrite the current values in memory—they become the parameters that control scheduling of processes in the specified class. The values in *file* must be in the format output by the **-g** option. Moreover, the values must describe a table that is the same size (has same number of priority levels) as the table being overwritten. Super-user privileges are required in order to use the **-s** option.

Specify time quantum values for scheduling classes in system clock ticks, and not in constant-time units. Time quantum values are based on the value of the kernel's `hz` variable. If kernel variable `hires_tick` is set to 1 to get higher resolution clock behavior, the actual time quanta will be reduced by the order of 10.

The **-g** and **-s** options are mutually exclusive: you may not retrieve the table at the same time you are overwriting it.

EXAMPLES

EXAMPLE 1 Retrieving the Current Scheduler Parameters for the real-time class

The following command retrieves the current scheduler parameters for the real-time class from kernel memory and writes them to the standard output. Time quantum values are in microseconds.

```
dispadmin -c RT -g -r 1000000
```

EXAMPLE 2 Overwriting the Current Scheduler Parameters for the Real-time Class

The following command overwrites the current scheduler parameters for the real-time class with the values specified in `rt.config`.

```
dispadmin -c RT -s rt.config
```

EXAMPLE 3 Retrieving the Current Scheduler Parameters for the Time-sharing Class

The following command retrieves the current scheduler parameters for the time-sharing class from kernel memory and writes them to the standard output. Time quantum values are in nanoseconds.

```
dispadmin -c TS -g -r 1000000000
```

dispadmin(1M)

EXAMPLE 4 Overwriting the Current Scheduler Parameters for the Time-sharing Class

The following command overwrites the current scheduler parameters for the time-sharing class with the values specified in `ts.config`.

```
dispadmin -c TS -s ts.config
```

FILES /etc/dispadmin.conf

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `priocntl(1)`, `priocntl(2)`, `fx_dptbl(4)`, `rt_dptbl(4)`, `ts_dptbl(4)`, `attributes(5)`, `FSS(7)`

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DIAGNOSTICS `dispadmin` prints an appropriate diagnostic message if it fails to overwrite the current scheduler parameters due to lack of required permissions or a problem with the specified input file.

NAME dmesg – collect system diagnostic messages to form error log

SYNOPSIS `/usr/bin/dmesg`
`/usr/sbin/dmesg`

DESCRIPTION dmesg is made obsolete by `syslogd(1M)` for maintenance of the system error log.

dmesg looks in a system buffer for recently printed diagnostic messages and prints them on the standard output.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWesu (32-bit) SUNWesxu (64-bit)

SEE ALSO `syslogd(1M)`, `attributes(5)`

dmi_cmd(1M)

NAME	dmi_cmd – DMI command line interface utility
SYNOPSIS	<pre> dmi_cmd -AL -c <i>compId</i> -g <i>groupId</i> [-dp] [-a <i>attrId</i>] [-m <i>max-count</i>] [-r <i>req-mode</i>] [-s <i>hostname</i>] dmi_cmd -CD -c <i>compId</i> [-s <i>hostname</i>] dmi_cmd -CI <i>mif-file</i> [-s <i>hostname</i>] dmi_cmd -CL [-dp] [-c <i>compId</i>] [-m <i>max-count</i>] [-r <i>req-mode</i>] [-s <i>hostname</i>] dmi_cmd -GD -c <i>compId</i> -g <i>groupId</i> [-s <i>hostname</i>] dmi_cmd -GI <i>schema-file</i> -c <i>compId</i> [-s <i>hostname</i>] dmi_cmd -GL -c <i>compId</i> -g <i>groupId</i> [-dp] [-m <i>max-count</i>] [-r <i>req-mode</i>] [-s <i>hostname</i>] dmi_cmd -GM -c <i>compId</i> [-m <i>max-count</i>] [-s <i>hostname</i>] dmi_cmd -h dmi_cmd -ND -c <i>compId</i> -l <i>language-string</i> [-s <i>hostname</i>] dmi_cmd -NI <i>schema-file</i> -c <i>compId</i> [-s <i>hostname</i>] dmi_cmd -NL -c <i>compId</i> [-s <i>hostname</i>] dmi_cmd -V [-s <i>hostname</i>] dmi_cmd -W <i>config-file</i> [-s <i>hostname</i>] dmi_cmd -X [-s <i>hostname</i>] </pre>
DESCRIPTION	The <code>dmi_cmd</code> utility provides the ability to: ■ Obtain version information about the DMI Service Provider ■ Set the configuration to describe the language required by the management application ■ Obtain configuration information describing the current language in use for the session ■ Install components into the database ■ List components in a system to determine what is installed ■ Delete an existing component from the database ■ Install group schemas to an existing component in the database ■ List class names for all groups in a component ■ List the groups within a component ■ Delete a group from a component ■ Install a language schema for an existing component in the database ■ List the set of language mappings installed for a specified component ■ Delete a specific language mapping for a component

OPTIONS	■ List the properties for one or more attributes in a group The following options are supported:
-a <i>attrId</i>	Specify an attribute by its ID (positive integer). The default value is 0.
-AL	List the attributes for the specified component.
-c <i>compld</i>	Specify a component by its ID (positive integer). The default value is 0.
-CD	Delete the specified component.
-CI <i>mif-file</i>	Install the component described in the <i>mif-file</i> .
-CL	List component information.
-d	Display descriptions.
-g <i>groupId</i>	Specify a group by its ID (positive integer). The default value is 0.
-GD	Delete a group for the specified component.
-GI <i>schema-file</i>	Install the group schema specified in <i>schema-file</i> .
-GL	List the groups for the specified component.
-GM	List the class names for the specified component.
-h	Help. Print the command line usage.
-l <i>language-string</i>	Specify a language mapping.
-m <i>max-count</i>	Specify the maximum number of components to display.
-ND	Delete a language mapping for the specified component.
-NI <i>schema-file</i>	Install the language schema specified in <i>schema-file</i> .
-NL	List the language mappings for a specified component.
-p	Display the pragma string.
-r <i>req-mode</i>	Specify the request mode. The valid values are: 1 DMI_UNIQUE - access the specified item (or table row). 2 DMI_FIRST - access the first item. 3 DMI_NEXT - access the next item. The default request mode is 1 DMI_UNIQUE.
-s <i>hostname</i>	Specify the host machine on which <code>dmi_spd</code> is running. The default host is the local host.

dmi_cmd(1M)

- V Version. Prints version information about the DMI Service Provider.
- W *config-file* Set the configuration specified in *config-file* to dmispd.
- X Retrieve configuration information describing the current language in use.

EXIT STATUS The following error values are returned:

- 0 Successful completion.
- 1 An error occurred.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWsadmi

SEE ALSO dmiget(1M), dmispd(1M), attributes(5)

NAME	dmiget – DMI command line retrieval utility				
SYNOPSIS	dmiget -c <i>compId</i> [-a <i>attrId</i>] [-g <i>groupId</i>] [-s <i>hostname</i>] dmiget -h				
DESCRIPTION	The dmiget utility retrieves the table information of a specific component in the DMI Service Provider.				
OPTIONS	The following options are supported: -a <i>attrId</i> Display the attribute information for the component specified with the -c argument. -c <i>compId</i> Display all the table information for the specified component. -g <i>groupId</i> Display all the attribute information in the group specified with <i>groupId</i> for the component specified with the -c argument -h Help. Print the command line usage. -s <i>hostname</i> Specify the host machine on which dmispd is running. The default host is the local host.				
EXIT STATUS	The following error values are returned: 0 Successful completion. -1 An error occurred.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWsadmi</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWsadmi
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWsadmi				
SEE ALSO	dmi_cmd(1M), dmispd(1M), attributes(5)				

dminfo(1M)

NAME	dminfo – report information about a device entry in a device maps file	
SYNOPSIS	dminfo [-v] [-a] [-f <i>pathname</i>] dminfo [-v] [-a] [-f <i>pathname</i>] -n <i>dev</i> -name... dminfo [-v] [-a] [-f <i>pathname</i>] -d <i>dev</i> -path... dminfo [-v] [-a] [-f <i>pathname</i>] -t <i>dev</i> -type... dminfo [-v] [-f <i>pathname</i>] -u <i>dm</i> -entry	
DESCRIPTION	dminfo reports and updates information about the device_maps(4) file.	
OPTIONS	The following options are supported	
	-a	Succeed if any of the requested entries are found. If used with -v, all entries that match the requested case(s) are printed.
	-d <i>dev-path</i>	Search by <i>dev-path</i> . Search device_maps(4) for a device special pathname in the <i>device_list</i> field matching the <i>dev-path</i> argument. This option cannot be used with -n, -t or -u.
	-f <i>pathname</i>	Use a device_maps file with <i>pathname</i> instead of /etc/security/device_maps.
	-n <i>dev-name</i>	Search by <i>dev-name</i> . Search device_maps(4) for a <i>device_name</i> field matching <i>dev-name</i> . This option cannot be used with -d, -t or -u.
	-t <i>dev-type</i>	Search by <i>dev-type</i> . Search device_maps(4) for a <i>device_type</i> field matching the given <i>dev-type</i> . This option cannot be used with -d, -n or -u.
	-u <i>dm-entry</i>	Update the device_maps(4) file. This option is provided to add entries to the device_maps(4) file. The <i>dm-entry</i> must be a complete device_maps(4) file entry. The <i>dm-entry</i> has fields, as in the device_maps file. It uses the colon (:) as a field separator, and white space as the <i>device_list</i> subfield separators. The <i>dm-entry</i> is not made if any fields are missing, or if the <i>dm-entry</i> would be a duplicate. The default device maps file can be updated only by the super user.
	-v	Verbose. Print the requested entry or entries, one line per entry, on the standard output. If no entries are specified, all are printed.
EXIT STATUS	0	Successful completion.
	1	Request failed.
	2	Incorrect syntax.

FILES /etc/security/device_maps

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO bsmconv(1M), device_maps(4), attributes(5)

NOTES The functionality described in this man page is available only if the Basic Security Module (BSM) has been enabled. See bsmconv(1M) for more information.

dmispd(1M)

NAME	dmispd – Sun Solstice Enterprise DMI Service Provider				
SYNOPSIS	<code>/usr/lib/dmi/dmispd [-h] [-c <i>config-dir</i>] [-d <i>debug-level</i>]</code>				
DESCRIPTION	The DMI Service Provider, <code>dmispd</code>, is the core of the DMI solution. Management applications and Component instrumentations communicate with each other through the Service Provider. The Service Provider coordinates and arbitrates requests from the management application to the specified component instrumentations. The Service Provider handles runtime management of the Component Interface (CI) and the Management Interface (MI), including component installation, registration at the MI and CI level, request serialization and synchronization, event handling for CI, and general flow control and housekeeping. The Service Provider is invoked from a start-up script at boot time only if contents of the DMI Service Provider configuration file <code>/etc/dmi/conf/dmispd.conf</code> are non-trivial.				
OPTIONS	The following options are supported: <code>-c <i>config-dir</i></code> Specify the full path of the directory containing the <code>dmispd.conf</code> configuration file. The default directory is <code>/etc/dmi/conf</code>. <code>-d <i>debug-level</i></code> Debug. Levels from 0 to 5 are supported, giving various levels of debug information. The default is 0, meaning no debug information is given. - If this option is omitted, then <code>dmispd</code> is run as a daemon process. <code>-h</code> Help. Print the command line usage.				
EXIT STATUS	The following error values are returned: 0 Successful completion. 1 An error occurred.				
FILES	<code>/etc/dmi/conf/dmispd.conf</code> DMI Service Provider configuration file				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:				
	<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWsadmi</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWsadmi
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWsadmi				
SEE ALSO	<code>snmpXdmid(1M)</code> , <code>attributes(5)</code>				

NAME	dnskeygen – generate public, private, and shared secret keys for DNS
SYNOPSIS	dnskeygen [[-DHR] <i>size</i>] [-F] [-zhu] [-a] [-c] [-p <i>num</i>] [-s <i>num</i>] -n <i>name</i>
DESCRIPTION	The dnskeygen utility is a tool to generate and maintain keys for DNS security with the Domain Name System (“DNS”). Use dnskeygen to generate public and private keys to authenticate zone data or shared secret keys for request and transaction signatures. dnskeygen stores each key in two files: <pre>K<name>+<algorithm>+<footprint>.private</pre> and <pre>K<name>+<algorithm>+<footprint>.key</pre> The key is stored in a portable format within K<name>+<alg>+<footprint>.private. The public key is stored in K<name>+<alg>+<footprint>.private in the DNS zone file format: <pre><name> IN KEY <flags><algorithm><protocol><exponent modulus></pre> The underlying cryptographic math is done by the DNSSAFE and Foundation Toolkit libraries.
OPTIONS	The dnskeygen utility supports the following options: -D Generate a DSA/DSS key. The value of <i>size</i> must be one of the following: 512, 576, 640, 704, 768, 832, 896, 960 or 1024. -F Use a large exponent for key generation. Use for RSA only. -H Generate a HMAC-MD5 key. The value of <i>size</i> must be between 128 and 504. -R Generate an RSA key. The value of <i>size</i> must be between 512 and 4096. -a Cannot use key for authentication. -c Cannot use key for encryption. -h Generate host or service key. -n <i>name</i> Set the key’s name to <i>name</i>. -p <i>num</i> Set the key’s protocol field to <i>num</i>. The values for <i>num</i> are as follows: 3 If -z or -h is specified (DNSSEC), this is the default value. 2 Unless specified, the default value for all other options.

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1 Use this value for TLS.

4 Use this value for IPSEC.

255 Use this value for ANY.

-s *num* Set the key's strength field to *num*. The default value of *num* is 0.

-u Generate User key, for example, for email.

-z Generate Zone key for DNS validation.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	Standard Bind 8.2.4

SEE ALSO `attributes(5)`

Eastlake III, D. and Kaufman, C. *RFC 2065, Domain Name System Security Extension*. Network Working Group. January 1997.

Vixie, P., Gudmundsson, O., Eastlake III, D., and Wellington, B. *RFC 2845, Secret Key Transaction Authentication for DNS (TSIG)*. Network Working Group. May 2000.

NAME	domainname – Set or display name of the current domain				
SYNOPSIS	domainname [<i>name-of-domain</i>]				
DESCRIPTION	Without an argument, domainname displays the name of the current domain, which typically encompasses a group of <i>hosts</i> or <i>passwd</i> entries under the same administration. The domainname command is used by various components of Solaris to resolve names for types such as <i>passwd</i>, <i>hosts</i> and <i>aliases</i>. By default, various naming services such as NIS, NIS+, the Internet Domain Name Service (DNS) and <i>sendmail</i>(1M) use this domainname to resolve names. The domainname is normally a valid Internet domain name. The domainname for various naming services can also be set by other means. For example, <i>ypinit</i> can be used to specify a different domain for all NIS calls. The file <i>/etc/resolv.conf</i> can be used to specify a different domain for DNS lookups. For <i>sendmail</i>, the domainname can be specified through the <i>sendmail_vars</i> entry in the <i>/etc/nsswitch.conf</i> file, or through the <i>/etc/mail/sendmail.cf</i> file. Only the superuser can set the name of the domain by specifying the new domainname as an argument. The domain name of the machine is usually set during boot-time through the domainname command in the <i>/etc/init.d/inetinit</i> file. If the new domain name is not saved in the <i>/etc/defaultdomain</i> file, the machine will revert back to the old domain after rebooting.				
FILES	<i>/etc/defaultdomain</i> <i>/etc/init.d/inetinit</i> <i>/etc/mail/sendmail.cf</i> <i>/etc/nsswitch.conf</i> <i>/etc/resolv.conf</i>				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<i>nis</i>+(1), <i>nischown</i>(1), <i>nisspasswd</i>(1), <i>hostconfig</i>(1M), <i>named</i>(1M), <i>nissaddcred</i>(1M), <i>sendmail</i>(1M), <i>ypinit</i>(1M), <i>sys-unconfig</i>(1M), <i>aliases</i>(4), <i>defaultdomain</i>(4), <i>hosts</i>(4), <i>nsswitch.conf</i>(4), <i>passwd</i>(4), <i>attributes</i>(5)				

drvconfig(1M)

NAME	drvconfig – configure the /devices directory
SYNOPSIS	drvconfig [-bn] [-a <i>alias_name</i>] [-c <i>class_name</i>] [-i <i>drivername</i>] [-m <i>major_num</i>] [-r <i>rootdir</i>]
DESCRIPTION	devfsadm(1M) is now the preferred command for /dev and /devices and should be used instead of drvconfig. The default operation of drvconfig is to create the /devices directory tree that describes, in the filesystem namespace, the hardware layout of a particular machine. Hardware devices present on the machine and powered on as well as pseudo-drivers are represented under /devices. Normally this command is run automatically after a new driver has been installed (with add_drv(1M)) and the system has been rebooted.
/etc/minor_perm File	drvconfig reads the /etc/minor_perm file to obtain permission information and applies the permissions only to nodes that it has just created. It does not change permissions on already existing nodes. The format of the /etc/minor_perm file is as follows: <i>name</i> : <i>minor_name</i> <i>permissions</i> <i>owner</i> <i>group</i> <i>minor_name</i> may be the actual name of the minor node, or contain shell metacharacters to represent several minor nodes (see sh(1)). For example: <pre>sd:* 0640 root sys zs:[a-z],cu 0600 uucp uucp mm:kmem 0640 root bin</pre> The first line sets all devices exported by the sd node to 0640 permissions, owned by root, with group sys. In the second line, devices such as a, cu and z, cu exported by the zs driver are set to 0600 permission, owned by uucp, with group uucp. In the third line the kmem device exported by the mm driver is set to 0640 permission, owned by root, with group bin.
OPTIONS	The following options are supported: -a <i>alias_name</i> Add the name <i>alias_name</i> to the list of aliases that this driver is known by. This option, if used, must be used with the -m <i>major_num</i>, the -b and the -i <i>drivername</i> options. -b Add a new major number to name binding into the kernel's internal name_to_major tables. This option is not normally used directly, but is used by other utilities such as add_drv(1M). Use of the -b option requires that -i and -m be used also. No /devices entries are created. -c <i>class_name</i> The driver being added to the system exports the class <i>class_name</i>. This option is not normally used directly, but is used by other utilities. It is only effective when used with the -b option.

	-i <i>drivername</i> Only configure the devices for the named driver. The following options are used by the implementation of <code>add_drv(1M)</code> and <code>rem_drv(1M)</code>, and may not be supported in future versions of Solaris:				
	-m <i>major_num</i> Specify the major number <i>major_num</i> for this driver to add to the kernel's <code>name_to_major</code> binding tables.				
	-n Do not try to load and attach any drivers, or if the <code>-i</code> option is given, do not try to attach the driver named <i>drivername</i>.				
	-r <i>rootdir</i> Build the device tree under the directory specified by <i>rootdir</i> instead of the default <code>/devices</code> directory.				
EXIT STATUS	0 Successful completion. non-zero An error occurred.				
FILES	/devices Device nodes directory /etc/minor_perm Minor mode permissions /etc/name_to_major Major number binding /etc/driver_classes Driver class binding file				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>sh(1)</code>, <code>add_drv(1M)</code>, <code>devlinks(1M)</code>, <code>disks(1M)</code>, <code>modinfo(1M)</code>, <code>modload(1M)</code>, <code>modunload(1M)</code>, <code>ports(1M)</code>, <code>rem_drv(1M)</code>, <code>tapes(1M)</code>, <code>path_to_inst(4)</code>, <code>attributes(5)</code>				
NOTES	This document does not constitute an API. <code>/etc/minor_perm</code>, <code>/etc/name_to_major</code>, <code>/etc/driver_classes</code>, and <code>/devices</code> may not exist or may have different contents or interpretations in a future release. The existence of this notice does not imply that any other documentation that lacks this notice constitutes an API.				

dsvclockd(1M)

NAME	dsvclockd – DHCP service lock daemon						
SYNOPSIS	/usr/lib/inet/dsvclockd [-d 1 2] [-f] [-v]						
DESCRIPTION	The dsvclockd daemon is a lock manager that works in conjunction with the Dynamic Host Configuration Protocol (DHCP) Data Service Library (libdhcpsvc). It provides shared or exclusive access to the dhcp_network(4) and dhcptab(4) tables. This service is used by the SUNWbinfiles and SUNWfiles DHCP data store modules. See dhcp_modules(5). dsvclockd is started on demand by libdhcpsvc. The dsvclockd daemon should be started manually only if command line options need to be specified.						
OPTIONS	The following options are supported: <table><tr><td>-d 1 2</td><td>Set debug level. Two levels of debugging are currently available, 1 and 2. Level 2 is more verbose.</td></tr><tr><td>-f</td><td>Run in the foreground instead of as a daemon process. When this option is used, messages are sent to standard error instead of to syslog(3C).</td></tr><tr><td>-v</td><td>Provide verbose output.</td></tr></table>	-d 1 2	Set debug level. Two levels of debugging are currently available, 1 and 2. Level 2 is more verbose.	-f	Run in the foreground instead of as a daemon process. When this option is used, messages are sent to standard error instead of to syslog(3C).	-v	Provide verbose output.
-d 1 2	Set debug level. Two levels of debugging are currently available, 1 and 2. Level 2 is more verbose.						
-f	Run in the foreground instead of as a daemon process. When this option is used, messages are sent to standard error instead of to syslog(3C).						
-v	Provide verbose output.						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWdhcsu</td></tr><tr><td>Interface Stability</td><td>Unstable</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWdhcsu	Interface Stability	Unstable
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWdhcsu						
Interface Stability	Unstable						
SEE ALSO	syslog(3C), dhcp_network(4), dhcptab(4), dhcp_modules(5), attributes(5)						

NAME	dumpadm – configure operating system crash dump
SYNOPSIS	<pre> /usr/sbin/dumpadm [-nuy] [-c content-type] [-d dump-device] [-m mink minm min%] [-s savecore-dir] [-r root-dir] </pre>
DESCRIPTION	The dumpadm program is an administrative command that manages the configuration of the operating system crash dump facility. A crash dump is a disk copy of the physical memory of the computer at the time of a fatal system error. When a fatal operating system error occurs, a message describing the error is printed to the console. The operating system then generates a crash dump by writing the contents of physical memory to a predetermined dump device, which is typically a local disk partition. The dump device can be configured by way of dumpadm. Once the crash dump has been written to the dump device, the system will reboot. Fatal operating system errors can be caused by bugs in the operating system, its associated device drivers and loadable modules, or by faulty hardware. Whatever the cause, the crash dump itself provides invaluable information to your support engineer to aid in diagnosing the problem. As such, it is vital that the crash dump be retrieved and given to your support provider. Following an operating system crash, the savecore(1M) utility is executed automatically during boot to retrieve the crash dump from the dump device, and write it to a pair of files in your file system named <i>unix.X</i> and <i>vmcore.X</i>, where X is an integer identifying the dump. Together, these data files form the <i>saved crash dump</i>. The directory in which the crash dump is saved on reboot can also be configured using dumpadm. By default, the dump device is configured to be an appropriate swap partition. Swap partitions are disk partitions reserved as virtual memory backing store for the operating system, and thus no permanent information resides there to be overwritten by the dump. See swap(1M). To view the current dump configuration, execute dumpadm with no arguments: <pre> example# dumpadm Dump content: kernel pages Dump device: /dev/dsk/c0t0d0s1 (swap) Savecore directory: /var/crash/saturn Savecore enabled: yes </pre> When no options are specified, dumpadm prints the current crash dump configuration. The example shows the set of default values: the dump content is set to kernel memory pages only, the dump device is a swap disk partition, the directory for savecore files is set to /var/crash/hostname, and savecore is set to run automatically on reboot. When one or more options are specified, dumpadm verifies that your changes are valid, and if so, reconfigures the crash dump parameters and displays the resulting configuration. You must be root to view or change dump parameters.
OPTIONS	The following options are supported:

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<i>-c content-type</i>	Modify the dump configuration so that the crash dump consists of the specified dump content. The content should be one of the following: <table><tr><td><i>kernel</i></td><td>Kernel memory pages only.</td></tr><tr><td><i>all</i></td><td>All memory pages.</td></tr><tr><td><i>curproc</i></td><td>Kernel memory pages, and the memory pages of the process whose thread was currently executing on the CPU on which the crash dump was initiated. If the thread executing on that CPU is a kernel thread not associated with any user process, only kernel pages will be dumped.</td></tr></table>	<i>kernel</i>	Kernel memory pages only.	<i>all</i>	All memory pages.	<i>curproc</i>	Kernel memory pages, and the memory pages of the process whose thread was currently executing on the CPU on which the crash dump was initiated. If the thread executing on that CPU is a kernel thread not associated with any user process, only kernel pages will be dumped.
<i>kernel</i>	Kernel memory pages only.						
<i>all</i>	All memory pages.						
<i>curproc</i>	Kernel memory pages, and the memory pages of the process whose thread was currently executing on the CPU on which the crash dump was initiated. If the thread executing on that CPU is a kernel thread not associated with any user process, only kernel pages will be dumped.						
<i>-d dump-device</i>	Modify the dump configuration to use the specified dump device. The dump device may one of the following: <table><tr><td><i>dump-device</i></td><td>A specific dump device specified as an absolute pathname, such as <i>/dev/dsk/cNtNdNsN</i>.</td></tr><tr><td><i>swap</i></td><td>If the special token <i>swap</i> is specified as the dump device, <i>dumpadm</i> examines the active swap entries and selects the most appropriate entry to configure as the dump device. See <i>swap(1M)</i>. Refer to the NOTES below for details of the algorithm used to select an appropriate swap entry. When the system is first installed, <i>dumpadm</i> uses <i>swap</i> to determine the initial dump device setting.</td></tr></table>	<i>dump-device</i>	A specific dump device specified as an absolute pathname, such as <i>/dev/dsk/cNtNdNsN</i> .	<i>swap</i>	If the special token <i>swap</i> is specified as the dump device, <i>dumpadm</i> examines the active swap entries and selects the most appropriate entry to configure as the dump device. See <i>swap(1M)</i> . Refer to the NOTES below for details of the algorithm used to select an appropriate swap entry. When the system is first installed, <i>dumpadm</i> uses <i>swap</i> to determine the initial dump device setting.		
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<i>-m mink minm min%</i>	Create a <i>minfree</i> file in the current <i>savecore</i> directory indicating that <i>savecore</i> should maintain at least the specified amount of free space in the file system where the <i>savecore</i> directory is located. The <i>min</i> argument can be one of the following: <table><tr><td><i>k</i></td><td>A positive integer suffixed with the unit <i>k</i> specifying kilobytes.</td></tr><tr><td><i>m</i></td><td>A positive integer suffixed with the unit <i>m</i> specifying megabytes.</td></tr></table>	<i>k</i>	A positive integer suffixed with the unit <i>k</i> specifying kilobytes.	<i>m</i>	A positive integer suffixed with the unit <i>m</i> specifying megabytes.		
<i>k</i>	A positive integer suffixed with the unit <i>k</i> specifying kilobytes.						
<i>m</i>	A positive integer suffixed with the unit <i>m</i> specifying megabytes.						

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	%	A % symbol, indicating that the <code>minfree</code> value should be computed as the specified percentage of the total current size of the file system containing the <code>savecore</code> directory. The <code>savecore</code>
		command will consult the <code>minfree</code> file, if present, prior to writing the dump files. If the size of these files would decrease the amount of free disk space below the <code>minfree</code> threshold, no dump files are written and an error message is logged. The administrator should immediately clean up the <code>savecore</code> directory to provide adequate free space, and re-execute the <code>savecore</code> command manually. The administrator can also specify an alternate directory on the <code>savecore</code> command-line.
-n		Modify the dump configuration to not run <code>savecore</code> automatically on reboot. This is not the recommended system configuration; if the dump device is a swap partition, the dump data will be overwritten as the system begins to swap. If <code>savecore</code> is not executed shortly after boot, crash dump retrieval may not be possible.
	-r	Specify an alternate root directory relative to which <code>dumpadm</code> should create files. If no <code>-r</code> argument is specified, the default root directory "/" is used.
	-s	Modify the dump configuration to use the specified directory to save files written by <code>savecore</code> . The directory should be an absolute path and exist on the system. If upon reboot the directory does not exist, it will be created prior to the execution of <code>savecore</code> . See the NOTES section below for a discussion of security issues relating to access to the <code>savecore</code> directory. The default <code>savecore</code> directory is <code>/var/crash/hostname</code> where is the output of the <code>-n</code> option to the <code>uname(1)</code> command.
	-u	Forcibly update the kernel dump configuration based on the contents of <code>/etc/dumpadm.conf</code> . Normally this option is used only on reboot by the startup script <code>/etc/init.d/savecore</code> , when the <code>dumpadm</code> settings from the previous boot must be restored. Your dump configuration is saved in the configuration file for this purpose. If the configuration file is missing or contains invalid values for any dump properties, the

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	default values are substituted. Following the update, the configuration file is resynchronized with the kernel dump configuration. -Y Modify the dump configuration to automatically run <code>savecore</code> on reboot. This is the default for this dump setting.						
EXAMPLES	EXAMPLE 1 Reconfiguring The Dump Device To A Dedicated Dump Device: The following command reconfigures the dump device to a dedicated dump device: <pre>example# dumpadm -d /dev/dsk/c0t2d0s2</pre> <pre> Dump content: kernel pages Dump device: /dev/dsk/c0t2d0s2 (dedicated) Savecore directory: /var/crash/saturn Savecore enabled: yes</pre>						
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Dump configuration is valid and the specified modifications, if any, were made successfully.</td></tr><tr><td>1</td><td>A fatal error occurred in either obtaining or modifying the dump configuration.</td></tr><tr><td>2</td><td>Invalid command line options were specified.</td></tr></table>	0	Dump configuration is valid and the specified modifications, if any, were made successfully.	1	A fatal error occurred in either obtaining or modifying the dump configuration.	2	Invalid command line options were specified.
0	Dump configuration is valid and the specified modifications, if any, were made successfully.						
1	A fatal error occurred in either obtaining or modifying the dump configuration.						
2	Invalid command line options were specified.						
FILES	/dev/dump /etc/init.d/savecore /etc/dumpadm.conf <i>savecore-directory</i>/minfree						
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsr</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsr		
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWcsr						
SEE ALSO	<code>uname(1)</code>, <code>savecore(1M)</code>, <code>swap(1M)</code>, <code>attributes(5)</code>						
NOTES							
Dump Device Selection	When the special swap token is specified as the argument to <code>dumpadm -d</code> the utility will attempt to configure the most appropriate swap device as the dump device. <code>dumpadm</code> configures the largest swap block device as the dump device; if no block devices are available for swap, the largest swap entry is configured as the dump						

**Dump
Device/Swap
Device Interaction**

device. If no swap entries are present, or none can be configured as the dump device, a warning message will be displayed. While local and remote swap files can be configured as the dump device, this is not recommended.

In the event that the dump device is also a swap device, and the swap device is deleted by the administrator using the `swap -d` command, the `swap` command will automatically invoke `dumpadm -d swap` in order to attempt to configure another appropriate swap device as the dump device. If no swap devices remain or none can be configured as the dump device, the crash dump will be disabled and a warning message will be displayed. Similarly, if the crash dump is disabled and the administrator adds a new swap device using the `swap -a` command, `dumpadm -d swap` will be invoked to re-enable the crash dump using the new swap device.

Once `dumpadm -d swap` has been issued, the new dump device is stored in the configuration file for subsequent reboots. If a larger or more appropriate swap device is added by the administrator, the dump device is not changed; the administrator must re-execute `dumpadm -d swap` to reselect the most appropriate device from the new list of swap devices.

**Minimum Free
Space**

If the `dumpadm -m` option is used to create a `minfree` file based on a percentage of the total size of the file system containing the `savecore` directory, this value is not automatically recomputed if the file system subsequently changes size. In this case, the administrator must re-execute `dumpadm -m` to recompute the `minfree` value. If no such file exists in the `savecore` directory, `savecore` will default to a free space threshold of one megabyte. If no free space threshold is desired, a `minfree` file containing size 0 can be created.

Security Issues

If, upon reboot, the specified `savecore` directory is not present, it will be created prior to the execution of `savecore` with permissions 0700 (read, write, execute by owner only) and owner `root`. It is recommended that alternate `savecore` directories also be created with similar permissions, as the operating system crash dump files themselves may contain secure information.

editmap(1M)

NAME	editmap – query and edit single records in database maps for sendmail
SYNOPSIS	editmap -C <i>file</i> [-N] [-f] [-q -u -x] <i>maptype mapname key</i> [" <i>value</i> "...]
DESCRIPTION	The editmap command queries or edits one record in a database maps used by the keyed map lookups in sendmail(1M). Arguments are passed on the command line and output (for queries) is directed to standard output. Depending on how it is compiled, editmap handles up to three different database formats, selected using the <i>maptype</i> parameter. See OPERANDS. If the TrustedUser option is set in the sendmail configuration file and editmap is invoked as root, the generated files are owned by the specified TrustedUser.
OPTIONS	The following options are supported: -C <i>file</i> Use the specified sendmail configuration file (<i>file</i>) to look up the TrustedUser option. -f Disable the folding of all upper case letters in the key to lower case. Normally, all upper case letters in the key are folded to upper case. This is intended to mesh with the -f flag in the K line in sendmail.cf. The value is never case folded. -N Include the null byte that terminates strings in the map (for alias maps). -q Query the map for the specified key. If found, print value to standard output and exit with 0. If not found then print an error message to stdout and exit with EX_UNAVAILABLE. -u Update the record for key with value or inserts a new record if one doesn't exist. Exits with 0 on success or EX_IOERR on failure. -x Delete the specific key from the map. Exit with 0 on success or EX_IOERR on failure.
OPERANDS	The following operands are supported: <i>key</i> The left hand side of a record. - Each record is of the form: <i>key value</i> <i>key</i> and <i>value</i> are separated by white space. <i>mapname</i> File name of the database map being created. <i>maptype</i> Specifies the database format. The following <i>maptype</i> parameters are available: dbm Specifies DBM format maps. btree Specifies B-Tree format maps.

editmap(1M)

hash Specifies hash format maps.

value The right hand side of a record.

Each record is of the form:

key value

key and *value* are separated by white space.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWsndmu

SEE ALSO makemap(1M), sendmail(1M), attributes(5)

edquota(1M)

NAME	edquota – edit user quotas for ufs file system
SYNOPSIS	edquota [-p <i>proto_user</i>] <i>username...</i> edquota -t
DESCRIPTION	edquota is a quota editor. One or more users may be specified on the command line. For each user a temporary file is created with an ASCII representation of the current disk quotas for that user for each mounted ufs file system that has a <i>quotas</i> file, and an editor is then invoked on the file. The quotas may then be modified, new quotas added, etc. Upon leaving the editor, edquota reads the temporary file and modifies the binary quota files to reflect the changes made. The editor invoked is <i>vi</i>(1) unless the EDITOR environment variable specifies otherwise. Only the super-user may edit quotas. In order for quotas to be established on a file system, the root directory of the file system must contain a file, owned by root, called <i>quotas</i>. (See <i>quotaon</i>(1M).) <i>proto_user</i> and <i>username</i> can be numeric, corresponding to the UID of a user. Unassigned UIDs may be specified; unassigned names may not. In this way, default quotas can be established for users who are later assigned a UID. If no options are specified, the temporary file created will have one or more lines of the format, where a block is considered to be a 1024 byte (1K) block: <pre>fs mount_point blocks (soft =number, hard =number) inodes (soft =number, hard =number)</pre> The <i>number</i> fields may be modified to reflect desired values. The following options are supported: -p Duplicate the quotas of the <i>proto_user</i> specified for each <i>username</i> specified. This is the normal mechanism used to initialize quotas for groups of users. -t Edit the soft time limits for each file system. If the time limits are zero, the default time limits in <i>/usr/include/sys/fs/ufs_quota.h</i> are used. The temporary file created will have one or more lines of the form <pre>fs mount_point blocks time limit = number tmunit, files time limit = number tmunit</pre> <i>tmunit</i> may be one of "month", "week", "day", "hour", "min" or "sec"; characters appended to these keywords are ignored, so you may write "months" or "minutes" if you prefer. The <i>number</i> and <i>tmunit</i> fields may be modified to set desired values. Time limits are printed in the greatest possible time unit such that the value is greater than or equal to one. If "default" is printed after the <i>tmunit</i>, this indicates that the value shown is zero (the default).

edquota(1M)

USAGE See largefile(5) for the description of the behavior of edquota when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).

FILES quotas quota file at the file system root
/etc/mnttab table of mounted file systems

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO vi(1), quota(1M), quotacheck(1M), quotaon(1M), repquota(1M), attributes(5), largefile(5), quotactl(7I)

NOTES All UIDs can be assigned quotas.

eeprom(1M)

NAME	eeprom – EEPROM display and load utility	
SYNOPSIS		
SPARC	/usr/platform/ <i>platform-name</i> /sbin/eeprom [-] [-f <i>device</i>] [<i>parameter</i> [=value]]	
x86	/usr/platform/ <i>platform-name</i> /sbin/eeprom [-] [-f <i>device</i>] [-I] [<i>mmu-modlist</i>] [<i>parameter</i> [=value]]	
DESCRIPTION	eeprom displays or changes the values of parameters in the EEPROM. It processes parameters in the order given. When processing a <i>parameter</i> accompanied by a <i>value</i>, eeprom makes the indicated alteration to the EEPROM; otherwise, it displays the <i>parameter</i>'s value. When given no parameter specifiers, eeprom displays the values of all EEPROM parameters. A '-' (hyphen) flag specifies that parameters and values are to be read from the standard input (one <i>parameter</i> or <i>parameter=value</i> per line). Only the super-user may alter the EEPROM contents. eeprom verifies the EEPROM checksums and complains if they are incorrect. <i>platform-name</i> is the name of the platform implementation and can be found using the -i option of uname(1).	
SPARC	SPARC based systems implement firmware password protection with eeprom, using the security-mode, security-password and security-#badlogins properties.	
x86	EEPROM storage is simulated using a file residing in the platform-specific boot area. The /platform/<i>platform-name</i>/boot/solaris/bootenv.rc file simulates EEPROM storage. Because x86 based systems typically implement password protection in the system BIOS, there is no support for password protection in the eeprom program. While it is possible to set the security-mode, security-password and security-#badlogins properties on x86 based systems, these properties have no special meaning or behavior on x86 based systems.	
OPTIONS	-f <i>device</i>	Use <i>device</i> as the EEPROM device.
x86 Only	-I	Initialize boot properties on an x86 based system. Only init(1M) run-level initialization scripts should use this option.
OPERANDS		
x86 Only	<i>acpi-user-options</i>	A configuration variable that controls the use of ACPI. A value of 0x0 attempts to use ACPI if it is available on the system. A value of 0x2 disables the use of ACPI. Defaults to 0x0.
	<i>mmu-modlist</i>	A colon-separated list of candidate modules that implement memory management. If <i>mmu-modlist</i> is defined, it overrides the default list derived from the memory configuration on x86 based

NVRAM CONFIGURATION PARAMETERS

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systems. Instead, the first module in the list that is found in `/platform/platform-name/kernel/mmu` is used.

Not all OpenBoot systems support all parameters. Defaults vary depending on the system and the PROM revision. See the output in the "Default Value" column of the `printenv` command, as entered at the `ok` (OpenBoot) prompt, to determine the default for your system.

`auto-boot?`

If `true`, boots automatically after power-on or reset. Defaults to `true`.

`ansi-terminal?`

Configuration variable used to control the behavior of the terminal emulator. The value `false` makes the terminal emulator stop interpreting ANSI escape sequences; instead, echoes them to the output device. Defaults to `true`.

`boot-command`

Command executed if `auto-boot?` is `true`. Defaults to `boot`.

`boot-device`

Device from which to boot. *boot-device* may contain 0 or more device specifiers separated by spaces. Each device specifier may be either a prom device alias or a prom device path. The boot prom will attempt to open each successive device specifier in the list beginning with the first device specifier. The first device specifier that opens successfully will be used as the device to boot from. Defaults to `disk` or `net`.

`boot-file`

File to boot (an empty string lets the secondary booter choose default). Defaults to empty string.

`boot-from`

Boot device and file (OpenBoot PROM version 1.x only). Defaults to `vmunix`.

`boot-from-diag`

Diagnostic boot device and file (OpenBoot PROM version 1.x only). Defaults to `le( )unix`.

`comX-noprobe`

Where *X* is the number of the serial port, prevents device probe on serial port *X*.

`diag-device`

Diagnostic boot source device. Defaults to `net`.

`diag-file`

File from which to boot in diagnostic mode. Defaults to empty string.

`diag-level`

Diagnostics level. Values include `off`, `min`, `max` and `menus`. There may be additional platform-specific values. When set to `off`, POST is not called. If POST is called, the value is made available as an argument to, and is interpreted by POST. Defaults to platform-dependent.

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diag-switch?

If `true`, run in diagnostic mode. Defaults to `false` on most desktop systems, `true` on most servers.

error-reset-recovery

Recover after an error reset trap. Defaults to platform-specific setting.

On platforms supporting this variable, it replaces the `watchdog-reboot?`, `watchdog-sync?`, `redmode-reboot?`, `redmode-sync?`, `sir-sync?`, and `xir-sync?` parameters.

The options are:

- `none` Print a message describing the reset trap and go to OpenBoot PROM's user interface, *aka* OK prompt.
- `sync` Invoke OpenBoot PROM's `sync` word after the reset trap. Some platforms may treat this as `none` after an externally initiated reset (XIR) trap.
- `boot` Reboot after the reset trap. Some platforms may treat this as `none` after an XIR trap.

fcode-debug?

If `true`, include name parameter for plug-in device FCodes. Defaults to `false`.

hardware-revision

System version information.

input-device

Input device used at power-on (usually keyboard, `tttya`, or `tttyb`). Defaults to keyboard.

keyboard-click?

If `true`, enable keyboard click. Defaults to `false`.

keymap

Keymap for custom keyboard.

last-hardware-update

System update information.

load-base

Default load address for client programs. Default value is 16384.

local-mac-address?

If `true`, network drivers use their own MAC address, not the system's. Defaults to `false`.

mfg-mode

Manufacturing mode argument for POST. Possible values include `off` or `chamber`. The value is passed as an argument to POST. Defaults to `off`.

mfg-switch?

If `true`, repeat system self-tests until interrupted with STOP-A. Defaults to `false`.

nvrामrc

Contents of NVRAMRC. Defaults to empty.

network-boot-arguments

Arguments to be used by the PROM for network booting. Defaults to an empty string. `network-boot-arguments` can be used to specify the boot protocol (RARP/DHCP) to be used and a range of system knowledge to be used in the process.

The syntax for arguments supported for network booting is:

```
[protocol,] [key=value,]*
```

All arguments are optional and can appear in any order. Commas are required unless the argument is at the end of the list. If specified, an argument takes precedence over any default values, or, if booting using DHCP, over configuration information provided by a DHCP server for those parameters.

protocol, above, specifies the address discovery protocol to be used.

Configuration parameters, listed below, are specified as *key=value* attribute pairs.

tftp-server

IP address of the TFTP server

file

file to download using TFTP or URL for WAN boot

host-ip

IP address of the client (in dotted-decimal notation)

router-ip

IP address of the default router (in dotted-decimal notation)

subnet-mask

subnet mask (in dotted-decimal notation)

client-id

DHCP client identifier

hostname

hostname to use in DHCP transactions

http-proxy

HTTP proxy server specification (IPADDR[:PORT])

tftp-retries

maximum number of TFTP retries

dhcp-retries

maximum number of DHCP retries

If no parameters are specified (that is, `network-boot-arguments` is an empty string), the PROM will use the platform-specific default address discovery protocol.

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Absence of the protocol parameter when other configuration parameters are specified implies manual configuration.

Manual configuration requires that the client be provided with all the information necessary for boot. If using manual configuration, information required by the PROM to load the second-stage boot program must be provided in `network-boot-arguments` while information required for the second-stage boot program can be specified either as arguments to the `boot` program or by means of the `boot` program's interactive command interpreter.

Information required by the PROM when using manual configuration includes the booting client's IP address, name of the boot file, and the address of the server providing the boot file image. Depending on network configuration, it might be required that the subnet mask and address of the default router to use also be specified.

`oem-banner`

Custom OEM banner (enabled by setting `oem-banner?` to `true`). Defaults to empty string.

`oem-banner?`

If `true`, use custom OEM banner. Defaults to `false`.

`oem-logo`

Byte array custom OEM logo (enabled by setting `oem-logo?` to `true`). Displayed in hexadecimal.

`oem-logo?`

If `true`, use custom OEM logo (else, use Sun logo). Defaults to `false`.

`output-device`

Output device used at power-on (usually `screen`, `ttya`, or `ttyb`). Defaults to `screen`.

`redmode-reboot?`

Specify `true` to reboot after a redmode reset trap. Defaults to `true`. (Sun Enterprise 10000 only.)

`redmode-sync?`

Specify `true` to invoke OpenBoot PROM's `sync` word after a redmode reset trap. Defaults to `false`. (Sun Enterprise 10000 only.)

`sbus-probe-list`

Designate which SBus slots are probed and in what order. Defaults to `0123`.

`screen-#columns`

Number of on-screen columns (characters/line). Defaults to `80`.

`screen-#rows`

Number of on-screen rows (lines). Defaults to `34`.

`scsi-initiator-id`

SCSI bus address of host adapter, range `0-7`. Defaults to `7`.

sd-targets

Map SCSI disk units (OpenBoot PROM version 1.x only). Defaults to 31204567, which means that unit 0 maps to target 3, unit 1 maps to target 1, and so on.

security-#badlogins

Number of incorrect security password attempts. This property has no special meaning or behavior on x86 based systems.

security-mode

Firmware security level (options: none, command, or full). If set to command or full, system will prompt for PROM security password. Defaults to none. This property has no special meaning or behavior on x86 based systems.

security-password

Firmware security password (never displayed). Can be set only when security-mode is set to command or full. This property has no special meaning or behavior on x86 based systems.

```
example# eeprom security-password=
Changing PROM password:
New password:
Retype new password:
```

selftest-#megs

Megabytes of RAM to test. Ignored if diag-switch? is true. Defaults to 1.

sir-sync?

Specify true to invoke OpenBoot PROM's sync word after a software-initiated reset (SIR) trap. Defaults to false. (Sun Enterprise 10000 only.)

skip-vme-loopback?

If true, POST does not do VMEbus loopback tests. Defaults to false.

st-targets

Map SCSI tape units (OpenBoot PROM version 1.x only). Defaults to 45670123, which means that unit 0 maps to target 4, unit 1 maps to target 5, and so on.

sunmon-compat?

If true, display Restricted Monitor prompt (>). Defaults to false.

testarea

One-byte scratch field, available for read/write test. Defaults to 0.

tpe-link-test?

Enable 10baseT link test for built-in twisted pair Ethernet. Defaults to true.

ttya-mode

TTYA (baud rate, #bits, parity, #stop, handshake). Defaults to 9600, 8, n, 1, -.

Fields, in left-to-right order, are:

Baud rate: 110, 300, 1200, 4800, 9600 . . .

Data bits: 5, 6, 7, 8

eeeprom(1M)

Parity: n(none), e(even), o(odd), m(mark), s(space)
Stop bits: 1, 1.5, 2
Handshake: –(none), h(hardware:rts/cts), s(software:xon/xoff)

tttyb-mode

TTYB (baud rate, #bits, parity, #stop, handshake). Defaults to 9600, 8, n, 1, –.

Fields, in left-to-right order, are:

Baud rate: 110, 300, 1200, 4800, 9600 . . .
Data bits: 5, 6, 7, 8
Stop bits: 1, 1.5, 2
Parity: n(none), e(even), o(odd), m(mark), s(space)
Handshake: –(none), h(hardware:rts/cts), s(software:xon/xoff)

tttya-ignore-cd

If true, operating system ignores carrier-detect on TTYA. Defaults to true.

tttyb-ignore-cd

If true, operating system ignores carrier-detect on TTYB. Defaults to true.

tttya-rts-dtr-off

If true, operating system does not assert DTR and RTS on TTYA. Defaults to false.

tttyb-rts-dtr-off

If true, operating system does not assert DTR and RTS on TTYB. Defaults to false.

use-nvramrc?

If true, execute commands in NVRAMRC during system start-up. Defaults to false.

version2?

If true, hybrid (1.x/2.x) PROM comes up in version 2.x. Defaults to true.

watchdog-reboot?

If true, reboot after watchdog reset. Defaults to false.

watchdog-sync?

Specify true to invoke OpenBoot PROM's sync word after a watchdog reset trap. Defaults to false. (Sun Enterprise 10000 only.)

xir-sync?

Specify true to invoke OpenBoot PROM's sync word after an XIR trap. Defaults to false. (Sun Enterprise 10000 only.)

EXAMPLES

EXAMPLE 1 Changing the Number of Megabytes of RAM.

The following example demonstrates the method for changing from one to two the number of megabytes of RAM that the system will test.

EXAMPLE 1 Changing the Number of Megabytes of RAM. (Continued)

```
example# eeprom selftest-#megs
selftest-#megs=1

example# eeprom selftest-#megs=2

example# eeprom selftest-#megs
selftest-#megs=2
```

EXAMPLE 2 Setting the auto-boot? Parameter to true.

The following example demonstrates the method for setting the auto-boot? parameter to true.

```
example# eeprom auto-boot?=true
```

When the eeprom command is executed in user mode, the parameters with a trailing question mark (?) need to be enclosed in double quotation marks (" ") to prevent the shell from interpreting the question mark. Preceding the question mark with an escape character (\) will also prevent the shell from interpreting the question mark.

```
example% eeprom "auto-boot?"=true
```

EXAMPLE 3 Enabling and Disabling PAE Mode

Certain IA machines support Physical Address Extension (PAE) mode. To enable and disable PAE mode on these machines, use commands such as those below.

To enable PAE mode:

```
example# eeprom mmu-modlist=mmu36
```

To disable PAE mode:

```
example# eeprom mmu-modlist=mmu32
```

The commands take effect following your next reboot.

EXAMPLE 4 Using network-boot-arguments

To use DHCP as the boot protocol and a hostname of abcd.sun.com for network booting, set these values in network-boot-arguments as:

```
example# eeprom network-boot-arguments="dhcp,hostname=abcd.sun.com"
```

...then boot using the command:

```
ok boot net
```

Note that network boot arguments specified from the PROM command line cause the contents of network-boot-arguments to be ignored. For example, with network-boot-arguments set as shown above, the boot command:

eeeprom(1M)

EXAMPLE 4 Using network-boot-arguments (Continued)

```
ok boot net:dhcp
```

...causes DHCP to be used, but the hostname specified in network-boot-arguments will not be used during network boot.

FILES

/dev/openprom
Device file

/usr/platform/*platform-name*/sbin/eeeprom
Platform-specific version of eeeprom. Use `uname -i` to obtain *platform-name*.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

passwd(1), boot(1M), init(1M), sh(1), uname(1), attributes(5)

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NAME	efdaemon – embedded FCode interpreter daemon				
SYNOPSIS	<code>/usr/lib/efcode/sparcv9/efdaemon</code> [-d]				
DESCRIPTION	efdaemon, the embedded FCode interpreter daemon, invokes the embedded FCode interpreter when the daemon receives an interpretation request. A new session of the interpreter is started for each unique request by invoking the script <code>/usr/lib/efcode/efcode</code>. efdaemon is used on selected platforms as part of the processing of some dynamic reconfiguration events.				
OPTIONS	The following option is supported: -d Set debug output. Log debug messages as LOG_DEBUG level messages by using <code>syslog()</code>. See <code>syslog(3C)</code>.				
FILES	<code>/dev/fcode</code> FCode interpreter pseudo device, which is a portal for receipt of FCode interpretation requests <code>/usr/lib/efcode/efcode</code> Shell script that invokes the embedded FCode interpreter <code>/usr/lib/efcode/interpreter</code> Embedded FCode interpreter <code>/usr/lib/efcode/sparcv9/interpreter</code> Embedded FCode interpreter				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWefcx, SUNWefcux, SUNWefcr, SUNWefclx</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWefcx, SUNWefcux, SUNWefcr, SUNWefclx
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWefcx, SUNWefcux, SUNWefcr, SUNWefclx				
SEE ALSO	<code>prtconf(1M)</code> , <code>syslog(3C)</code> , <code>attributes(5)</code>				

etrn(1M)

NAME	etrn – start mail queue run
SYNOPSIS	etrn [-v] <i>server-host</i> [<i>client-hosts</i>]
DESCRIPTION	SMTP's ETRN command allows an SMTP client and server to interact, giving the server an opportunity to start the processing of its queues for messages to go to a given host. This is meant to be used in start-up conditions, as well as for mail nodes that have transient connections to their service providers. The <i>etrn</i> utility initiates an SMTP session with the host <i>server-host</i> and sends one or more ETRN commands as follows: If no <i>client-hosts</i> are specified, <i>etrn</i> looks up every host name for which <i>sendmail</i>(1M) accepts email and, for each name, sends an ETRN command with that name as the argument. If any <i>client-hosts</i> are specified, <i>etrn</i> uses each of these as arguments for successive ETRN commands.
OPTIONS	The following option is supported: -v The normal mode of operation for <i>etrn</i> is to do all of its work silently. The -v option makes it verbose, which causes <i>etrn</i> to display its conversations with the remote SMTP server.
ENVIRONMENT VARIABLES	No environment variables are used. However, at system start-up, <i>/etc/init.d/sendmail</i> reads <i>/etc/default/sendmail</i>. In this file, if the variable ETRN_HOSTS is set, <i>/etc/init.d/sendmail</i> parses this variable and invokes <i>etrn</i> appropriately. ETRN_HOSTS should be of the form: <pre>"s1:c1.1,c1.2 s2:c2.1 s3:c3.1,c3.2,c3.3"</pre> That is, white-space separated groups of <i>server:client</i> where <i>client</i> can be one or more comma-separated names. The <i>:client</i> part is optional. <i>server</i> is the name of the server to prod; a mail queue run is requested for each <i>client</i> name. This is comparable to running: <pre>/usr/lib/sendmail -qR client</pre> on the host <i>server</i>.
EXAMPLES	EXAMPLE 1 Using <i>etrn</i> Inserting the line: <pre>ETRN_HOSTS="s1.domain.com:clnt.domain.com s2.domain.com:clnt.domain.com"</pre> in <i>/etc/default/sendmail</i> results in <i>/etc/init.d/sendmail</i> invoking <i>etrn</i> such that ETRN commands are sent to both <i>s1.domain.com</i> and <i>s2.domain.com</i>, with both having <i>clnt.domain.com</i> as the ETRN argument. The line: <pre>ETRN_HOSTS="server.domain.com:client1.domain.com,client2.domain.com"</pre>

EXAMPLE 1 Using etrn (Continued)

results in two ETRN commands being sent to `server.domain.com`, one with the argument `client1.domain.com`, the other with the argument `client2.domain.com`.

The line:

```
ETRN_HOSTS="server1.domain.com server2.domain.com"
```

results in set of a ETRN commands being sent to both `server1.domain.com` and `server2.domain.com`; each set contains one ETRN command for each host name for which `sendmail(1M)` accepts email, with that host name as the argument.

FILES `/etc/mail/sendmail.cf`
sendmail configuration file

`/etc/default/sendmail`
Variables used by `/etc/init.d/sendmail`

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWsndmu

SEE ALSO `sendmail(1M)`, RFC 1985.

CAVEATS Not all SMTP servers support ETRN.

fbconfig(1M)

NAME	fbconfig – Frame Buffer configuration utility										
SYNOPSIS	fbconfig [-list -help] fbconfig [-dev <i>device_filename</i>] [-prconf] [-propt] [-res] fbconfig [-dev <i>device_filename</i>] [-res <i>resolution-specification</i>] <i>device_specific_options</i>										
DESCRIPTION	fbconfig is the generic command line interface to query and configure frame buffer attributes. The following form of fbconfig is the interface for the device independent operations performed by fbconfig: fbconfig [-list -help] The following form of fbconfig is the interface for configuring a frame buffer: fbconfig [-dev <i>device_filename</i>] [-prconf] [-propt] [-res] If the -dev option is omitted, the default frame buffer (/dev/fb or /dev/fb0) is assumed. In the absence of specific options, the response will depend upon the device specific configuration program and how it responds to no options										
OPTIONS	The following options are supported: -dev <i>device_filename</i> Specify the FFB special file. The default is /dev/fbs/ffb0. -help Print the fbconfig command usage summary. This is the default option. -list Print the list of installed frame buffers and associated device specific configuration routines. <table> <tr> <th>Device Filename</th><th>Specific Config Program</th></tr> <tr> <td>/dev/fbs/ffb0</td><td>SUNWffb_config</td></tr> <tr> <td>/dev/fbs/ffb1</td><td>SUNWffb_config</td></tr> <tr> <td>/dev/fbs/m640</td><td>SUNWm64_config</td></tr> <tr> <td>/dev/fbs/cgsix0</td><td>not configurable</td></tr> </table> -prconf Print the current hardware configuration. -propt Print the current software configuration.	Device Filename	Specific Config Program	/dev/fbs/ffb0	SUNWffb_config	/dev/fbs/ffb1	SUNWffb_config	/dev/fbs/m640	SUNWm64_config	/dev/fbs/cgsix0	not configurable
Device Filename	Specific Config Program										
/dev/fbs/ffb0	SUNWffb_config										
/dev/fbs/ffb1	SUNWffb_config										
/dev/fbs/m640	SUNWm64_config										
/dev/fbs/cgsix0	not configurable										
OPERANDS	The following operands are supported: <i>device_specific_options</i> <i>device_specific_options</i> are specified in the format shown by the -help output, or the corresponding										

device-specific man page.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWfbc

SEE ALSO `SUNWgfb_config(1M)`, `SUNWifb_config(1M)`, `SUNWpfb_config(1M)`, `SUNWzulu_config(1M)`, `afbconfig(1M)`, `ffbconfig(1M)`, `m64config(1M)`, `pgxconfig(1M)`, `attributes(5)`

LIMITATIONS Because of limitations in the `m64` kernel driver and related software, `fbconfig` (with the `-prconf` option) is unable to distinguish between a current depth of 24 or 8+24. The `-propt` option returns the depth specified in the `OWconfig` file, which will be in effect following the next restart of the window system. The `xwininfo` utility, usually shipped in the package containing frame buffer software (such as `SUNWxwplt`), reports current depth of a specified window.

fdetach(1M)

NAME	fdetach – detach a name from a STREAMS-based file descriptor				
SYNOPSIS	fdetach <i>path</i>				
DESCRIPTION	The fdetach command detaches a STREAMS-based file descriptor from a name in the file system. Use the <i>path</i> operand to specify the path name of the object in the file system name space, which was previously attached. See fattach(3C). The user must be the owner of the file or a user with the appropriate privileges. All subsequent operations on <i>path</i> will operate on the underlying file system entry and not on the STREAMS file. The permissions and status of the entry are restored to the state they were in before the STREAMS file was attached to the entry.				
OPERANDS	The following operands are supported: <i>path</i> Specifies the the path name of the object in the file system name space, which was previously attached.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	fattach(3C), fdetach(3C), attributes(5), streamio(7I) <i>STREAMS Programming Guide</i>				

NAME	fdisk – create or modify fixed disk partition table
SYNOPSIS	<pre> fdisk [-o <i>offset</i>] [-s <i>size</i>] [-P <i>fill_patt</i>] [-S <i>geom_file</i>] [-w r d n I B t T g G R] [-F <i>fdisk_file</i>] [[-v] -W {<i>fdisk_file</i> -}] [-h] [-b <i>masterboot</i>] [-A <i>id</i> : <i>act</i> : <i>bhead</i> : <i>bsect</i> : <i>bcyl</i> : <i>ehhead</i> : <i>esect</i> : <i>ecyl</i> : <i>rsect</i> : <i>numsect</i>] [-D <i>id</i> : <i>act</i> : <i>bhead</i> : <i>bsect</i> : <i>bcyl</i> : <i>ehhead</i> : <i>esect</i> : <i>ecyl</i> : <i>rsect</i> : <i>numsect</i>] <i>rdevice</i> </pre>
DESCRIPTION	This command is used to create and modify the partition table, and to install the master boot (x86 only) record that is put in the first sector of the fixed disk. This table is used by the first-stage bootstrap (or firmware) to identify parts of the disk reserved for different operating systems, and to identify the partition containing the second-stage bootstrap (the <i>active</i> Solaris partition). The <i>rdevice</i> argument must be used to specify the raw device associated with the fixed disk, for example, <code>/dev/rdisk/c0t0d0p0</code>. The program can operate in three different modes. The first is interactive mode. In interactive mode, the program displays the partition table as it exists on the disk, and then presents a menu allowing the user to modify the table. The menu, questions, warnings, and error messages are intended to be self-explanatory. In interactive mode, if there is no partition table on the disk, the user is given the options of creating a default partitioning or specifying the initial table values. The default partitioning allocates the entire disk for the Solaris system and makes the Solaris system partition active. In either case, when the initial table is created, <i>fdisk</i> also writes out the first-stage bootstrap (x86 only) code along with the partition table. The second mode of operation is used for automated entry addition, entry deletion, or replacement of the entire <i>fdisk</i> table. This mode can add or delete an entry described on the command line. In this mode the entire <i>fdisk</i> table can be read in from a file replacing the original table. <i>fdisk</i> can also be used to create this file. There is a command line option that will cause <i>fdisk</i> to replace any <i>fdisk</i> table with the default of the whole disk for the Solaris system. The third mode of operation is used for disk diagnostics. In this mode, a section of the disk can be filled with a user specified pattern, and mode sections of the disk can also be read or written.
Menu Options	The menu options for interactive mode given by the <i>fdisk</i> program are: Create a partition This option allows the user to create a new partition. The maximum number of partitions is 4. The program will ask for the type of the partition (SOLARIS, MS-DOS, UNIX, or other). It will then ask for the size of the partition as a percentage of the disk. The user may also enter the letter <i>c</i> at this point, in which case the program will ask for the starting cylinder number and size of the partition in cylinders. If a <i>c</i> is not entered, the program will determine the starting cylinder number where the partition will fit. In either case, if the partition would overlap an existing partition or will not fit, a message is displayed and the program returns to the original menu.

fdisk(1M)

Change Active (Boot from) partition

This option allows the user to specify the partition where the first-stage bootstrap will look for the second-stage bootstrap, otherwise known as the *active* partition.

Delete a partition

This option allows the user to delete a previously created partition. Note that this will destroy all data in that partition.

Use the following options to include your modifications to the partition table at this time or to cancel the session without modifying the table:

Exit

This option writes the new version of the table created during this session with *fdisk* out to the fixed disk, and exits the program.

Cancel

This option exits without modifying the partition table.

OPTIONS

The following options apply to *fdisk*:

-A *id:act:bhead:bsect:bcyl:ehhead:esect:ecyl:rsect:numsect*

Add a partition as described by the argument (see the *-F* option below for the format). Use of this option will zero out the VTOC on the Solaris partition if the *fdisk* table changes.

-b *master_boot*

Specify the file *master_boot* as the master boot program. The default master boot program is */usr/lib/fs/ufs/mboot*.

-B

Default to one Solaris partition that uses the whole disk.

-d

Turn on verbose *debug* mode. This will cause *fdisk* to print its state on *stderr* as it is used. The output from this option should not be used with *-F*.

-D *id:act:bhead:bsect:bcyl:ehhead:esect:ecyl:rsect:numsect*

Delete a partition as described by the argument (see the *-F* option below for the format). Note that the argument must be an exact match or the entry will not be deleted! Use of this option will zero out the VTOC on the Solaris partition if the *fdisk* table changes.

-F *fdisk_file*

Use *fdisk* file *fdisk_file* to initialize table. Use of this option will zero out the VTOC on the Solaris partition if the *fdisk* table changes.

The *fdisk_file* contains up to four specification lines. Each line is delimited by a new-line character (*\n*). If the first character of a line is an asterisk (*), the line is treated as a comment. Each line is composed of entries that are position-dependent, are separated by "white space" or colons, and have the following format:

id act bhead bsect bcyl ehhead esect ecyl rsect numsect

where the entries have the following values:

<i>id</i>	This is the type of partition and the correct numeric values may be found in <code>fdisk.h</code> .
<i>act</i>	This is the active partition flag; 0 means not active and 128 means active.
<i>bhead</i>	This is the head where the partition starts. If this is set to 0, <code>fdisk</code> will correctly fill this in from other information.
<i>bsect</i>	This is the sector where the partition starts. If this is set to 0, <code>fdisk</code> will correctly fill this in from other information.
<i>bcyl</i>	This is the cylinder where the partition starts. If this is set to 0, <code>fdisk</code> will correctly fill this in from other information.
<i>ehhead</i>	This is the head where the partition ends. If this is set to 0, <code>fdisk</code> will correctly fill this in from other information.
<i>esect</i>	This is the sector where the partition ends. If this is set to 0, <code>fdisk</code> will correctly fill this in from other information.
<i>ecyl</i>	This is the cylinder where the partition ends. If this is set to 0, <code>fdisk</code> will correctly fill this in from other information.
<i>rsect</i>	The relative sector from the beginning of the disk where the partition starts. This must be specified and can be used by <code>fdisk</code> to fill in other fields.
<i>numsect</i>	The size in sectors of this disk partition. This must be specified and can be used by <code>fdisk</code> to fill in other fields.

- g
Get the label geometry for disk and display on stdout (see the -S option for the format).
- G
Get the physical geometry for disk and display on stdout (see the -S option for the format).
- h
Issue verbose message; message will list all options and supply an explanation for each.
- I
Forgo device checks. This is used to generate a file image of what would go on a disk without using the device. Note that you must use -S with this option (see above).
- n
Don't update `fdisk` table unless explicitly specified by another option. If no other options are used, -n will only write the master boot record to the disk. In addition, note that `fdisk` will not come up in interactive mode if the -n option is specified.

fdisk(1M)

- o *offset*
Block offset from start of disk. This option is used for -P, -r, and -w. Zero is assumed when this option is not used.
- P *fill_patt*
Fill disk with pattern *fill_patt*. *fill_patt* can be decimal or hex and is used as number for constant long word pattern. If *fill_patt* is #, then pattern is block # for each block. Pattern is put in each block as long words and fills each block (see -o and -s).
- r
Read from disk and write to stdout. See -o and -s, which specify the starting point and size of the operation.
- R
Treat disk as read-only. This is for testing purposes.
- s *size*
Number of blocks to perform operation on (see -o).
- S *geom_file*
Set the label geometry to the content of the *geom_file*. The *geom_file* contains one specification line. Each line is delimited by a new-line character (\n). If the first character of a line is an asterisk (*), the line is treated as a comment. Each line is composed of entries that are position-dependent, are separated by white space, and have the following format:

pcyl ncyl acyl bcyl nheads nsectors sectsiz

where the entries have the following values:

<i>pcyl</i>	This is the number of physical cylinders for the drive.
<i>ncyl</i>	This is the number of usable cylinders for the drive.
<i>acyl</i>	This is the number of alt cylinders for the drive.
<i>bcyl</i>	This is the number of offset cylinders for the drive (should be zero).
<i>nheads</i>	The number of heads for this drive.
<i>nsectors</i>	The number of sectors per track.
<i>sectsiz</i>	The size in bytes of a sector.
- t
Adjust incorrect slice table entries so that they will not cross partition table boundaries.
- T
Remove incorrect slice table entries that span partition table boundaries.

- v
Output the HBA (virtual) geometry dimensions. This option must be used in conjunction with the -w flag. This option will work for platforms which support virtual geometry. (x86 only)
- w
Write to disk and read from stdin. See -o and -s, which specify the starting point and size of the operation.
- W -
Output the disk table to stdout.
- w *fdisk_file*
Create an fdisk file *fdisk_file* from disk table. This can be used with the -F option below.

FILES /dev/rdisk/c0t0d0p0 Raw device associated with the fixed disk.
 /usr/lib/fs/ufs/mboot Default master boot program.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	x86
Availability	SUNWcsu

SEE ALSO uname(1), fmthard(1M), prtvtoc(1M) attributes(5)

DIAGNOSTICS Most messages will be self-explanatory. The following may appear immediately after starting the program:

Fdisk: cannot open <device>

This indicates that the device name argument is not valid.

Fdisk: unable to get device parameters for device <device>

This indicates a problem with the configuration of the fixed disk, or an error in the fixed disk driver.

Fdisk: error reading partition table

This indicates that some error occurred when trying initially to read the fixed disk. This could be a problem with the fixed disk controller or driver, or with the configuration of the fixed disk.

Fdisk: error writing boot record

This indicates that some error occurred when trying to write the new partition table out to the fixed disk. This could be a problem with the fixed disk controller, the disk itself, the driver, or the configuration of the fixed disk.

ff(1M)

NAME	ff – list file names and statistics for a file system	
SYNOPSIS	ff [-F <i>FSType</i>] [-V] [<i>generic_options</i>] [-o <i>specific_options</i>] <i>special</i> ...	
DESCRIPTION	ff prints the pathnames and inode numbers of files in the file system which resides on the special device <i>special</i>. Other information about the files may be printed using options described below. Selection criteria may be used to instruct ff to only print information for certain files. If no selection criteria are specified, information for all files considered will be printed (the default); the -i option may be used to limit files to those whose inodes are specified. Output is sorted in ascending inode number order. The default line produced by ff is: <i>path-name</i> i-number The maximum information the command will provide is: <i>path-name</i> i-number size uid	
OPTIONS	-F	Specify the <i>FSType</i> on which to operate. The <i>FSType</i> should either be specified here or be determinable from <i>/etc/vfstab</i> by matching the <i>special</i> with an entry in the table, or by consulting <i>/etc/default/fs</i> .
	-V	Echo the complete command line, but do not execute the command. The command line is generated by using the options and arguments provided by the user and adding to them information derived from <i>/etc/vfstab</i> . This option may be used to verify and validate the command line.
	<i>generic_options</i>	Options that are supported by most <i>FSType</i> -specific modules of the command. The following options are available:
	-I	Do not print the i-node number after each path name.
	-l	Generate a supplementary list of all path names for multiply-linked files.
	-p <i>prefix</i>	The specified <i>prefix</i> will be added to each generated path name. The default is '.' (dot).
	-s	Print the file size, in bytes, after each path name.
	-u	Print the owner's login name after each path name.

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	-a -n	Select if the file has been accessed in <i>n</i> days.				
	-m -n	Select if the file has been written or created in <i>n</i> days.				
	-c -n	Select if file’s status has been changed in <i>n</i> days.				
	-n <i>file</i>	Select if the file has been modified more recently than the argument file.				
	-i <i>i-node-list</i>	Generate names for only those i-nodes specified in <i>i-node-list</i> . <i>i-node-list</i> is a list of numbers separated by commas (with no intervening spaces).				
	-o	Specify <i>FSType</i> -specific options in a comma separated (without spaces) list of suboptions and keyword-attribute pairs for interpretation by the <i>FSType</i> -specific module of the command.				
OPERANDS	<i>special</i>	A special device.				
USAGE	See <code>largefile(5)</code> for the description of the behavior of <code>ff</code> when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).					
FILES	<code>/etc/default/fs</code>	default local file system type. Default values can be set for the following flags in <code>/etc/default/fs</code> . For example: <code>LOCAL=ufs</code>				
	<code>LOCAL</code>	The default partition for a command if no <i>FSType</i> is specified.				
	<code>/etc/vfstab</code>	list of default parameters for each file system				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:					
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE					
Availability	SUNWcsu					
SEE ALSO	<code>find(1)</code> , <code>ncheck(1M)</code> , <code>stat(2)</code> , <code>vfstab(4)</code> , <code>attributes(5)</code> , <code>largefile(5)</code> Manual pages for the <i>FSType</i> -specific modules of <code>ff</code> .					
NOTES	This command may not be supported for all <i>FSTypes</i> . The <code>-a</code> , <code>-m</code> , and <code>-c</code> flags examine the <code>st_atime</code> , <code>st_mtime</code> , and <code>st_ctime</code> fields of the <code>stat</code> structure respectively. (See <code>stat(2)</code> .)					

ffbconfig(1M)

NAME	ffbconfig, SUNWffb_config – configure the FFB Graphics Accelerator
SYNOPSIS	<pre> /usr/sbin/ffbconfig [-dev <i>device-filename</i>] [-res <i>video-mode</i> [now try] [noconfirm nocheck]] [-file machine system] [-deflinear true false] [-defoverlay true false] [-linearorder first last] [-overlayorder first last] [-expvis enable disable] [-sov enable disable] [-maxwids <i>n</i>] [-extovl enable disable] [-g <i>gamma-correction-value</i>] [-gfile <i>gamma-correction-file</i>] [-propt] [-prconf] [-defaults] /usr/sbin/ffbconfig [-propt] [-prconf] /usr/sbin/ffbconfig [-help] [-res ?] </pre>
DESCRIPTION	ffbconfig configures the FFB Graphics Accelerator and some of the X11 window system defaults for FFB. The first form of ffbconfig stores the specified options in the OWconfig file. These options will be used to initialize the FFB device the next time the window system is run on that device. Updating options in the OWconfig file provides persistence of these options across window system sessions and system reboots. The second and third forms of ffbconfig, which invoke only the -prconf, -propt, -help, and -res ? options do not update the OWconfig file. Additionally, for the third form all other options are ignored. Options may be specified for only one FFB device at a time. Specifying options for multiple FFB devices requires multiple invocations of ffbconfig. Only FFB-specific options can be specified through ffbconfig. The normal window system options for specifying default depth, default visual class and so forth are still specified as device modifiers on the openwin command line. See the <i>OpenWindows Desktop Reference Manual</i> for details. The user can also specify the OWconfig file that is to be updated. By default, the machine-specific file in the /etc/openwin directory tree is updated. The -file option can be used to specify an alternate file to use. For example, the system-global OWconfig file in the /usr/openwin directory tree can be updated instead. Both of these standard OWconfig files can only be written by root. Consequently, the ffbconfig program, which is owned by the root user, always runs with setuid root permission.
OPTIONS	<pre> -dev <i>device-filename</i> Specifies the FFB special file. The default is /dev/fbs/ffb0. -file <i>machine</i> <i>system</i> Specifies which OWconfig file to update. If machine, the machine-specific OWconfig file in the /etc/openwin directory tree is used. If system, the global OWconfig file in the /usr/openwin directory tree is used. If the file does not exist, it is created. </pre>

`-res video-mode [now | try [noconfirm | nocheck]]`

Specifies the video mode used to drive the monitor connected to the specified FFB device.

video-mode has the format of *widthxheightxrate* where *width* is the screen width in pixels, *height* is the screen height in pixels, and *rate* is the vertical frequency of the screen refresh.

The *s* suffix, as in 960x680x112*s* and 960x680x108*s*, indicates stereo video modes. The *i* suffix, as in 640x480x60*i* and 768x575x50*i*, indicates interlaced video timing. If absent, non-interlaced timing will be used.

`-res` (the third form in the SYNOPSIS) also accepts formats with @ (at sign) in front of the refresh rate instead of *x*. 1280x1024@76 is an example of this format.

Some video-modes are supported only on certain revisions of FFB. Also, some video-modes, supported by FFB, may not be supported by the monitor. The list of video-modes supported by the FFB device and the monitor can be obtained by running `ffbconfig` with the `-res ?` option.

The following table lists all possible video modes supported on FFB:

Name	Description
1024x768x60	
1024x768x70	
1024x768x75	
1024x768x77	
1024x800x84	
1152x900x66	
1152x900x76	
1280x800x76	
1280x1024x60	
1280x1024x67	
1280x1024x76	
960x680x112s	(stereo)
960x680x108s	(stereo)
640x480x60	
640x480x60i	(interlaced)

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Name	Description
768x575x50i	(interlaced)
1440x900x76	(hi-res)
1600x1000x66	(hi-res)
1600x1000x76i	(hi-res)
1600x1280x76	(hi-res)
1920x1080x72	(hi-res)
1920x1200x70	(hi-res)

Symbolic names

For convenience, some video modes have symbolic names defined for them. Instead of the form *widthxheightxrate*, one of these names may be supplied as the argument to `-res`. The meaning of the symbolic name `none` is that when the window system is run the screen resolution will be the video mode that is currently programmed in the device.

Name	Corresponding Video Mode
svga	1024x768x60
1152	1152x900x76
1280	1280x1024x76
stereo	960x680x112s
ntsc	640x480x60i
pal	768x575x50i
none	(video mode currently programmed in device)

The `-res` option also accepts additional, optional arguments immediately following the video mode specification. Any or all of these may be present.

now

Specifies that the FFB device will be immediately programmed to display this video mode, in addition to updating the video mode in the `OWconfig` file. This option is useful for changing the video mode before starting the window system.

It is inadvisable to use this suboption with `ffbconfig` while the configured device is being used (for example, while running the window system); unpredictable results may occur. To run `ffbconfig` with the `now` suboption, first bring the

window system down. If the `now` suboption is used within a window system session, the video mode will be changed immediately, but the width and height of the affected screen won't change until the window system is exited and re-entered. In addition, the system may not recognize changes in stereo mode. Consequently, this usage is strongly discouraged.

`noconfirm`

Instructs `ffconfig` to bypass confirmation and warning messages and to program the requested video mode anyway.

Using the `-res` option, the user could potentially put the system into an unusable state, a state where there is no video output. This can happen if there is ambiguity in the monitor sense codes for the particular code read. To reduce the chance of this, the default behavior of `ffconfig` is to print a warning message to this effect and to prompt the user to find out if it is okay to continue. This option is useful when `ffconfig` is being run from a shell script.

`nocheck`

Suspends normal error checking based on the monitor sense code. The video mode specified by the user will be accepted regardless of whether it is appropriate for the currently attached monitor. This option is useful if a different monitor is to be connected to the FFB device. Note: Use of this option implies `noconfirm` as well.

`try`

Programs the specified video mode on a trial basis. The user will be asked to confirm the video mode by typing `y` within 10 seconds. The user may also terminate the trial before 10 seconds are up by typing any character. Any character other than `y` or `RETURN` is considered a `no` and the previous video mode will be restored and `ffconfig` will not change the video mode in the `OWconfig` file and other options specified will still take effect. If a `RETURN` is pressed, the user is prompted for a yes or no answer on whether to keep the new video mode. This option implies the `now` suboption (see the warning note on the `now` suboption).

`-deflinear true | false`

FFB possesses two types of visuals: linear and nonlinear. Linear visuals are gamma corrected and nonlinear visuals are not. There are two visuals that have both linear and nonlinear versions: 24-bit TrueColor and 8-bit StaticGray.

`-deflinear true` sets the default visual to the linear visual that satisfies other specified default visual selection options. Specifically, the default visual selection options are those set by the `Xsun` (1) `defdepth` and `defclass` options. See *OpenWindows Desktop Reference Manual* for details.

`-deflinear false` (or if there is no linear visual that satisfies the other default visual selection options) sets the default visual to the non-linear visual as the default.

This option cannot be used when the `-defoverlay` option is present, because FFB does not possess a linear overlay visual.

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`-defoverlay true | false`

FFB provides an 8-bit PseudoColor visual whose pixels are disjoint from the rest of the FFB visuals. This is called the overlay visual. Windows created in this visual will not damage windows created in other visuals. The converse, however, is not true. Windows created in other visuals will damage overlay windows. This visual has 256 maxwids of opaque color values. See `-maxwids` in OPTIONS.

If `-defoverlay` is true, the overlay visual will be made the default visual. If `-defoverlay` is false, the nonoverlay visual that satisfies the other default visual selection options, such as `defdepth` and `defclass`, will be chosen as the default visual. See the *OpenWindows Desktop Reference Manual* for details.

Whenever `-defoverlay true` is used, the default depth and class chosen on the `openwin` command line must be 8-bit PseudoColor. If not, a warning message will be printed and the `-defoverlay` option will be treated as false. This option cannot be used when the `-deflinear` option is present, because FFB doesn't possess a linear overlay visual.

`-linearorder first | last`

If `first`, linear visuals will come before their non-linear counterparts on the X11 screen visual list for the FFB screen. If `last`, the nonlinear visuals will come before the linear ones.

`-overlayorder first | last`

If true, the depth 8 PseudoColor Overlay visual will come before the non-overlay visual on the X11 screen visual list for the FFB screen. If false, the non-overlay visual will come before the overlay one.

`-expvis enable | disable`

If enabled, OpenGL Visual Expansion will be activated. Multiple instances of selected visual groups (8-bit PseudoColor, 24-bit TrueColor and so forth) can be found in the screen visual list.

`-sov enable | disable`

Advertises the root window's `SERVER_OVERLAY_VISUALS` property. SOV visuals will be exported and their transparent types, values and layers can be retrieved through this property. If `-sov disable` is specified, the `SERVER_OVERLAY_VISUALS` property will not be defined. SOV visuals will not be exported.

`-maxwids n`

Specifies the maximum number of FFB X channel pixel values that are reserved for use as window sIDs (WIDs). The remainder of the pixel values in overlay colormaps are used for normal X11 opaque color pixels. The reserved WIDs are allocated on a first-come first-serve basis by 3D graphics windows (such as XGL), MBX windows, and windows that have a non-default visual. The X channel codes 0 to $(255-n)$ will be opaque color pixels. The X channel codes $(255-n+1)$ to 255 will be reserved for use as WIDs. Legal values on FFB, FFB2 are: 1, 2, 4, 8, 16, and 32. Legal values on FFB2+ are: 1, 2, 4, 8, 16, 32, and 64.

-extovl enable | disable

This option is available only on FFB2+. If enabled, extended overlay is available. The overlay visuals will have 256 opaque colors. The SOV visuals will have 255 opaque colors and 1 transparent color. This option enables hardware supported transparency which provides better performance for windows using the SOV visuals.

-g *gamma-correction value*

This option is available only on FFB2+. This option allows changing the gamma correction value. All linear visuals provide gamma correction. By default the gamma correction value is 2.22. Any value less than zero is illegal. The gamma correction value is applied to the linear visual, which then has an effective gamma value of 1.0, which is the value returned by `XSolarisGetVisualGamma(3)`. See `XSolarisGetVisualGamma(3)` for a description of that function.

This option can be used while the window system is running. Changing the gamma correction value will affect all the windows being displayed using the linear visuals.

-gfile *gamma-correction file*

This option is available only on FFB2+. This option loads gamma correction table from the specified file. This file should be formatted to provide the gamma correction values for R, G and B channels on each line. This file should provide 256 triplet values, each in hexadecimal format and separated by at least 1 space. Following is an example of this file:

```
0x00 0x00 0x00
0x01 0x01 0x01
0x02 0x02 0x02
...
...
0xff 0xff 0xff
```

Using this option, the gamma correction table can be loaded while the window system is running. The new gamma correction will affect all the windows being displayed using the linear visuals. Note, when gamma correction is being done using user specified table, the gamma correction value is undefined. By default, the window system assumes a gamma correction value of 2.22 and loads the gamma table it creates corresponding to this value.

-defaults

Resets all option values to their default values.

-propt

Prints the current values of all FFB options in the OWconfig file specified by the **-file** option for the device specified by the **-dev** option. Prints the values of options as they will be in the OWconfig file after the call to `ffbconfig` completes. The following is a typical display using the **-propt** option:

```
--- OpenWindows Configuration for /dev/fbs/ffb0 ---
OWconfig: machine
Video Mode: NONE
Default Visual: Non-Linear Normal Visual
```

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```
Visual Ordering: Linear Visuals are last
                  Overlay Visuals are last
OpenGL Visuals: disabled
SOV: disabled
Allocated WIDs: 32
```

-prconf

Prints the FFB hardware configuration. The following is a typical display using the -prconf option:

```
--- Hardware Configuration for /dev/fbs/ffb0 ---
Type: double-buffered FFB2 with Z-buffer
Board: rev x
PROM Information: @(#)ffb2.fth x.x xx/xx/xx
FBC: version x
DAC: Brooktree 9068, version x
3DRAM: Mitsubishi 1309, version x
EDID Data: Available - EDID version 1 revision x
Monitor Sense ID: 4 (Sun 37x29cm RGB color monitor)
Monitor possible resolutions: 1024x768x60, 1024x768x70,
                              1024x768x75, 1152x900x66, 1152x900x76,
                              1280x1024x67, 1280x1024x76, 960x680x112s,
                              640x480x60
Current resolution setting: 1280x1024x76
```

-help

Prints a list of the ffbconfig command line options, along with a brief explanation of each.

DEFAULTS

For a given invocation of ffbconfig command line if an option does not appear on the command line, the corresponding OWconfig option is not updated; it retains its previous value.

When the window system is run, if an FFB option has never been specified via ffbconfig, a default value is used. The option defaults are listed in the following table:

Option	Default
-dev	/dev/fbs/ffb0
-file	machine
-res	none
-deflinear	false
-defoverlay	false
-linearorder	last

Option	Default
-overlayorder	last
-expvis	enabled
-sov	enabled
-maxwids	32

The default for the `-res` option of none means that when the window system is run the screen resolution will be the video mode that is currently programmed in the device.

This provides compatibility for users who are used to specifying the device resolution through the PROM. On some devices (for example, GX) this is the only way of specifying the video mode. This means that the PROM ultimately determines the default FFB video mode.

EXAMPLES **EXAMPLE 1** Changing The Monitor Type

The following example switches the monitor type to the resolution of 1280 × 1024 at 76 Hz:

```
example% /usr/sbin/ffbconfig -res 1280x1024x76
```

FILES /dev/fbs/ffb0 device special file

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWffbcf

SEE ALSO mmap(2), attributes(5), fbio(7I), ffb(7D)

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ff_ufs(1M)

NAME	ff_ufs – list file names and statistics for a ufs file system				
SYNOPSIS	ff -F ufs [<i>generic_options</i>] [-o a,m,s] <i>special</i> ...				
DESCRIPTION	ff prints the pathnames and inode numbers of files in the file system which resides on the special device <i>special</i>. See ff(1M) for information regarding the ff command. See OPTIONS for information regarding the ufs-specific options.				
OPTIONS	The following options are supported: -o Specify ufs file system specific options. The following options available are: - a Print the '.' and '..' directory entries. - m Print mode information. This option must be specified in conjunction with the -i <i>i-node-list</i> option (see ff(1M)). - s Print only special files and files with set-user-ID mode.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	find(1), ff(1M), ncheck(1M), attributes(5)				

NAME	flar – administer flash archives				
SYNOPSIS	<pre> flar create -n <i>name</i> [-R <i>root</i>] [-A <i>system_image</i>] [-H] [-I] [-M] [-S] [-c] [-t [-p <i>posn</i>] [-b <i>blocksize</i>]] [-i <i>date</i>] [-u <i>section...</i>] [-m <i>master</i>] [-f [<i>filelist</i> -] [-F]] [-a <i>author</i>] [-e <i>descr</i> -E <i>descr_file</i>] [-T <i>type</i>] [-U <i>key=value...</i>] [-x <i>exclude...</i>] [-y <i>include...</i>] [-z <i>filelist...</i>] [-X <i>filelist...</i>] <i>archive</i> flar combine [-d <i>dir</i>] [-u <i>section...</i>] [-t [-p <i>posn</i>] [-b <i>blocksize</i>]] <i>archive</i> flar split [-d <i>dir</i>] [-u <i>section...</i>] [-f] [-S <i>section</i>] [-t [-p <i>posn</i>] [-b <i>blocksize</i>]] <i>archive</i> flar info [-l] [-k <i>keyword</i>] [-t [-p <i>posn</i>] [-b <i>blocksize</i>]] <i>archive</i> </pre>				
DESCRIPTION	The flar command is used to administer flash archives. A flash archive is an easily transportable version of a reference configuration of the Solaris operating environment, plus optional other software. Such an archive is used for the rapid installation of Solaris on large numbers of machines. You can create a flash archive using either flar with the create subcommand or the flarcreate(1M) command. See flash_archive(4). In flash terminology, a system on which an archive is created is called a <i>master</i>. The system image stored in the archive is deployed to systems that are called <i>clones</i>. There are two types of flash archives: full and differential. Both are created with the create subcommand. A full archive contains all the files that are in a system image. A differential archive contains only differences between two system images. Installation of a differential archive is faster and consumes fewer resources than installation of a full archive. In creating a differential archive, you compare two system images. A system image can be any of: ■ a Live Upgrade boot environment, mounted on some directory using lumount(1M) (see live_upgrade(5)) ■ a clone system mounted over NFS with root permissions ■ a full flash archive expanded into some local directory To explain the creation of a differential flash archive, the following terminology is used: <table style="width: 100%; border: none;"> <tr> <td style="vertical-align: top; width: 150px;"><i>old</i></td><td>The image prior to upgrade or other modification. This is likely the image as it was installed on clone systems.</td></tr> <tr> <td style="vertical-align: top;"><i>new</i></td><td>The old image, plus possible additions or changes and minus possible deletions. This is likely the image you want to duplicate on clone systems.</td></tr> </table> The flar command compares <i>old</i> and <i>new</i>, creating a differential archive as follows: ■ files on <i>new</i> that are not in <i>old</i> are added to the archive;	<i>old</i>	The image prior to upgrade or other modification. This is likely the image as it was installed on clone systems.	<i>new</i>	The old image, plus possible additions or changes and minus possible deletions. This is likely the image you want to duplicate on clone systems.
<i>old</i>	The image prior to upgrade or other modification. This is likely the image as it was installed on clone systems.				
<i>new</i>	The old image, plus possible additions or changes and minus possible deletions. This is likely the image you want to duplicate on clone systems.				

flar(1M)

- files of the same name that are different between *old* and *new* are taken from *new* and added to the archive;
- files that are in *old* and not in *new* are put in list of files to be deleted when the differential archive is installed on clone systems.

When creating a differential flash archive, the currently running image is, by default, the new image and a second image, specified with the `-A` option, is the old image. You can use the `-R` option to designate an image other than the currently running system as the new image. These options are described below.

You can run `flarcreate` in multi- or single-user mode. You can also use the command when the master system is booted from the first Solaris software CD or from a Solaris net image. Archive creation should be performed when the master system is in as stable a state as possible.

Following creation of a flash archive, you can use JumpStart to clone the archive on multiple systems.

The `flar` command includes subcommands for creating, combining, splitting, and providing information about archives. A subcommand is the first argument in a `flar` command line. These subcommands are as follows:

<code>create</code>	Create a new flash archive, of a name you specify with the <code>-n</code> argument, based on the currently running system. Use the <code>-A</code> option (described below) to create a differential flash archive.
<code>combine</code>	Combine the individual sections that make up an archive into the archive. If <i>dir</i> is specified (see <code>-d</code> option below), the sections will be gathered from <i>dir</i>; otherwise, they will be gathered from the current directory. Each section is assumed to be in a separate file, the names of which are the section names. At a minimum, the archive cookie (<code>cookie</code>), archive identification (<code>identification</code>), and archive files (<code>archive</code>) sections must be present. If <i>archive</i> is a directory, its contents are archived using <code>cpio</code> prior to inclusion in the archive. If so specified in the <code>identification</code> section, the contents are compressed. Note that no validation is performed on any of the sections. In particular, no fields in the <code>identification</code> section are validated or updated. See <code>flash_archive(4)</code> for a description of the archive sections.
<code>info</code>	Extract information on an archive. This subcommand is analogous to <code>pkginfo</code> .

split

Split an archive into one file for each section of the archive. Each section is copied into a separate file in *dir*, if *dir* is specified (see `-d` option below), or the current directory if it is not. The files resulting from the split are named after the sections. The archive cookie is stored in a file named `cookie`. If *section* is specified (see `-u` option below), only the named section is copied.

The create subcommand requires root privileges.

The options for each subcommand are described below.

OPTIONS

The create subcommand has one required argument:

-n *name*

name is supplied as the value of the `content_name` keyword. See `flash_archive(4)`.

The options for the create subcommand below. Many of these options supply values for keywords in the identification section of a file containing a flash archive. See `flash_archive(4)` for a description of these keywords.

-a *author*

author is used to provide an author name for the archive identification section of the new flash archive. If you do not specify `-a`, no author name is included in the identification section.

-A *system_image*

Create a differential flash archive by comparing a new system image (see `DESCRIPTION`) with the image specified by the *system_image* argument. By default, the new system image is the currently running system. You can change the default with the `-R` option, described below. *system_image* is a directory containing an image. It can be accessible through UFS, NFS, or `lumount(1M)`.

The rules for inclusion and exclusion of files in a differential archive are described in `DESCRIPTION`. You can modify the effect of these rules with the use of the `-x`, `-X`, `-y`, and `-z` options, described below.

-c

Compress the archive using `compress(1)`

-f *filelist*

Use the contents of *filelist* as a list of files to include in the archive. The files are included in addition to the normal file list, unless `-F` is specified (see below). If *filelist* is `-`, the list is taken from standard input.

-e *descr*

The description to be included in the archive as the value of the `content_description` archive identification key. This option is incompatible with `-E`.

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-E <i>descr_file</i>	The description to be used as the value of the archive identification <code>content_description</code> key is retrieved from the file <i>descr_file</i> . This option is incompatible with <code>-e</code> .
-F	Include only files in the list specified by <code>-f</code> . This option makes <code>-f filelist</code> an absolute list, rather than a list that is appended to the normal file list.
-H	Do not generate hash identifier.
-I	Ignore integrity check. To prevent you from excluding important system files from an archive, <code>flar</code> runs an integrity check. This check examines all files registered in a system package database and stops archive creation if any of them are excluded. Use this option to override this integrity check.
-i <i>date</i>	By default, the value for the <code>creation_date</code> field in the identification section is generated automatically, based on the current system time and date. If you specify the <code>-i</code> option, <i>date</i> is used instead.
-m <i>master</i>	By default, the value for the <code>creation_master</code> field in the identification section is the name of the system on which you run <code>flarcreate</code> , as reported by <code>uname -n</code> . If you specify <code>-m</code> , <i>master</i> is used instead.
-M	Used only when you are creating a differential flash archive. When creating a differential archive, <code>flar</code> creates a long list of the files in the system that remain the same, are changed, and are to be deleted on clone systems. This list is stored in the manifest section of the archive (see <code>flash_archive(4)</code>). When the differential archive is deployed, the flash software uses this list to perform a file-by-file check, ensuring the integrity of the clone system. Use of this option to avoids such a check and saves the space used by the manifest section in a differential archive. However, you must weigh the savings in time and disk space against the loss of an integrity check upon deployment. Because of this loss, use of this option is not recommended.
-R <i>root</i>	Create the archive from the file system tree rooted at <i>root</i> . If you do not specify this option, <code>flar</code> creates an archive from a file system rooted at <code>/</code> . When creating a differential flash archive, the system image specified by <code>-R</code> replaces the currently running system as the <i>new</i> image. See DESCRIPTION.

-S	Skip the disk space check and do not write archive size data to the archive. Without -S, flar builds a compressed archive in memory before writing the archive to disk, to ensure you have sufficient disk space. Use -S to skip this step. The result of the use of -S is a significant decrease in the time it takes to create an archive.
-T <i>type</i>	Content type included in the archive as the value of the <code>content_type</code> archive identification key. If you do not specify -T, the <code>content_type</code> keyword is not included.
-U <i>key=value...</i>	Include the user-defined keyword(s) and values in the archive identification section. See <code>flash_archive(4)</code> .
-u <i>section...</i>	Include the user-defined section located in the file <i>section</i> in the archive. <i>section</i> must be a blank-separated list of section names as described in <code>flash_archive(4)</code> .
-x <i>exclude ...</i>	Exclude the file or directory <i>exclude</i> from the archive. Note that the <i>exclude</i> file or directory is assumed to be relative to the alternate root specified using -R. If the parent directory of the file <i>exclude</i> is included with the -y option (see -y <i>include</i>), then only the specific file or directory specified by <i>exclude</i> is excluded. Conversely, if the parent directory of an included file is specified for exclusion, then only the file <i>include</i> is included. For example, if you specify: -x /a -y /a/b all of /a except for /a/b is excluded. If you specify: -y /a -x /a/b all of /a except for /a/b is included.
-y <i>include ...</i>	Include the file or directory <i>include</i> in the archive. Note that the <i>exclude</i> file or directory is assumed to be relative to the alternate root specified using -R. See the description of the -x option, above, for a description of the interaction of the -x and -y options.
-X <i>filelist ...</i>	Use the contents of <i>filelist</i> as a list of files to exclude from the archive. If <i>filelist</i> is -, the list is taken from standard input.
-z <i>filelist ...</i>	<i>filelist</i> is a list of files prefixed with a plus (+) or minus (-). A plus indicates that a file should be included in

the archive; the minus indicates exclusion. If *filelist* is *-*, the list is taken from standard input.

The options for `flar info` subcommand are as follows:

- `-k keyword` Only the value of the keyword *keyword* is returned.
- `-l` List all files in the archive. Does not process content from any sections other than the archive section.

The following are `flar info` options used with tape archives:

- `-b blocksize` The block size to be used when creating the archive. If not specified, a default block size of 64K is used.
- `-p posn` Specifies the position on the tape device where the archive should be created. If not specified, the current position of the tape device is examined.
- `-t` The archive to be analyzed is located on a tape device. The path to the device is specified by *archive* (see OPERANDS).

The options for `flar split` and `combine` (split and combine archives) subcommands are as follows:

- `-d dir` Retrieve sections from *dir*, rather than from the current directory.
- `-f` (Used with `split` only.) Extract the archive section into directory called *archive*, rather than placing it in a file of the same name as the section.
- `-S section` (Used with `split` only.) Extract only the section named *section* from the archive.
- `-u section...` Appends *section* to the list of sections to be included. The default list includes the *cookie*, *identification*, and *archive* sections. *section* can be a single section name or a space-separated list of section names.

The following options are used with tape archives (with both `split` and `combine`):

- `-b blocksize` The block size to be used when creating the archive. If not specified, a default block size of 64K is used.
- `-p posn` Used only with `-t`. Specifies the position on the tape device where the archive should be created. If not specified, the current position of the tape device is used.
- `-t` Create an archive on or read an archive from a tape device. The *archive* operand (see OPERANDS) is

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assumed to be the name of the tape device.

EXAMPLES

EXAMPLE 1 Creating a Flash Archive

The command below creates a flash archive named `pogoS9` and stores it in `/export/home/archives/s9fcs.flar`. The currently running system is the basis for the new archive.

```
# flar create -n pogoS9 /export/home/archives/s9fcs.flar
```

EXAMPLE 2 Creating Differential Flash Archives

The command below creates a differential flash archive.

```
# flar create -n diff_pogoS9 -A /images \
/export/home/archives/diff_s9fcs.flar
```

In the following example the *old* system image is accessed through `lumount`.

```
# lumount s9BE /test
# flar create -n diff_pogoS9 -A /test /export/home/archives/diff_s9fcs.flar
```

The following example shows the use of the `-R` option to specify a new system image other than the currently running system.

```
# flar create -n diff_pogoS9 -R /test \
-A /images /export/home/archives/diff_s9fcs.flar
```

OPERANDS

The following operand is supported:

archive

Path to tape device if the `-t` option was used. Otherwise, the complete path name of a flash archive. By convention, a file containing a flash archive has a file extension of `.flar`.

EXIT STATUS

The following exit values are returned for the `create`, `split`, and `combine` subcommands:

0 Successful completion.

>0 An error occurred.

The following exit values are returned for the `info` subcommand:

0 Successful completion.

1 Command failed. If the `-k` option is used and the requested keyword is not found, `flar` returns 2.

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ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWinst

SEE ALSO flarcreate(1M), flash_archive(4), attributes(5)

NAME	flarcreate – create a flash archive from a master system				
SYNOPSIS	<pre>flarcreate create -n <i>name</i> [-R <i>root</i>] [-A <i>system_image</i>] [-H] [-I] [-M] [-S] [-c] [-t [-p <i>posn</i>] [-b <i>blocksize</i>]] [-i <i>date</i>] [-u <i>section...</i>] [-m <i>master</i>] [-f [<i>filelist</i> -] [-F]] [-a <i>author</i>] [-e <i>descr</i> -E <i>descr_file</i>] [-T <i>type</i>] [-U <i>key=value...</i>] [-x <i>exclude...</i>] [-y <i>include...</i>] [-z <i>filelist...</i>] [-X <i>filelist...</i>] <i>archive</i></pre>				
DESCRIPTION	The flarcreate command creates a flash archive from a master system. A master system is one that contains a reference configuration, which is a particular configuration of the Solaris operating environment, plus optional other software. A flash archive is an easily transportable version of the reference configuration. In flash terminology, a system on which an archive is created is called a <i>master</i>. The system image stored in the archive is deployed to systems that are called <i>clones</i>. There are two types of flash archives: full and differential. A full archive contains all the files that are in a system image. A differential archive contains only differences between two system images. Installation of a differential archive is faster and consumes fewer resources than installation of a full archive. In creating a differential archive, you compare two system images. A system image can be any of: ■ a Live Upgrade boot environment, mounted on some directory using lumount(1M) (see live_upgrade(5)) ■ a clone system mounted over NFS with root permissions ■ a full flash archive expanded into some local directory To explain the creation of a differential flash archive, the following terminology is used: <table> <tr> <td><i>old</i></td><td>The image prior to upgrade or other modification. This is likely the image as it was installed on clone systems.</td></tr> <tr> <td><i>new</i></td><td>The old image, plus possible additions or changes and minus possible deletions. This is likely the image you want to duplicate on clone systems.</td></tr> </table> The flarcreate command compares <i>old</i> and <i>new</i>, creating a differential archive as follows: ■ files on <i>new</i> that are not in <i>old</i> are added to the archive; ■ files of the same name that are different between <i>old</i> and <i>new</i> are taken from <i>new</i> and added to the archive; ■ files that are in <i>old</i> and not in <i>new</i> are put in list of files to be deleted when the differential archive is installed on clone systems.	<i>old</i>	The image prior to upgrade or other modification. This is likely the image as it was installed on clone systems.	<i>new</i>	The old image, plus possible additions or changes and minus possible deletions. This is likely the image you want to duplicate on clone systems.
<i>old</i>	The image prior to upgrade or other modification. This is likely the image as it was installed on clone systems.				
<i>new</i>	The old image, plus possible additions or changes and minus possible deletions. This is likely the image you want to duplicate on clone systems.				

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When creating a differential flash archive, the currently running image is, by default, the new image and a second image, specified with the `-A` option, is the old image. You can use the `-R` option to designate an image other than the currently running system as the new image. These options are described below.

Following creation of a flash archive, you can use JumpStart to clone the archive on multiple systems.

You can run `flarcreate` in multi- or single-user mode. You can also use the command when the master system is booted from the first Solaris software CD or from a Solaris net image.

Archive creation should be performed when the master system is in as stable a state as possible. Following archive creation, use the `flar(1M)` command to administer a flash archive.

See `flash_archive(4)` for a description of the flash archive.

The `flarcreate` command requires root privileges.

OPTIONS

The `flarcreate` command has one required argument:

<code>-n name</code>	Specifies the name of the flash archive. <i>name</i> is supplied as the value of the <code>content_name</code> keyword. See <code>flash_archive(4)</code> .

The `flarcreate` command has the following general options:

<code>-A system_image</code>	Create a differential flash archive by comparing a new system image (see <code>DESCRIPTION</code>) with the image specified by the <i>system_image</i> argument. By default, the new system image is the currently running system. You can change the default with the <code>-R</code> option, described below. <i>system_image</i> is a directory containing an image. It can be accessible through UFS, NFS, or <code>lumount(1M)</code> .

The rules for inclusion and exclusion of files in a differential archive are described in `DESCRIPTION`. You can modify the effect of these rules with the use of the `-x`, `-X`, `-y`, and `-z` options, described below.

<code>-c</code>	Compress the archive using <code>compress(1)</code>

<code>-f filelist</code>	Use the contents of <i>filelist</i> as a list of files to include in the archive. The files are included in addition to the normal file list, unless <code>-F</code> is specified (see below). If <i>filelist</i> is <code>-</code> , the list is taken from standard input.

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-F	Include only files in the list specified by -f. This option makes -f <i>filelist</i> an absolute list, rather than a list that is appended to the normal file list.
-H	Do not generate hash identifier.
-I	Ignore integrity check. To prevent you from excluding important system files from an archive, <code>flarcreate</code> runs an integrity check. This check examines all files registered in a system package database and stops archive creation if any of them are excluded. Use this option to override this integrity check.
-M	Used only when you are creating a differential flash archive. When creating a differential archive, <code>flarcreate</code> creates a long list of the files in the system that remain the same, are changed, and are to be deleted on clone systems. This list is stored in the manifest section of the archive (see <code>flash_archive(4)</code>). When the differential archive is deployed, the flash software uses this list to perform a file-by-file check, ensuring the integrity of the clone system. Use of this option to avoids such a check and saves the space used by the manifest section in a differential archive. However, you must weigh the savings in time and disk space against the loss of an integrity check upon deployment. Because of this loss, use of this option is not recommended.
-R <i>root</i>	Create the archive from the file system tree rooted at <i>root</i> . If you do not specify this option, <code>flarcreate</code> creates an archive from a file system rooted at <code>/</code> .
-S	Skip the disk space check and do not write archive size data to the archive. Without -S, <code>flarcreate</code> builds a compressed archive in memory before writing the archive to disk, to ensure you have sufficient disk space. Use -S to skip this step. The result of the use of -S is a significant decrease in the time it takes to create an archive.
-U <i>key=value...</i>	Include the user-defined keyword(s) and values in the archive identification section.
-x <i>exclude...</i>	Exclude the file or directory <i>exclude</i> from the archive. Note that the <i>exclude</i> file or directory is assumed to be relative to the alternate root specified using -R. If the parent directory of the file <i>exclude</i> is included with the -y option (see -y <i>include</i>), then only the specific file or directory specified by <i>exclude</i> is excluded. Conversely, if

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	the parent directory of an included file is specified for exclusion, then only the file <i>include</i> is included. For example, if you specify: -x /a -y /a/b all of /a except for /a/b is excluded. If you specify: -y /a -x /a/b all of /a except for /a/b is included.
-y <i>include</i> ...	Include the file or directory <i>include</i> in the archive. Note that the <i>exclude</i> file or directory is assumed to be relative to the alternate root specified using -R. See the description of the -x option, above, for a description of the interaction of the -x and -y options.
-x <i>filelist</i> ...	Use the contents of <i>filelist</i> as a list of files to exclude from the archive. If <i>filelist</i> is -, the list is taken from standard input.
-z <i>filelist</i> ...	<i>filelist</i> is a list of files prefixed with a plus (+) or minus (-). A plus indicates that a file should be included in the archive; the minus indicates exclusion. If <i>filelist</i> is -, the list is taken from standard input.
Use the following option with user-defined sections.	
-u <i>section</i> ...	Include the user-defined section located in the file <i>section</i> in the archive. <i>section</i> must be a blank-separated list of section names as described in <code>flash_archive(4)</code> .
Use the following options with tape archives.	
-b <i>blocksize</i>	The block size to be used when creating the archive. If not specified, a default block size of 64K is used.
-p <i>posn</i>	Used only with -t. Specifies the position on the tape device where the archive should be created. If not specified, the current position of the tape device is used.
-t	Create an archive on a tape device. The <i>archive</i> operand (see OPERANDS) is assumed to be the name of the tape device.
The following options are used for archive identification.	

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-a <i>author</i>	<i>author</i> is used to provide an author name for the archive identification section. If you do not specify -a , no author name is included in the identification section.
-e <i>descr</i>	The description to be included in the archive as the value of the <code>content_description</code> archive identification key. This option is incompatible with -E .
-E <i>descr_file</i>	The description to be used as the value of the archive identification <code>content_description</code> key is retrieved from the file <i>descr_file</i> . This option is incompatible with -e .
-i <i>date</i>	By default, the value for the <code>creation_date</code> field in the identification section is generated automatically, based on the current system time and date. If you specify the -i option, <i>date</i> is used instead.
-m <i>master</i>	By default, the value for the <code>creation_master</code> field in the identification section is the name of the system on which you run <code>flarcreate</code> , as reported by <code>uname -n</code> . If you specify -m , <i>master</i> is used instead.
-T <i>type</i>	Content type included in the archive as the value of the <code>content_type</code> archive identification key. If you do not specify -T , the <code>content_type</code> keyword is not included.

OPERANDS The following operand is supported:

archive

Path to tape device if the **-t** option was used. Otherwise, the complete path name of a flash archive. By convention, a file containing a flash archive has a file extension of `.flar`.

EXIT STATUS The following exit values are returned:

0	Successful completion.
>0	An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWinst

SEE ALSO `flar(1M)`, `flash_archive(4)`, `attributes(5)`

fmthard(1M)

NAME	fmthard – populate label on hard disks								
SYNOPSIS									
SPARC	fmthard -d <i>data</i> -n <i>volume_name</i> -s <i>datafile</i> [-i] /dev/rdisk/c? [t?] d?s2								
x86	fmthard -d <i>data</i> -n <i>volume_name</i> -s <i>datafile</i> [-i] [-p <i>pboot</i>] [-b <i>bootblk</i>] /dev/rdisk/c? [t?] d?s2								
DESCRIPTION	The fmthard command updates the VTOC (Volume Table of Contents) on hard disks and, on x86 systems, adds boot information to the Solaris fdisk partition. One or more of the options -s datafile, -d data, or -n volume_name must be used to request modifications to the disk label. To print disk label contents, see prtvtoc(1M). The /dev/rdisk/c?[t?]d ?s2 file must be the character special file of the device where the new label is to be installed. On x86 systems, fdisk(1M) must be run on the drive before fmthard. If you are using an x86 system, note that the term “partition” in this page refers to <i>slices</i> within the x86 fdisk partition on x86 machines. Do not confuse the partitions created by fmthard with the partitions created by fdisk.								
OPTIONS	The following options are supported: <table> <tr> <td>-d <i>data</i></td><td>The <i>data</i> argument of this option is a string representing the information for a particular partition in the current VTOC. The string must be of the format <i>part:tag:flag:start:size</i> where <i>part</i> is the partition number, <i>tag</i> is the ID TAG of the partition, <i>flag</i> is the set of permission flags, <i>start</i> is the starting sector number of the partition, and <i>size</i> is the number of sectors in the partition. See the description of the <i>datafile</i> below for more information on these fields.</td></tr> <tr> <td>-i</td><td>This option allows the command to create the desired VTOC table, but prints the information to standard output instead of modifying the VTOC on the disk.</td></tr> <tr> <td>-n <i>volume_name</i></td><td>This option is used to give the disk a <i>volume_name</i> up to 8 characters long.</td></tr> <tr> <td>-s <i>datafile</i></td><td> This option is used to populate the VTOC according to a <i>datafile</i> created by the user. If the <i>datafile</i> is "-", fmthard reads from standard input. The <i>datafile</i> format is described below. This option causes all of the disk partition timestamp fields to be set to zero. Every VTOC generated by fmthard will also have partition 2, by convention, that corresponds to the whole disk. If the input in <i>datafile</i> does not specify an </td></tr> </table>	-d <i>data</i>	The <i>data</i> argument of this option is a string representing the information for a particular partition in the current VTOC. The string must be of the format <i>part:tag:flag:start:size</i> where <i>part</i> is the partition number, <i>tag</i> is the ID TAG of the partition, <i>flag</i> is the set of permission flags, <i>start</i> is the starting sector number of the partition, and <i>size</i> is the number of sectors in the partition. See the description of the <i>datafile</i> below for more information on these fields.	-i	This option allows the command to create the desired VTOC table, but prints the information to standard output instead of modifying the VTOC on the disk.	-n <i>volume_name</i>	This option is used to give the disk a <i>volume_name</i> up to 8 characters long.	-s <i>datafile</i>	This option is used to populate the VTOC according to a <i>datafile</i> created by the user. If the <i>datafile</i> is "-", fmthard reads from standard input. The <i>datafile</i> format is described below. This option causes all of the disk partition timestamp fields to be set to zero. Every VTOC generated by fmthard will also have partition 2, by convention, that corresponds to the whole disk. If the input in <i>datafile</i> does not specify an
-d <i>data</i>	The <i>data</i> argument of this option is a string representing the information for a particular partition in the current VTOC. The string must be of the format <i>part:tag:flag:start:size</i> where <i>part</i> is the partition number, <i>tag</i> is the ID TAG of the partition, <i>flag</i> is the set of permission flags, <i>start</i> is the starting sector number of the partition, and <i>size</i> is the number of sectors in the partition. See the description of the <i>datafile</i> below for more information on these fields.								
-i	This option allows the command to create the desired VTOC table, but prints the information to standard output instead of modifying the VTOC on the disk.								
-n <i>volume_name</i>	This option is used to give the disk a <i>volume_name</i> up to 8 characters long.								
-s <i>datafile</i>	This option is used to populate the VTOC according to a <i>datafile</i> created by the user. If the <i>datafile</i> is "-", fmthard reads from standard input. The <i>datafile</i> format is described below. This option causes all of the disk partition timestamp fields to be set to zero. Every VTOC generated by fmthard will also have partition 2, by convention, that corresponds to the whole disk. If the input in <i>datafile</i> does not specify an								

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entry for partition 2, a default partition 2 entry will be created automatically in VTOC with the tag `V_BACKUP` and size equal to the full size of the disk.

The *datafile* contains one specification line for each partition, starting with partition 0. Each line is delimited by a new-line character (`\n`). If the first character of a line is an asterisk (*), the line is treated as a comment. Each line is composed of entries that are position-dependent, separated by "white space" and having the following format:

partition tag flag starting_sector size_in_sectors

where the entries have the following values:

<i>partition</i>	The partition number. Currently, for Solaris SPARC, a disk can have up to 8 partitions, 0–7. Even though the <i>partition</i> field has 4 bits, only 3 bits are currently used. For x86, all 4 bits are used to allow slices 0–15. Each Solaris <i>fdisk</i> partition can have up to 16 slices.
<i>tag</i>	The partition tag: a decimal number. The following are reserved codes: 0 (<code>V_UNASSIGNED</code>), 1 (<code>V_BOOT</code>), 2 (<code>V_ROOT</code>), 3 (<code>V_SWAP</code>), 4 (<code>V_USR</code>), 5 (<code>V_BACKUP</code>), 6 (<code>V_STAND</code>), 7 (<code>V_VAR</code>), and 8 (<code>V_HOME</code>).
<i>flag</i>	The flag allows a partition to be flagged as unmountable or read only, the masks being: <code>V_UNMNT 0x01</code> , and <code>V_RDONLY 0x10</code> . For mountable partitions use <code>0x00</code> .
<i>starting_sector</i>	The sector number (decimal) on which the partition starts.
<i>size_in_sectors</i>	The number (decimal) of sectors occupied by the partition.

You can save the output of a `prtvtoc` command to a file, edit the file, and use it as the *datafile* argument to the `-s` option.

fmthard(1M)

x86 Options The functionality provided by the following two x86 options is also provided by `installboot(1M)`. Because the functionality described here may be removed in future versions of `fmthard`, you should use `installboot` to install boot records.

The following options are supported:

- `-b bootblk` This option allows the user to override the default `bootblk` file, `/usr/platform/platform-name/lib/fs/ufs/bootblk`. The boot block file is platform dependent, where `platform-name` can be determined using the `-i` option to `uname(1)`.
- `-p pboot` This option allows the user to override the default partition boot file, `/usr/platform/platform-name/lib/fs/ufs/pboot`. The partition boot file is platform dependent, where `platform-name` can be determined using the `-i` option to `uname(1)`.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `uname(1)`, `format(1M)`, `prtvtoc(1M)`, `attributes(5)`

x86 Only `fdisk(1M)`, `installboot(1M)`

NOTES Special care should be exercised when overwriting an existing VTOC, as incorrect entries could result in current data being inaccessible. As a precaution, save the old VTOC.

For disks under one terabyte, `fmthard` cannot write a VTOC on an unlabeled disk. Use `format(1M)` for this purpose.

NAME	fncheck – check for consistency between FNS data and NIS+ data				
SYNOPSIS	fncheck [-r] [-s] [-u] [-t <i>type</i>] [<i>domain_name</i>]				
DESCRIPTION	fncheck is used for checking for inconsistencies between FNS username or hostname contexts and the contents of the corresponding NIS+ <i>passwd.org_dir</i> or <i>hosts.org_dir</i> tables, respectively, in the NIS+ domain <i>domain_name</i>. If <i>domain_name</i> is omitted, the domain name of the current machine is used. By default (in the absense of the -r and -s options), the following inconsistencies are displayed: ■ items that appear only in the FNS context but do not appear in the NIS+ table, ■ items that appear only in the NIS+ table but do not appear in the FNS context.				
OPTIONS	-r Display only items that appear in the FNS context but do not appear in the corresponding NIS+ table. -s Display items that appear in the NIS+ table but do not appear in the corresponding FNS context. -u Update the FNS context based on information in the corresponding NIS+ table. If the -r option is used, items that appear only in the FNS context are removed from the FNS context. If the -s option is used, items that appear only in the NIS+ table are added to the FNS context. If neither -r or -s are specified, items are added and removed from the FNS context to make it consistent with the corresponding NIS+ table. -t <i>type</i> Specify the type of context to check. <i>type</i> can be either <i>hostname</i> or <i>username</i>. If this option is omitted, both <i>hostname</i> and <i>username</i> contexts are checked. If <i>type</i> is <i>hostname</i>, the FNS <i>hostname</i> context is checked against the NIS+ <i>hosts.org_dir</i> table. If <i>type</i> is <i>username</i>, the FNS <i>username</i> context is checked against the NIS+ <i>passwd.org_dir</i> table.				
USAGE	Although fncheck can be used to add users and hosts to the username and hostname contexts as new users and hosts are added to NIS+, that is not its intended purpose. fncheck is an expensive operation because it makes complete comparisons of the NIS+ table and the corresponding FNS context. When a user or host is added or removed from NIS+ using <i>admintool</i> (see <i>admintool</i>(1M)), it automatically updates the appropriate FNS contexts.				
ATTRIBUTES	See <i>attributes</i>(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWfns</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWfns
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWfns				
SEE ALSO	<i>admintool</i> (1M), <i>fncreate</i> (1M), <i>fndestroy</i> (1M), <i>nis</i> (1), <i>attributes</i> (5), <i>fns</i> (5), <i>fns_policies</i> (5)				

fnccopy(1M)

NAME	fnccopy – copy FNS contexts, possibly from one naming service to another naming service						
SYNOPSIS	fnccopy [-f <i>filename</i>] [-i <i>old-naming-service</i>] [-o <i>new-naming-service</i>] <i>old-fns-context</i> <i>new-fns-context</i>						
DESCRIPTION	fnccopy copies recursively the FNS context, <i>old-fns-context</i>, and attributes to a new FNS context, <i>new-fns-context</i>. If -i and -o options are specified with the respective naming service, the <i>old-fns-context</i> will be resolved using <i>old-naming-service</i> as the underlying naming service, and <i>new-fns-context</i> will be created using <i>new-naming-service</i> as the underlying naming service. In the absence of -i and -o options, the default naming service will be used (see fnselect(1M)). When the -f option is used, <i>filename</i> names a file containing a list of contexts in the <i>old-fns-context</i> that should be copied to the <i>new-fns-context</i>. If the FNS context <i>new-fns-context</i> already exists in the target naming service, <i>new-naming-service</i>, this command will copy only the contexts and bindings that do not exist in the target naming service. This command will not over-write any of the existing FNS contexts in the target naming service. This command follows links and copies FNS contexts and binding to the <i>new-fns-context</i> namespace.						
OPTIONS	The following options are supported: <table> <tr> <td>-f <i>filename</i></td><td>Specifies a file name that contains a list of FNS contexts to be copied.</td></tr> <tr> <td>-i <i>old-naming-service</i></td><td>Specifies the source naming service; currently only nis is supported.</td></tr> <tr> <td>-o <i>new-naming-service</i></td><td>Specifies the target naming service; currently only nisplus is supported.</td></tr> </table>	-f <i>filename</i>	Specifies a file name that contains a list of FNS contexts to be copied.	-i <i>old-naming-service</i>	Specifies the source naming service; currently only nis is supported.	-o <i>new-naming-service</i>	Specifies the target naming service; currently only nisplus is supported.
-f <i>filename</i>	Specifies a file name that contains a list of FNS contexts to be copied.						
-i <i>old-naming-service</i>	Specifies the source naming service; currently only nis is supported.						
-o <i>new-naming-service</i>	Specifies the target naming service; currently only nisplus is supported.						
OPERANDS	The following operands are supported: <table> <tr> <td><i>new-fns-context</i></td><td>The new FNS context.</td></tr> <tr> <td><i>old-fns-context</i></td><td>The current FNS context.</td></tr> </table>	<i>new-fns-context</i>	The new FNS context.	<i>old-fns-context</i>	The current FNS context.		
<i>new-fns-context</i>	The new FNS context.						
<i>old-fns-context</i>	The current FNS context.						
EXAMPLES	EXAMPLE 1 Copying the fnccopy FNS Printer Context The following command copies the FNS printer context .../fed-naming.eng.sun.com/service/printer and its subcontexts and bindings to the FNS printer context .../sun.com/orgunit/ssi.eng/service/printer. <pre>% fnccopy .../fed-naming.eng.sun.com/service/printer \ .../sun.com/orgunit/ssi.eng/service/printer</pre>						

EXAMPLE 2 Copying the NIS FNS Users' Contexts

The following command copies the NIS FNS users' contexts specified in the file `/etc/ssi-users-list` to NIS+ FNS users' context of the orgunit `ssi.eng`:

```
% fncopy -i nis -o nisplus -f /etc/ssi-users-list \
    thisorgunit/user org/ssi.eng/user
```

EXIT STATUS

0	Operation was successful.
1	Operation failed.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWfns

SEE ALSO `fnbind(1)`, `fnunbind(1)`, `fncreate(1M)`, `fncreate_fs(1M)`, `fncreate_printer(1M)`, `fndestroy(1M)`, `attributes(5)`, `fns(5)`

fncreate(1M)

NAME	fncreate – create an FNS context
SYNOPSIS	fncreate -t <i>context_type</i> [-Dosv] [-f <i>input_file</i>] [-r <i>reference_type</i>] <i>composite_name</i>
DESCRIPTION	fncreate creates an FNS context of type <i>context_type</i>, where a <i>context_type</i> must be one of org, hostname, host, username, user, service, fs, site, nsid, or generic. It takes as the last argument a composite name, <i>composite_name</i>, for the context to be created. In addition to creating the context named, fncreate also creates subcontexts of the named context using FNS Policies of what types of contexts should be bound in those contexts. See <i>fns_policies</i>(5). fncreate discovers which naming service is in use and creates contexts in the appropriate naming service. When FNS is being initially set up, it will by default create contexts for NIS+. This default can be changed by the use of <i>fnselect</i>(1M) to explicitly select a naming service. When using FNS for a NIS+ environment, fncreate creates NIS+ tables and directories in the NIS+ hierarchy. See <i>fns_nis+</i>(5) for more information on the necessary NIS+ credentials and the use of the environment variable NIS_GROUP when using fncreate and other FNS commands. When using FNS for a NIS environment, fncreate creates NIS maps and hence must be executed as superuser on the NIS master of the FNS-related maps. See <i>fns_nis</i>(5) for more information specific to the use of FNS in a NIS environment. When using FNS for an environment that uses /etc files for its naming information, fncreate creates files in the /var/fn directory. See <i>fns_files</i>(5) for more information specific to the use of FNS for files.
OPTIONS	The following options are supported: -D Information about the creation of a context, and corresponding NIS+ directories and tables, or NIS maps, or files entry, is displayed as each context is created. -f <i>input_file</i> Create a context for every user or host listed in <i>input_file</i>. This option is only applicable when used with the -t username or -t hostname options. The format of the file is an atomic user name or host name per line. This option is used to create contexts for a subset of the users/hosts found in the corresponding passwd or hosts database of the naming service (that is, for NIS+ these are the passwd.org_dir or hosts.org_dir tables, respectively). If this option is omitted, fncreate creates a context for every user/host found in the corresponding passwd or hosts database.

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-o

Only the context named by *composite_name* is created; no subcontexts are created. When this option is omitted, subcontexts are created according to the FNS Policies for the type of the new object.

-t *context_type*

The following are valid entries for *context_type*:

org

Create organization context, and default subcontexts, for an existing NIS+ domain, NIS domain, or /etc files environment.

For NIS+, *composite_name* is of the form *org/domain/* where *domain* is a NIS+ domain. An empty domain name indicates the creation of the organization context for the root NIS+ domain; otherwise, the domain name names the corresponding NIS+ domain. *domain* can be either the fully-qualified NIS+ domain name — dot ('.')-terminated — or the NIS+ domain name named relative to the NIS+ root domain.

For example, the following creates the root organization context and its subcontexts for the NIS+ root domain *Wiz.Com.*:

```
eg% fncreate -t org org//
```

The same thing could have been achieved using the following command:

```
eg% fncreate -t org org/Wiz.COM./
```

Typically, this is the first FNS context created.

To create the organization context for a subdomain of *Wiz.COM.*, execute either of the following commands:

```
eg% fncreate -t org org/sales/
```

or

```
eg% fncreate -t org \  
org/sales.Wiz.COM./
```

Note that if the corresponding NIS+ domain does not exist, *fncreate* fails. See *nissetup(1M)* for setting up a NIS+ domain.

A *ctx_dir* directory is created under the directory of the organization named.

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For NIS or an `/etc` files environment, *domain* should be NULL (empty) because NIS and `/etc` files do not support a hierarchy namespace of domains. For example, the following command creates the organization context for the NIS or `/etc` files environment:

```
eg% fncreate -t org org//
```

For NIS+, NIS, and `/etc` files, creating the organization context also creates the organization's immediate subcontexts `host`, `user`, and `service` and their subcontexts. This includes a context for every host entry in the corresponding hosts database of the naming service (that is, `hosts.org_dir` NIS+ table, or `hosts` NIS map, or `/etc/hosts` file), and a context for every user entry in the `passwd` database of the naming service (that is, `passwd.org_dir` NIS+ table, or `passwd` NIS map, or `/etc/passwd` file) unless the option `-o` is specified. Bindings for these subcontexts are recorded under the organization context.

hostname

Create a hostname context in which atomic host names can be bound, and bind the reference of the context to *composite_name*. If the suffix of *composite_name* is `host /`, the hostname context created is also bound to the composite name with this suffix replaced by `_host /`, and the reverse (that is, if a composite name with a `_host /` suffix was supplied, a binding would be created for `host /`). Also create a host context for every host entry in the corresponding hosts database of the naming service (`hosts.org_dir` NIS+ table, or `hosts` NIS map, or `/etc/hosts` file), unless either option `-o` or `-f` is specified. The following example creates host contexts for all hosts in the sales organization:

```
eg% fncreate -t hostname \  
org/sales/host/
```

Typically, a hostname context need not be created explicitly since it is created by default, as a subcontext under `org`.

host

Create a host context for a specific host, and its `service` and `fs` subcontexts, and bind the reference of the context to *composite_name*. For

example, the following creates a host context and service and fs subcontexts for host sylvan:

```
eg% fncreate -t host \
org/sales/host/sylvan/
```

username

Create a username context in which atomic user names can be bound, and bind the reference of the context to *composite_name*. If the suffix of *composite_name* is *user/*, the username context created is also bound to the composite name with this suffix replaced by *_user/*, and the reverse. Also create a user context for every user entry in the corresponding passwd database of the naming service (that is, passwd.org_dir NIS+ table, or passwd NIS map, or /etc/passwd file), unless either the option -o or -f is specified. The following example creates username contexts for all users in the sales organization:

```
eg% fncreate -t username \
org/sales/user/
```

Typically, a username context need not be created explicitly since it is created by default, as a subcontext under org.

user

Create a user context for a specific user, and its service and fs subcontexts, and bind the reference of the context to *composite_name*. For example, the following creates a user context and service and fs subcontexts for user jsmith:

```
eg% fncreate -t user \
org/sales/user/jsmith/
```

service

Create a service context in which slash-separated left-to-right service names can be bound, and bind the reference of the context to *composite_name*. If the suffix of *composite_name* is *service/*, the service context created is also bound to the composite name with this suffix replaced by *_service/*, and the reverse. Typically, a service context need not be created explicitly since it is created by default, as a subcontext under org, host, or user contexts.

fs

Create a file system context for a user or host, and bind the reference of the context to *composite_name*.

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The composite name must be the name of a host or a user, with either `fs/` or `_fs/` appended to it. If the suffix of *composite_name* is `fs/`, the file system context created is also bound to the composite name with this suffix replaced by `_fs/`, and the reverse.

Typically, a file system context need not be created explicitly since it is created by default, as a subcontext of a user or host context.

The file system context of a user is the user's home directory as stored in the `passwd` database of the naming service (that is, in NIS+ table `passwd.org_dir`, or `passwd` NIS map, or `/etc/passwd` file). The file system context of a host is the set of NFS file systems that the host exports.

Use the `fncreate_fs(1M)` command to create file system contexts for organizations and sites, or to create file system contexts other than the defaults for users and hosts.

site

Create a site context in which dot-separated right-to-left site names can be bound, and a service subcontext, and bind the reference of the context to *composite_name*. If the suffix of *composite_name* is `site/`, the hostname context created is also bound to the composite name with this suffix replaced by `_site/`, and the reverse. Typically, a `site` context is created at the same level as the `org` context and is used for creating a geographical namespace that complements the organizational namespace of an enterprise.

nsid

Create a context in which namespace identifiers can be bound. This context has a flat namespace, in which only atomic names can be bound. An example of such a context is the context to which the name `site/east/` is bound. This context can have the following bindings: `site/east/host`, `site/east/user`, and `site/east/service`.

generic

Create a generic context in which slash-separated left-to-right names can be bound, and bind the reference of the context to *composite_name*. The option `-r` can be used to specify the reference type to be associated with the context. If the `-r` option is

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omitted, the reference type used is the reference type of the parent context if the parent context is a generic context; otherwise, the reference type is `onc_fn_generic`.

`-r reference_type`

Use *reference_type* as the reference type of the generic context being created. This option can be used only with the `-t generic` option.

`-s`

Create the context and bind it in to supercede any existing binding associated with *composite_name*. If this option is omitted, `fncreate` fails if *composite_name* is already bound.

`-v`

Information about the creation of a context is displayed as each context is created.

OPERANDS The following operand is supported:

composite_name An FNS named object.

EXAMPLES **EXAMPLE 1** Creating A Host Context

This example illustrates the creation of a host context in the root organization and a user context in a sub-organization.

The following command creates a context, and subcontexts, for the root organization:

```
% fncreate -t org org//
```

It causes the following commands to be invoked automatically:

```
% fncreate -t service org//service/
% fncreate -t hostname org//host/
% fncreate -t username org//user/
```

The following command creates a context, and subcontexts, for host `sylvan`:

```
% fncreate -t host org//host/sylvan/
```

It causes the following commands to be invoked automatically:

```
% fncreate -t service org//host/sylvan/service/
eg% fncreate -t fs org//host/sylvan/fs/
```

The following command creates a context, and subcontexts, associated with a sub-organization `dct`:

```
% fncreate -t org org/dct/
```

It causes the following commands to be invoked automatically:

```
% fncreate -t service org/dct/service/
% fncreate -t hostname org/dct/host/
% fncreate -t username org/dct/user/
```

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EXAMPLE 1 Creating A Host Context (Continued)

The following command creates a context, and subcontexts, for user msmith:

```
% fncreate -t user org/dct/user/msmith/
```

It causes the following commands to be invoked automatically:

```
% fncreate -t service org/dct/user/msmith/service/  
% fncreate -t fs org/dct/user/msmith/fs/
```

The following commands create service contexts:

```
% fncreate -t service org/dct/service/fax  
% fncreate -t service org/dct/service/fax/classA
```

EXIT STATUS

0	Operation was successful.
1	Operation failed.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWfns

SEE ALSO nis(1), fncheck(1M), fncreate_fs(1M), fndestroy(1M), fnselect(1M), nissetup(1M), xfn(3XFN), attributes(5), fns(5), fns_files(5), fns_nis(5), fns_nis+(5), fns_policies(5), fns_references(5)

NAME	fncreate_fs – create FNS file system contexts
SYNOPSIS	fncreate_fs [-r] [-v] -f <i>input_file</i> <i>composite_name</i> fncreate_fs [-r] [-v] <i>composite_name</i> [<i>mount_options</i>] [<i>mount_location...</i>]
DESCRIPTION	The <code>fncreate_fs</code> command creates or updates the FNS file system context named by <i>composite_name</i> . A description of the context's bindings is provided in <i>input_file</i> if the first form of the command is used, or is given on the command line if the second form is used.
OPTIONS	-r Replace the bindings in the context named by <i>composite_name</i> with only those specified in the input. This is equivalent to destroying the context (and, recursively, its subcontexts), and then running <code>fncreate_fs</code> without this option. This option should be used with care. -v Verbose. Display information about the contexts being created and modified. -f <i>input_file</i> Read input from <i>input_file</i>. If <i>input_file</i> is '-' (hyphen), read from standard input instead.
OPERANDS	The following operand is supported: <i>composite_name</i> An FNS named object.
USAGE	The <code>fncreate_fs</code> command populates the file system portions of the FNS namespace. The automounter (see <code>automount(1M)</code>) will then "mount" the FNS namespace under <code>/xfn</code>. The directory with the FNS name <code>org/engineering/fs</code>, for example, can be found on the file system as <code>/xfn/org/engineering/fs</code>. The format of the input to <code>fncreate_fs</code> is similar, but not identical, to the format of indirect automount maps. Differences are enumerated in the NOTES section below.
Input File Format	The input file supplies the names and values to be bound in the context of <i>composite_name</i>. Its format is a sequence of lines of the form: <i>name</i> [-<i>options</i>] [<i>location</i> . . .] For each such entry, a reference to the <i>location</i>(s) and the corresponding <i>options</i> is bound to the name <i>composite_name/name</i>. The <i>name</i> field may be a simple atomic name, a slash-separated hierarchical name, or '.' (period). If it is '.' then the reference is bound directly to <i>composite_name</i>. The <i>name</i> field must not begin with a slash. The <i>location</i> field specifies the host or hosts that serve the files for <i>composite_name/name</i>. In the case of a simple NFS mount, <i>location</i> takes the form: <i>host</i> : <i>path</i> where <i>host</i> is the name of the host from which to mount the file system, and <i>path</i> is the path name of the directory to mount.

fncreate_fs(1M)

	The <i>options</i> field is a comma-separated list of the mount options to use when mounting the location bound to <i>composite_name/name</i>. These options also apply to any subcontexts of <i>composite_name/name</i> that do not specify their own mount options. If <i>options</i> is given but <i>location</i> is not, the options apply to subcontexts only. If neither <i>options</i> nor a <i>location</i> is given, then no reference is bound to <i>composite_name/name</i>. Any existing reference is unbound. A single logical line may be continued across multiple input lines by escaping the newline with a '\' (backslash). Comments begin with a '#' that is either at the beginning of a line or is prefixed by whitespace, and end at the end of the line.
Command-line Input	If no <i>input_file</i> is specified on the command line, then the <i>options</i> and <i>location</i> fields given on the command line are bound directly to <i>composite_name</i>. This is equivalent to providing a one-line input file with a '.' in the <i>name</i> field.
Multiple Locations	Multiple <i>location</i> fields may be specified for NFS file systems that are exported from multiple, functionally-equivalent locations. If several locations in the list share the same path name, they may be combined using a comma-separated list of host names: <pre>host1, host2, . . . : path</pre> The hosts may be weighted, with the weighting factor appended to the host name as a non-negative integer in parentheses: the lower the number, the more desirable the server. The default weighting factor is 0 (most desirable). In the example: <pre>alpha,bravo,charlie(1),delta(2):/usr/man</pre> hosts alpha and bravo are the most desirable; host delta is the least desirable. See the USAGE section of automount(1M) for additional information on how the automounter interprets the location field.
Variable Substitution	Variable names, prefixed by '\$', may be used with the <i>options</i> or <i>location</i> fields. For example, a <i>location</i> may be given as: <pre>svr1:/export/\$CPU</pre> The automounter will substitute client-specific values for these variables when mounting the corresponding file systems. In the above example, \$CPU is replaced by the output of <code>uname -p</code>; for example, "sparc". See the USAGE section of automount(1M) for more information on how the automounter treats variable substitution.
Alternate Input Format	For additional compatibility with automount maps (see automount(1M)), the following input format is accepted: <pre>name [options] [location . . .] \ /offset1 [options1] location1 . . . \ /offset2 [options2] location2 . . . \ . . .</pre>

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where each *offset* field is a slash-separated hierarchy. This is interpreted as being equivalent to:

```
name      [options] [location . . . ^]
name/offset1  [options1] location1 . . .
name/offset2  [options2] location2 . . .
. . . (the first line being omitted if both options and location are omitted).
```

This format is for compatibility only; it provides no additional functionality. Its use is deprecated.

EXAMPLES **EXAMPLE 1** Using the fncreate_fs Command

The following examples illustrate the use of the fncreate_fs command. The call:

```
example% cat input1
src      -ro      svr1:/export/src
dist     -ro      svr2,svr3:/export/dist
example% fncreate_fs -f input1 org/engineering/fs
creates a file system context for the engineering organization. It specifies that
org/engineering/fs/src is a read-only NFS mount from server svr1, and that
org/engineering/fs/dist is a read-only NFS mount from either svr2 or svr3.
```

Once this is done, there are several equivalent ways to create the engineering organization's src/cmd context. It could be done using the composite name org/engineering/fs:

```
example% cat input2
src/cmd      svr1:/export/cmd
example% fncreate_fs -f input2 org/engineering/fs
```

Equivalently, it could be done using the composite name org/engineering/fs/src:

```
example% cat input3
cmd      svr1:/export/cmd
example% fncreate_fs -f input3 org/engineering/fs/src
```

The same results could also be achieved by:

```
example% fncreate_fs org/engineering/fs/src/cmd svr1:/export/cmd
```

Note that cmd will also be mounted read-only, since it is a subcontext of src and does not have mount options of its own.

In the first example of this section, the -ro mount option was specified for each entry in the input file. It could instead have been specified only once:

```
example% cat input4
.      -ro
src      svr1:/export/src
dist     svr2,svr3:/export/dist
example% fncreate_fs -f input4 org/engineering/fs
```

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EXAMPLE 1 Using the fncreate_fs Command (Continued)

The `-ro` option here applies to all bindings in the context `org/engineering/fs` and any of its subcontexts. In particular, it also applies to the `cmd` context from the above examples.

The following will change the NFS server for the `src` context:

```
example% fncreate_fs org/engineering/fs/src svr4:/export/src
```

Had the `-r` option been used, the `cmd` subcontext would have been destroyed as well:

```
example% fncreate_fs -r org/engineering/fs/src svr4:/export/src
```

Only the FNS context is destroyed. The `/export/cmd` directory on `svr1` is not affected.

The file system contexts of users and hosts are not usually created by `fncreate_fs` (see the **NOTES** section below). The defaults set by `fncreate`, however, may be overridden. For example, the call:

```
example% fncreate_fs user/jane/fs svr1:/export/home/jane
```

sets Jane's file system to be an NFS mount from `svr1`.

EXIT STATUS 0 Operation was successful.

1 Operation failed.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWfns

SEE ALSO `fnbind(1)`, `fnlist(1)`, `fnlookup(1)`, `fnunbind(1)`, `nis+(1)`, `automount(1M)`, `fncreate(1M)`, `fndestroy(1M)`, `attributes(5)`, `fns(5)`, `fns_files(5)`, `fns_nis(5)`, `fns_nis+(5)`, `fns_policies(5)`

NOTES The `fncreate_fs` command affects the FNS file system namespace only. It does not have any effect on the servers that export the files and directories from which the namespace is constructed. Destroying an FNS context does not remove any files on any server.

FNS policies specify that file system contexts are bound after the namespace identifier `fs` in composite names (see `fns_policies(5)`). Therefore, *composite_name* must contain an `fs`. The alias `_fs` may be used in place of `fs`.

The context named by the components of *composite_name* preceding `fs` must exist prior to the call to `fncreate_fs`, since `fncreate_fs` creates *only* file system contexts.

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Default file system contexts for hosts and users are generally created by the command `fncreate(1M)`. These defaults may be overridden using `fncreate_fs`. Overriding a host's default file system context is unlikely to make sense.

The input file format is similar to the format of indirect automount maps (see `automount(1M)`). The differences are:

- the *name* field may be hierarchical, and may be `'.'`
- there are no included maps or special maps
- there may be entries with neither options nor locations
- the characters `'*'` and `'&'` have no special meaning

The process executing the `fncreate_fs` command may need certain credentials to update information in the underlying naming service. See `fns_nis(5)`, `fns_nis+(5)`, and `fns_files(5)` for more information.

fncreate_printer(1M)

NAME	fncreate_printer – create new printers in the FNS namespace
SYNOPSIS	fncreate_printer [-sv] <i>compositename printername printeraddr [printeraddr...]</i> fncreate_printer [-sv] [-f <i>filename</i>] <i>compositename</i>
DESCRIPTION	fncreate_printer creates a new printer context for an <i>organization</i>, <i>user</i>, <i>host</i>, or <i>site</i> object. <i>compositename</i> is the FNS name of the object. fncreate_printer uses <i>printername</i> to name the new printer and binds it to an FNS reference constructed from the set of <i>printeraddrs</i>. fncreate_printer may also be used to add new <i>printeraddrs</i> for an existing <i>printername</i>. The command also supports creating a set of printers as listed in the file <i>filename</i>. The new printer context is created with the FNS name <i><compositename>/service/printer/<printername></i>. If the intermediate <i>service</i> or <i>printer</i> names do not exist, their FNS contexts are also created by this command. Normally, these intermediate contexts would be created by an administrative script that uses fncreate(1M), and is run at the time a new FNS organization is set up. The reference bound to the FNS printer name is of type <i>onc_printers</i> and is constructed from the set of <i>printeraddrs</i>. A <i>printeraddr</i> is of the form <i><addresstype> = <address></i>. See printers.conf(4) for the format of <i>printeraddr</i> and also the examples below for currently supported address types and address strings. An FNS printer name is accepted as a valid printer name by lp(1), lpstat(1), cancel(1), lpmove(1M), lpr(1B), lpq(1B), and lprm(1B). The <i>printername</i> argument may be a slash-separated name. In this case, prior to creating the printer context denoted by the “leaf” name, this command will create printer context(s) for the intermediate node(s) if they do not already exist. See EXAMPLES. fncreate_printer creates entries in the naming service determined by fnselect(1M). See fnselect(1M) for more information on the default naming service and on selecting a naming service. Furthermore, the process executing the fncreate_printer command may require certain credentials to update information in the underlying namespace. See fns_nis+(5), fns_nis(5), and fns_files(5) for more information.
OPTIONS	-s The new <i>address</i> supersedes an existing address with the same <i>addresstype</i>, if any, for <i><compositename>/service/printer/<printername></i>. If this option is omitted, it appends the <i>printeraddr</i> to an existing reference, or creates a new reference using <i>printeraddr</i> for the printer. -v Displays information about individual printer contexts as they are created. -f <i>filename</i> Use <i>filename</i> to obtain a list of printers for which to create contexts. If this option is omitted, <i>/etc/printers.conf</i> is used as the

		input file, in which case the <code>-s</code> option should be used to supersede the entries already present in this file.
OPERANDS	<i>filename</i>	The file that contains a list of printers to be created. This file uses the same format as <code>/etc/printers.conf</code> . See <code>printers.conf(4)</code> for more information.
	<i>printername</i>	The name of the new printer context created.
	<i>printeraddr</i>	An address to be associated with the printer context name.
	<i>compositename</i>	The FNS name for the <code>org</code> , <code>host</code> , <code>user</code> , or <code>site</code> object for which the new printer contexts are created.
EXAMPLES	EXAMPLE 1 Creating Printer Contexts The following examples illustrate creating a set of printer contexts under an organization, a printer context for a user, and a printer context associated with a hierarchical printer name for a site, respectively. To create printers for an organization: <pre>example% fncreate_printer -s org/marketing</pre> This causes the creation of a printer context for every entry listed in the <code>/etc/printers.conf</code> file on the system where the command is executed. The printer contexts thus created are bound under the organization's printer context, <code>org/marketing/service/printer</code>. The <code>-s</code> flag is required to force the creation of the printer contexts in the underlying namespace, since the default <code>/etc/printers.conf</code> file is being used. To create a printer named <code>ps</code> for user <code>jsmith</code> and associate it with the <code>killtree</code> printer served by the print server <code>paperwaster</code>: <pre>example% fncreate_printer -s usr/jsmith ps bsdaddr=paperwaster,killtree</pre> This causes <code>jsmith's ps</code> <code>printername</code> to be associated with the <code>killtree</code> printer on the server <code>paperwaster</code>, overwriting any existing address of type <code>bsdaddr</code>. The user can print to this printer using the command: <pre>example% lp -d thisuser/service/printer/ps <filename></pre> To create a printer with the hierarchical name <code>color/fast</code> under a site: <pre>example% fncreate_printer site/bldg14/northwing color/fast \ bsdaddr=paperwaster,laser</pre> This causes the printer named <code>site/bldg14/northwing/service/printer/color/fast</code> to be associated with the laser printer on server <code>paperwaster</code>. If the intermediate printer context <code>site/bldg14/northwing/service/printer/color</code> does not exist, it will also be created and associated with the same printer. If the printer name <code>site/bldg14/northwing/service/printer/color/fast</code> already exists and has an address of type <code>bsdaddr</code> associated with it, this command will fail.	
EXIT STATUS	0	Successful operation.

fncreate_printer(1M)

1 Operation failed.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWfns

SEE ALSO cancel(1), lp(1), lpq(1B), lpr(1B), lprm(1B), lpstat(1), fncreate(1M),
fnselect(1M), lpmove(1M), printers(4), printers.conf(4), attributes(5),
fns(5), fns_files(5), fns_nis(5), fns_nis+(5)

NAME	fndestroy – destroy an FNS context				
SYNOPSIS	fndestroy <i>composite_name</i>				
DESCRIPTION	fndestroy removes the context bound to <i>composite_name</i> . The context is not removed if there are subcontexts associated with <i>composite_name</i> .				
EXAMPLES	EXAMPLE 1 Using The fndestroy Command The command <pre>example% fndestroy user/jsmith/</pre> destroys the context named by user/jsmith/ and removes the binding of jsmith from the context user/. This command fails if the context user/jsmith/ contains subcontexts, or if the invoker does not have the NIS+ credentials required to delete the NIS+ tables that store the user’s bindings. See fns(5).				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWfns</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWfns
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWfns				
SEE ALSO	fnlist(1), fnlookup(1), fnunbind(1), fncreate(1M), attributes(5), fns(5), fns_policies(5)				

fnselect(1M)

NAME	fnselect – select a specific naming service to use for the FNS Initial Context										
SYNOPSIS	fnselect [-D] fnselect <i>naming-service</i>										
DESCRIPTION	<i>fnselect</i> is used to set the specified naming service to be used to construct the bindings in the FNS Initial Context. This setting affects the entire machine and affects applications that make subsequent calls to <code>fn_ctx_handle_from_initial(3XFN)</code> . This setting can be changed only by an administrator who has root privilege on the machine.										
OPTIONS	-D	Displays the actual naming service used to generate the FNS Initial Context.									
OPERANDS	<i>naming-service</i>	The following are possible values for <i>naming-service</i> : <table><tr><td>default</td><td>Use the FNS default algorithm for determining the target naming service.</td></tr><tr><td>nisplus</td><td>Use NIS+ as the target naming service.</td></tr><tr><td>nis</td><td>Use NIS as the target naming service.</td></tr><tr><td>files</td><td>Use /etc files as the target naming service.</td></tr></table>		default	Use the FNS default algorithm for determining the target naming service.	nisplus	Use NIS+ as the target naming service.	nis	Use NIS as the target naming service.	files	Use /etc files as the target naming service.
default	Use the FNS default algorithm for determining the target naming service.										
nisplus	Use NIS+ as the target naming service.										
nis	Use NIS as the target naming service.										
files	Use /etc files as the target naming service.										
USAGE	When the default option is selected, FNS determines the underlying naming service using the following algorithm: ■ First, it checks for NIS+ with FNS installed. ■ If the result is TRUE, then FNS assumes nisplus as the underlying naming service. ■ Otherwise, it checks if the system is a NIS client. ■ If TRUE, FNS assumes nis as the underlying naming service. ■ Otherwise, FNS assumes /etc files. <i>fnselect</i> without any arguments displays the service currently selected for the Initial Context (one of default, nisplus, nis, or files). When the -D option is specified and the current setting is default, <i>fnselect</i> will use the algorithm that is used by FNS and display the actual naming service used for the FNS Initial Context.										
EXAMPLES	EXAMPLE 1 Using The <i>fnselect</i> Command										
	The command										
	example% <i>fnselect</i> nisplus										
	will select NIS+ as the underlying naming service for the FNS Initial Context.										
	The command										

EXAMPLE 1 Using The fnselect Command *(Continued)*

```
example% fnselect
```

will print the naming service currently being used to generate the FNS Initial Context.

EXIT STATUS 0 Operation was successful.

1 Operation failed.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWfns

SEE ALSO fnbind(1), fnlist(1), fnlookup(1), fnunbind(1), fncreate(1M),
fncreate_fs(1M), fncreate_printer(1M), fndestroy(1M),
fn_ctx_handle_from_initial(3XFN), attributes(5), fns(5),
fns_initial_context(5)

fnsypd(1M)

NAME	fnsypd – update FNS context on an NIS master server				
SYNOPSIS	/usr/sbin/fnsypd				
DESCRIPTION	The fnsypd daemon is a Remote Procedure Call (RPC) service that accepts requests from NIS clients to update and modify Federated Naming Service (FNS) contexts. This daemon runs on an NIS master server with FNS on top of it. The fnsypd daemon requires the Secure Key Infrastructure (SKI) mechanism for authentication. The SKI mechanism is part of the SUNWski package. If SUNWski is not installed, authentication cannot be performed and users will receive "permission denied" error messages. The SUNWski man pages are located at /opt/SUNWski/man. fnsypd enables users and hosts to modify only their respective FNS contexts. Organization, site, hostname and username contexts cannot be modified using fnsypd.				
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>1</td><td>An error occurred.</td></tr></table>	0	Successful completion.	1	An error occurred.
0	Successful completion.				
1	An error occurred.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWfns</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWfns
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWfns				
SEE ALSO	nis(1), attributes(5), fns(5), fns_policies(5)				

NAME	format – disk partitioning and maintenance utility
SYNOPSIS	format [-f <i>command-file</i>] [-l <i>log-file</i>] [-x <i>data-file</i>] [-d <i>disk-name</i>] [-t <i>disk-type</i>] [-p <i>partition-name</i>] [-s] [-m] [-M] [-e] [<i>disk-list</i>]
DESCRIPTION	format enables you to format, label, repair and analyze disks on your system. Unlike previous disk maintenance programs, format runs under SunOS. Because there are limitations to what can be done to the system disk while the system is running, format is also supported within the memory-resident system environment. For most applications, however, running format under SunOS is the more convenient approach. format first uses the disk list defined in <i>data-file</i> if the -x option is used. format then checks for the FORMAT_PATH environment variable, a colon-separated list of filenames and/or directories. In the case of a directory, format searches for a file named <i>format.dat</i> in that directory; a filename should be an absolute pathname, and is used without change. format adds all disk and partition definitions in each specified file to the working set. Multiple identical definitions are silently ignored. If FORMAT_PATH is not set, the path defaults to <i>/etc/format.dat</i>. <i>disk-list</i> is a list of disks in the form <i>c?t?d?</i> or <i>/dev/rdisk/c?t?d?s?</i>. With the latter form, shell wildcard specifications are supported. For example, specifying <i>/dev/rdisk/c2*</i> causes format to work on all drives connected to controller <i>c2</i> only. If no <i>disk-list</i> is specified, format lists all the disks present in the system that can be administered by format. Removable media devices are listed only when users execute format in expert mode (option -e). This feature is provided for backward compatibility. Use <i>rmformat(1)</i> for rewritable removable media devices.
OPTIONS	The following options are supported: -d <i>disk-name</i> Specify which disk should be made current upon entry into the program. The disk is specified by its logical name (for instance, -d <i>c0t1d0</i>). This can also be accomplished by specifying a single disk in the disk list. -e Enable SCSI expert menu. Note this option is not recommended for casual use. -f <i>command-file</i> Take command input from <i>command-file</i> rather than the standard input. The file must contain commands that appear just as they would if they had been entered from the keyboard. With this option, format does not issue <i>continue?</i> prompts; there is no need to specify <i>y(es)</i> or <i>n(o)</i> answers in the <i>command-file</i>. In non-interactive mode, format does not initially expect the input of a disk selection number. The user must specify the current working disk with the -d <i>disk-name</i>

format(1M)

	option when <code>format</code> is invoked, or specify <code>disk</code> and the disk selection number in the <i>command-file</i> .
<code>-l log-file</code>	Log a transcript of the <code>format</code> session to the indicated <i>log-file</i> , including the standard input, the standard output and the standard error.
<code>-m</code>	Enable extended messages. Provides more detailed information in the event of an error.
<code>-M</code>	Enable extended and diagnostic messages. Provides extensive information on the state of a SCSI device's mode pages, during formatting.
<code>-p partition-name</code>	Specify the partition table for the disk which is current upon entry into the program. The table is specified by its name as defined in the data file. This option can be used only if a disk is being made current, and its type is either specified or available from the disk label.
<code>-s</code>	Silent. Suppress all of the standard output. Error messages are still displayed. This is generally used in conjunction with the <code>-f</code> option.
<code>-t disk-type</code>	Specify the type of disk which is current upon entry into the program. A disk's type is specified by name in the data file. This option can only be used if a disk is being made current as described above.
<code>-x data-file</code>	Use the list of disks contained in <i>data-file</i> .

USAGE

When you invoke `format` with no options or with the `-e`, `-l`, `-m`, `-M`, or `-s` options, the program displays a numbered list of available disks and prompts you to specify a disk by list number. If the machine has more than 10 disks, press SPACE to see the next screenful of disks.

You can specify a disk by list number even if the disk is not displayed in the current screenful. For example, if the current screen shows disks 11-20, you can enter 25 to specify the twenty-fifth disk on the list. If you enter a number for a disk that is not currently displayed, `format` prompts you to verify your selection. If you enter a number from the displayed list, `format` silently accepts your selection.

After you specify a disk, `format` displays its main menu. This menu enables you to perform the following tasks:

analyze	Run read, write, and compare tests.
backup	Search for backup labels.
cache	Enable, disable, and query the state of the write cache and read cache. This menu item only appears when <code>format</code> is invoked with the <code>-e</code> option, and is only supported on SCSI devices..

format(1M)

	current	Display the device name, the disk geometry, and the pathname to the disk device.
	defect	Retrieve and print defect lists. This option is supported only on SCSI devices. IDE disks perform automatic defect management. Upon using the <code>defect</code> option on an IDE disk, you receive the message: <code>Controller does not support defect management or disk supports automatic defect management.</code>
	disk	Choose the disk that will be used in subsequent operations (known as the current disk.)
	fdisk	Run the <code>fdisk(1M)</code> program to create a <code>fdisk</code> partition for Solaris software (x86 based systems only).
	format	Format and verify the current disk. This option is supported only on SCSI devices. IDE disks are pre-formatted by the manufacturer. Upon using the <code>format</code> option on an IDE disk, you receive the message: <code>Cannot format this drive. Please use your manufacturer-supplied formatting utility.</code>
	inquiry	Display the vendor, product name, and revision level of the current drive.
	label	Write a new label to the current disk.
	partition	Create and modify slices.
	quit	Exit the format menu.
	repair	Repair a specific block on the disk.
	save	Save new disk and slice information.
	type	Select (define) a disk type.
	verify	Read and display labels. Print information such as the number of cylinders, alternate cylinders, heads, sectors, and the partition table.
	volname	Label the disk with a new eight character volume name.
ENVIRONMENT VARIABLES	FORMAT_PATH	a colon-separated list of filenames and/or directories of disk and partition definitions. If a directory is specified, <code>format</code> searches for the file <code>format.dat</code> in that directory.
FILES	/etc/format.dat	default data file

format(1M)

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

fmthard(1M), prtvtoc(1M), rmformat(1), format.dat(4), attributes(5), sd(7D)

System Administration Guide: Basic Administration

x86 Only

fdisk(1M)

WARNINGS

When the `format` function is selected to format the Maxtor 207MB disk, the following message displays:

Mode sense page(4) reports rpm value as 0, adjusting it to 3600

This is a drive bug that may also occur with older third party drives. The above message is not an error; the drive will still function correctly.

Cylinder 0 contains the partition table (disk label), which can be overwritten if used in a raw disk partition by third party software.

`format` supports writing EFI-compliant disk labels in order to support disks or LUNs with capacities greater than one terabyte. However, care should be exercised since many software components, such as filesystems and volume managers, are still restricted to capacities of one terabyte or less. See the *System Administration Guide: Basic Administration* for additional information.

NOTES

`format` provides a help facility you can use whenever `format` is expecting input. You can request help about what information is expected by simply entering a question mark (?) and `format` prints a brief description of what type of input is needed. If you enter a ? at the menu prompt, a list of available commands is displayed.

For SCSI disks, formatting is done with both Primary and Grown defects list by default. However, if only Primary list is extracted in defect menu before formatting, formatting will be done with Primary list only.

Changing the state of the caches is only supported on SCSI devices, and not all SCSI devices support changing or saving the state of the caches.

NAME	fruadm – prints and updates customer data associated with FRUs	
SYNOPSIS	<pre> /usr/platform/sun4u/sbin/fruadm /usr/platform/sun4u/sbin/fruadm -l /usr/platform/sun4u/sbin/fruadm [-r] path [text] </pre>	
DESCRIPTION	fruadm prints or sets the customer data for Field-Replaceable Units (FRUs). Without arguments, fruadm prints the paths of all FRU ID-capable FRUs (containers) in the system, along with the contents of the customer data record, if present, for each such FRU; for FRUs without customer data, fruadm prints only the container's path. Only a privileged user can create or update data in containers. The privileges required to perform these write operations are hardware dependent. Typically, a default system configuration restricts write operations to the superuser or to the platform-administrator user.	
OPTIONS	The following options are supported: -l List the system's frutree paths. -r Recursively display or update the data for all containers rooted at the argument <i>path</i>.	
OPERANDS	The following operands are supported: <i>path</i> A full or partial system frutree path for or under which to print or set the customer data. The first field of each line of output of fruadm -l gives the valid full frutree paths for the system. Paths can include shell meta-characters; such paths should be quoted appropriately for the user's shell. For partial paths, the first matching full path is selected for display or update. Without the -r option, the path must be that of a container; with the -r option, all containers (if any) under <i>path</i> will be selected. <i>text</i> Up to 80 characters of text set as the customer data. If the text contains white space or shell metacharacters, it should be quoted appropriately for the user's shell.	
EXAMPLES	EXAMPLE 1 Displaying All Customer Data The following example prints all customer data available from FRUs on the system. For containers with no customer data, only the containers' paths will be listed. <pre>example% fruadm</pre>	

fruadm(1M)

EXAMPLE 2 Displaying Customer Data For a Single FRU

The following command prints the customer data, if present, for the specified FRU:

```
example% fruadm /frutree/chassis/system-board
```

EXAMPLE 3 Displaying Customer Data For a Single FRU

The following command prints the customer data, if present, for the first mem-module found:

```
example% fruadm mem-module
```

EXAMPLE 4 Setting Customer Data

The following example sets the customer data for a FRU:

```
example# fruadm system-board 'Asset Tag 123456'
```

EXAMPLE 5 Setting Customer Data

The following command sets the customer data for all FRUs under chassis:

```
example# fruadm -r /frutree/chassis "Property of XYZ, Inc."
```

EXIT STATUS The following exit values are returned:

0 Successful completion.

>0 An error occurred.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWfruip.u
Interface Stability	Unstable

SEE ALSO prtfru(1M), attributes(5)

NAME	fsck – check and repair file systems						
SYNOPSIS	fsck [-F <i>FSType</i>] [-m] [-V] [<i>special...</i>] fsck [-F <i>FSType</i>] [-n N y Y] [-V] [-o <i>FSType-specific-options</i>] [<i>special...</i>]						
DESCRIPTION	fsck audits and interactively repairs inconsistent file system conditions. If the file system is inconsistent the default action for each correction is to wait for the user to respond yes or no. If the user does not have write permission fsck defaults to a no action. Some corrective actions will result in loss of data. The amount and severity of data loss can be determined from the diagnostic output. <i>FSType-specific-options</i> are options specified in a comma-separated (with no intervening spaces) list of options or keyword-attribute pairs for interpretation by the <i>FSType</i>-specific module of the command. <i>special</i> represents the character special device on which the file system resides, for example, /dev/rdisk/c1t0d0s7. Note: the character special device, not the block special device, should be used. fsck will not work on a block device if it is mounted. If no <i>special</i> device is specified fsck checks the file systems listed in /etc/vfstab. Those entries in /etc/vfstab which have a character special device entry in the fsckdev field and have a non-zero numeric entry in the fsckpass field will be checked. Specifying -F <i>FSType</i> limits the file systems to be checked to those of the type indicated. If <i>special</i> is specified, but -F is not, the file system type will be determined by looking for a matching entry in /etc/vfstab. If no entry is found, the default local file system type specified in /etc/default/fs will be used. If a file system type supports parallel checking, for example, ufs, some file systems eligible for checking may be checked in parallel. Consult the file system-specific man page (for example, fsck_ufs(1M)) for more information.						
OPTIONS	The following generic options are supported: <table> <tr> <td>-F <i>FSType</i></td><td>Specify the file system type on which to operate.</td></tr> <tr> <td>-m</td><td>Check but do not repair. This option checks that the file system is suitable for mounting, returning the appropriate exit status. If the file system is ready for mounting, fsck displays a message such as: ufs fsck: sanity check: /dev/rdisk/c0t3d0s1 okay</td></tr> <tr> <td>-n -N</td><td>Assume a no response to all questions asked by fsck; do not open the file system for writing.</td></tr> </table>	-F <i>FSType</i>	Specify the file system type on which to operate.	-m	Check but do not repair. This option checks that the file system is suitable for mounting, returning the appropriate exit status. If the file system is ready for mounting, fsck displays a message such as: ufs fsck: sanity check: /dev/rdisk/c0t3d0s1 okay	-n -N	Assume a no response to all questions asked by fsck; do not open the file system for writing.
-F <i>FSType</i>	Specify the file system type on which to operate.						
-m	Check but do not repair. This option checks that the file system is suitable for mounting, returning the appropriate exit status. If the file system is ready for mounting, fsck displays a message such as: ufs fsck: sanity check: /dev/rdisk/c0t3d0s1 okay						
-n -N	Assume a no response to all questions asked by fsck; do not open the file system for writing.						

fsck(1M)

	-v	Echo the expanded command line but do not execute the command. This option may be used to verify and to validate the command line.
	-y Y	Assume a <i>yes</i> response to all questions asked by <i>fsck</i> .
	-o <i>specific-options</i>	These <i>specific-options</i> can be any combination of the following separated by commas (with no intervening spaces).
	b= <i>n</i>	Use block <i>n</i> as the super block for the file system. Block 32 is always one of the alternate super blocks. Determine the location of other super blocks by running <i>newfs</i> (1M) with the <i>-Nv</i> options specified.
	c	If the file system is in the old (static table) format, convert it to the new (dynamic table) format. If the file system is in the new format, convert it to the old format provided the old format can support the file system configuration. In interactive mode, <i>fsck</i> will list the direction the conversion is to be made and ask whether the conversion should be done. If a negative answer is given, no further operations are done on the file system. In preen mode, the direction of the conversion is listed and done if possible without user interaction. Conversion in preen mode is best used when all the file systems are being converted at once. The format of a file system can be determined from the first line of output from <i>fstyp</i> (1M). Note: the <i>c</i> option is seldom used and is included only for compatibility with pre-4.1 releases. There is no guarantee that this option will be included in future releases.
	f	Force checking of file systems regardless of the state of their super block clean flag.
	p	Check and fix the file system non-interactively ("preen"). Exit immediately if there is a problem requiring intervention. This option is required to enable parallel file system checking.
	w	Check writable file systems only.
EXIT STATUS	0	file system is okay and does not need checking
	1	erroneous parameters are specified

```

32     file system is unmounted and needs checking (fsck -m only)
33     file system is already mounted
34     cannot stat device
35     uncorrectable errors detected - terminate normally
36     a signal was caught during processing
37     uncorrectable errors detected - terminate immediately
38     for root, same as 0.

```

USAGE	See <code>largefile(5)</code> for the description of the behavior of <code>fsck</code> when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).

FILES	<code>/etc/default/fs</code>	default local file system type. Default values can be set for the following flags in <code>/etc/default/fs</code> . For example: <code>LOCAL=ufs</code> .
	<code>LOCAL</code>	The default partition for a command if no <code>FSType</code> is specified.
	<code>/etc/vfstab</code>	list of default parameters for each file system

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `clri(1M)`, `fsck_cachefs(1M)`, `fsck_ufs(1M)`, `fsdb_ufs(1M)`, `fsirand(1M)`, `fstyp(1M)`, `mkfs(1M)`, `mkfs_ufs(1M)`, `mountall(1M)`, `newfs(1M)`, `reboot(1M)`, `vfstab(4)`, `attributes(5)`, `largefile(5)`, `ufs(7FS)`

WARNINGS	The operating system buffers file system data. Running <code>fsck</code> on a mounted file system can cause the operating system's buffers to become out of date with respect to the disk. For this reason, the file system should be <i>unmounted</i> when <code>fsck</code> is used. If this is not possible, care should be taken that the system is quiescent and that it is rebooted immediately after <code>fsck</code> is run. Quite often, however, this will not be sufficient. A panic will probably occur if running <code>fsck</code> on a file system modifies the file system.

NOTES	This command may not be supported for all <i>FSTypes</i> .

Running `fsck` on file systems larger than 2 Gb fails if the user chooses to use the block interface to the device:

```
fsck /dev/dsk/c?t?d?s?
```

rather than the raw (character special) device:

fsck(1M)

```
fsck /dev/rdisk/c?t?d?s?
```

Starting with Solaris 9, `fsck` manages extended attribute data on the disk. (See `fsattr(5)` for a description of extended file attributes.) A file system with extended attributes can be mounted on versions of Solaris that are not attribute-aware (versions prior to Solaris 9), but the attributes will not be accessible and `fsck` will strip them from the files and place them in `lost+found`. Once the attributes have been stripped, the file system is completely stable on versions of Solaris that are attribute-aware, but would be considered corrupted on attribute-aware versions. In the latter circumstance, run the attribute-aware `fsck` to stabilize the file system before using it in an attribute-aware environment.

NAME	fsck_cachefs – check integrity of data cached with CacheFS				
SYNOPSIS	fsck -F cachefs [-m] [-o noclean] <i>cache_directory</i>				
DESCRIPTION	The CacheFS version of the <i>fsck</i> command checks the integrity of a cache directory. This utility corrects any CacheFS problems it finds by default. There is no interactive mode. The most likely invocation of <i>fsck</i> for CacheFS file systems is at boot time from an entry in the <i>/etc/vfstab</i> file. See <i>vfstab</i> (4).				
OPTIONS	The following options are supported: -m Check, but do not repair. -o noclean Force a check on the cache even if there is no reason to suspect there is a problem.				
EXAMPLES	EXAMPLE 1 Using <i>fsck_cachefs</i> to Force a Check on the Cache Directory The following example forces a check on the cache directory <i>/cache3</i>: <pre>example% fsck -F cachefs -o noclean /cache3</pre>				
ATTRIBUTES	See <i>attributes</i>(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<i>cfsadmin</i> (1M), <i>fsck</i> (1M), <i>mount_cachefs</i> (1M), <i>vfstab</i> (4), <i>attributes</i> (5)				

fsck_pcfs(1M)

NAME	fsck_pcfs – file system consistency check and interactive repair							
SYNOPSIS	fsck -F pcfs [<i>generic_options</i>] <i>special</i> fsck -F pcfs [<i>generic_options</i>] [-o <i>specific_options</i>] <i>special</i>							
DESCRIPTION	The fsck utility audits and interactively repairs inconsistent conditions on file systems. <i>special</i> represents the character special device on which the file system resides, for example /dev/rdiskette. The character special device, not the block special device, should be used. In the case of correcting serious inconsistencies, by default, fsck asks for confirmation before making a repair and waits for the operator to respond either <i>yes</i> or <i>no</i>. If the operator does not have write permission on the file system, fsck defaults to a -n (no corrections) action. See fsck(1M). Repairing some file system inconsistencies may result in loss of data. The amount and severity of data loss may be determined from the diagnostic output. When executed with the verify option (-o v), fsck_pcfs automatically scans the entire file system to verify that all of its allocation units are accessible. If it finds any units inaccessible, it updates the file allocation table (FAT) appropriately. It also updates any effected directory entries to reflect the problem. This directory update includes truncating the file at the point in its allocation chain where the file data is no longer accessible. Any remaining accessible allocation units become orphaned. Orphaned chains of accessible allocation units are, with the operator’s concurrence, linked back into the file system as files in the root directory. These files are assigned names of the form fileNNNN.chk, where the <i>Ns</i> are digits in the integral range from 0 through 9. After successfully scanning and correcting any errors in the file system, fsck displays a summary of information about the file system. This summary includes the size of the file system in bytes, the number of bytes used in directories and individual files, and the number of available allocation units remaining in the file system.							
OPTIONS	<i>generic_options</i>	The following generic options are supported: <table><tr><td>-m</td><td>Check but do not repair. This option checks that the file system is suitable for mounting, returning the appropriate exit status. If the file system is ready for mounting, fsck displays a message such as:</td></tr><tr><td></td><td><pre>pcfs fsck: sanity check: /dev/rdiskette okay</pre></td></tr><tr><td>-n -N</td><td>Assume a no response to all questions asked by fsck; do not open the file system for writing.</td></tr></table>	-m	Check but do not repair. This option checks that the file system is suitable for mounting, returning the appropriate exit status. If the file system is ready for mounting, fsck displays a message such as:		<pre>pcfs fsck: sanity check: /dev/rdiskette okay</pre>	-n -N	Assume a no response to all questions asked by fsck ; do not open the file system for writing.
-m	Check but do not repair. This option checks that the file system is suitable for mounting, returning the appropriate exit status. If the file system is ready for mounting, fsck displays a message such as:							
	<pre>pcfs fsck: sanity check: /dev/rdiskette okay</pre>							
-n -N	Assume a no response to all questions asked by fsck ; do not open the file system for writing.							

		fsck_pcfs(1M)						
		-V Echo the expanded command line, but do not execute the command. This option may be used to verify and to validate the command line.						
		-y -Y Assume a yes response to all questions asked by fsck.						
	-o <i>specific_options</i>	Specify pcfs file system specific options in a comma-separated list, in any combination, with no intervening spaces.						
	v	Verify all allocation units are accessible prior to correcting inconsistencies in the metadata.						
	p	Check and fix the file system non-interactively (preen). Exit immediately if there is a problem requiring intervention.						
	w	Check writable file systems only.						
FILES	<i>special</i>	The device which contains the pcfs. The device name for a diskette is specified as /dev/rdiskette0 for the first diskette drive, or /dev/rdiskette1 for a second diskette drive. A hard disk device or high-capacity removable device name much be qualified with a suffix to indicate the proper FDISK partition. For example, in the names: /dev/rdsk/c0t0d0p0:c and /dev/rdsk/c0t4d0s2:c, the :c suffix indicates the first partition on the disk contains the pcfs.						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:							
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWesu</td></tr><tr><td>Interface Stability</td><td>Stable</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWesu	Interface Stability	Stable
ATTRIBUTE TYPE	ATTRIBUTE VALUE							
Availability	SUNWesu							
Interface Stability	Stable							
SEE ALSO	fsck(1M), fstyp(1M), fdisk(1M), mkfs(1M), mkfs_pcfs(1M), mountall(1M), attributes(5), pcfs(7FS),							
WARNINGS	The operating system buffers file system data. Running fsck on a mounted file system can cause the operating system’s buffers to become out of date with respect to the disk. For this reason, the file system should be unmounted when fsck is used. If this is not possible, care should be taken that the system is quiescent and that it is rebooted immediately after fsck is run. Quite often, however, this is not sufficient. A panic will probably occur if running fsck on a file system modifies the file system.							

fsck_udfs(1M)

NAME	fsck_udfs – file system consistency check and interactive repair
SYNOPSIS	fsck -F udfs [<i>generic_options</i>] [<i>special</i> ...] fsck -F udfs [<i>generic_options</i>] [-o <i>specific_options</i>] [<i>special</i> ...]
DESCRIPTION	fsck audits and interactively repairs inconsistent conditions on file systems. A file system to be checked can be specified by giving the name of the block or character special device or by giving the name of its mount point if a matching entry exists in /etc/vfstab. <i>special</i> represents the character special device, for example, /dev/rdisk/c0t2d0s0, on which the file system resides. The character special device, not the block special device should be used. fsck does not work on a mounted block device. If no special device is specified, all udfs file systems specified in the vfstab file with a fsckdev entry are checked. If the -p (green) option is specified, udfs file systems with an fsckpass number greater than 1 are checked in parallel. See fsck(1M). In the case of correcting serious inconsistencies, by default, fsck asks for confirmation before making a repair and waits for the operator to respond with either yes or no. If the operator does not have write permission on the file system, fsck defaults to the -n (no corrections) option. See fsck(1M). Repairing some file system inconsistencies can result in loss of data. The amount and severity of data loss can be determined from the diagnostic output. fsck automatically corrects innocuous inconsistencies. It displays a message for each corrected inconsistency that identifies the nature of the correction which took place on the file system. After successfully correcting a file system, fsck prints the number of files on that file system and the number of used and free blocks. Inconsistencies checked are as follows: ■ Blocks claimed by more than one file or the free list ■ Blocks claimed by a file or the free list outside the range of the file system ■ Incorrect link counts in file entries ■ Incorrect directory sizes ■ Bad file entry format ■ Blocks not accounted for anywhere ■ Directory checks, file pointing to unallocated file entry and absence of a parent directory entry ■ Descriptor checks, more blocks for files than there are in the file system ■ Bad free block list format ■ Total free block count incorrect OPTIONS The following options are supported:

generic_options

The following *generic_options* are supported:

-m

Check but do not repair. This option checks to be sure that the file system is suitable for mounting, and returns the appropriate exit status. If the file system is ready for mounting, `fsck` displays a message such as:

```
udfs fsck: sanity check: /dev/rdsk/c0t2d0s0 okay
```

-n | -N

Assume a no response to all questions asked by `fsck`; do not open the file system for writing.

-V

Echo the expanded command line, but do not execute the command. This option can be used to verify and to validate the command line.

-y | -Y

Assume a yes response to all questions asked by `fsck`.

-o *specific_options*

Specify `udfs` file system specific options in a comma-separated list with no intervening spaces. The following *specific_options* are available:

f

Force checking of file systems regardless of the state of their logical volume integrity state.

p

Check and fix the file system non-interactively (`preen`). Exit immediately if there is a problem that requires intervention. This option is required to enable parallel file system checking.

w

Check writable file systems only.

FILES `/etc/vfstab` List of default parameters for each file system.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWudf

SEE ALSO `fsck(1M)`, `fsdb_udfs(1M)`, `fstyp(1M)`, `mkfs(1M)`, `mkfs_udfs(1M)`, `mountall(1M)`, `reboot(1M)`, `vfstab(4)`, `attributes(5)`

WARNINGS The operating system buffers file system data. Running `fsck` on a mounted file system can cause the operating system's buffers to become out of date with respect to the disk. For this reason, use `fsck` only when the file system is unmounted. If this is

fsck_udfs(1M)

not possible, take care that the system is quiescent and that it is rebooted immediately after running `fsck`. A panic will probably occur if running `fsck` on a file system that modifies the file system while it is mounted.

If an unmount of the file system is not done before the system is shut down, the file system might become corrupted. In this case, a file system check needs to be completed before the next mount operation.

DIAGNOSTICS

not writable

You cannot write to the device.

Currently Mounted on

The device is already mounted and cannot run `fsck`.

FILE SYSTEM WAS MODIFIED

File system has been modified to bring it to a consistent state.

Can't read allocation extent

Cannot read the block containing allocation extent.

Bad tag on alloc extent

Invalid tag detected when expecting an allocation extent.

Volume sequence tag error

Invalid tag detected in the volume sequence.

Space bitmap tag error

Invalid tag detected in the space bitmap.

UNEXPECTED INCONSISTENCY; RUN `fsck` MANUALLY

Use `fsck` in interactive mode.

NAME	fsck_ufs – file system consistency check and interactive repair
SYNOPSIS	<pre>fsck -F ufs [<i>generic-options</i>] [<i>special...</i>]</pre> <pre>fsck -F ufs [<i>generic-options</i>] [-o <i>specific-options</i>] [<i>special...</i>]</pre>
DESCRIPTION	The <code>fsck</code> utility audits and interactively repairs inconsistent conditions on file systems. A file system to be checked may be specified by giving the name of the block or character <i>special</i> device or by giving the name of its mount point if a matching entry exists in <code>/etc/vfstab</code>. The <i>special</i> parameter represents the character special device, for example, <code>/dev/rdisk/c1t0d0s7</code>, on which the file system resides. The character special device, not the block special device should be used. The <code>fsck</code> utility will not work on a block device if the block device is mounted, unless the file system is error-locked. If no <i>special</i> device is specified, all <code>ufs</code> file systems specified in the <code>vfstab</code> with a <code>fsckdev</code> entry will be checked. If the <code>-p</code> (“preen”) option is specified, <code>ufs</code> file systems with an <code>fsckpass</code> number greater than 1 are checked in parallel. See <code>fsck(1M)</code>. In the case of correcting serious inconsistencies, by default, <code>fsck</code> asks for confirmation before making a repair and waits for the operator to respond either <code>yes</code> or <code>no</code>. If the operator does not have write permission on the file system, <code>fsck</code> will default to a <code>-n</code> (no corrections) action. See <code>fsck(1M)</code>. Repairing some file system inconsistencies can result in loss of data. The amount and severity of data loss can be determined from the diagnostic output. The <code>fsck</code> utility automatically corrects innocuous inconsistencies such as unreferenced inodes, too-large link counts in inodes, missing blocks in the free list, blocks appearing in the free list and also in files, or incorrect counts in the super block. It displays a message for each inconsistency corrected that identifies the nature of the correction on the file system which took place. After successfully correcting a file system, <code>fsck</code> prints the number of files on that file system, the number of used and free blocks, and the percentage of fragmentation. Inconsistencies checked are as follows: ■ Blocks claimed by more than one inode or the free list. ■ Blocks claimed by an inode or the free list outside the range of the file system. ■ Incorrect link counts. ■ Incorrect directory sizes. ■ Bad inode format. ■ Blocks not accounted for anywhere. ■ Directory checks, file pointing to unallocated inode, inode number out of range, and absence of <code>'.'</code> and <code>'..'</code> as the first two entries in each directory. ■ Super Block checks: more blocks for inodes than there are in the file system.

fsck_ufs(1M)

- Bad free block list format.
- Total free block and/or free inode count incorrect.

Orphaned files and directories (allocated but unreferenced) are, with the operator's concurrence, reconnected by placing them in the `lost+found` directory. The name assigned is the inode number. If the `lost+found` directory does not exist, it is created. If there is insufficient space in the `lost+found` directory, its size is increased.

An attempt to mount a `ufs` file system with the `-o nolargefiles` option will fail if the file system has ever contained a large file (a file whose size is greater than or equal to 2 Gbyte). Invoking `fsck` resets the file system state if no large files are present in the file system. A successful mount of the file system after invoking `fsck` indicates the absence of large files in the file system. An unsuccessful mount attempt indicates the presence of at least one large file. See `mount_ufs(1M)`.

OPTIONS

The *generic-options* consist of the following options:

-m	Check but do not repair. This option checks that the file system is suitable for mounting, returning the appropriate exit status. If the file system is ready for mounting, <code>fsck</code> displays a message such as: <code>ufs fsck: sanity check: /dev/rdisk/c0t3d0s1 okay</code>
-n N	Assume a no response to all questions asked by <code>fsck</code> ; do not open the file system for writing.
-v	Echo the expanded command line, but do not execute the command. This option may be used to verify and to validate the command line.
-y Y	Assume a yes response to all questions asked by <code>fsck</code> .

See generic `fsck(1M)` for the details for specifying *special*.

-o <i>specific-options</i>	Specify <code>ufs</code> file system specific options. These options can be any combination of the following separated by commas (with no intervening spaces). b=<i>n</i> Use block <i>n</i> as the super block for the file system. Block 32 is always one of the alternate super blocks. Determine the location of other super blocks by running <code>newfs(1M)</code> with the <code>-Nv</code> options specified. c If the file system is in the old (static table) format, convert it to the new (dynamic table) format. If the file system is in the new format, convert it to the old format provided the old format can support the file system configuration. In interactive mode, <code>fsck</code> will

fsck_ufs(1M)

list the direction the conversion is to be made and ask whether the conversion should be done. If a negative answer is given, no further operations are done on the file system. In preen mode, the direction of the conversion is listed and done if possible without user interaction. Conversion in preen mode is best used when all the file systems are being converted at once. The format of a file system can be determined from the first line of output from `fstyp(1M)`. Note: the `c` option is seldom used and is included only for compatibility with pre-4.1 releases. There is no guarantee that this option will be included in future releases.

f
Force checking of file systems regardless of the state of their super block clean flag.

p
Check and fix the file system non-interactively (“preen”). Exit immediately if there is a problem requiring intervention. This option is required to enable parallel file system checking.

w
Check writable file systems only.

FILES /etc/vfstab list of default parameters for each file system

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `clri(1M)`, `fsck(1M)`, `fsdb_ufs(1M)`, `fsirand(1M)`, `fstyp(1M)`, `mkfs(1M)`, `mkfs_ufs(1M)`, `mount_ufs(1M)`, `mountall(1M)`, `newfs(1M)`, `reboot(1M)`, `vfstab(4)`, `attributes(5)`, `largefile(5)`, `ufs(7FS)`,

WARNINGS The operating system buffers file system data. Running `fsck` on a mounted file system can cause the operating system’s buffers to become out of date with respect to the disk. For this reason, the file system should be *unmounted* when `fsck` is used. If this is not possible, care should be taken that the system is quiescent and that it is rebooted immediately after `fsck` is run. Quite often, however, this will not be sufficient. A panic will probably occur if running `fsck` on a file system modifies the file system.

NOTES It is usually faster to check the character special device than the block special device.

`fsck_ufs(1M)`

Running `fsck` on file systems larger than 2 Gb fails if the user chooses to use the block interface to the device:

```
fsck /dev/dsk/c?t?d?s?
```

rather than the raw (character special) device:

```
fsck /dev/rdisk/c?t?d?s?
```


NAME	fsdb – file system debugger						
SYNOPSIS	fsdb [-F <i>FSType</i>] [-V] [-o <i>FSType-specific_options</i>] <i>special</i>						
DESCRIPTION	fsdb is a file system debugger that allows for the manual repair of a file system after a crash. <i>special</i> is a special device used to indicate the file system to be debugged. fsdb is intended for experienced users only. <i>FSType</i> is the file system type to be debugged. Since different <i>FSTypes</i> have different structures and hence different debugging capabilities, the manual pages for the <i>FSType</i> -specific fsdb should be consulted for a more detailed description of the debugging capabilities.						
OPTIONS	-F	Specify the <i>FSType</i> on which to operate. The <i>FSType</i> should either be specified here or be determinable from /etc/vfstab by matching the <i>special</i> with an entry in the table, or by consulting /etc/default/fs.					
	-V	Echo the complete command line, but do not execute the command. The command line is generated by using the options and arguments provided by the user and adding to them information derived from /etc/vfstab. This option may be used to verify and validate the command line.					
	-o	Specify <i>FSType</i> -specific options.					
USAGE	See largefile(5) for the description of the behavior of fsdb when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).						
FILES	/etc/default/fs	default local file system type. Default values can be set for the following flags in /etc/default/fs. For example: LOCAL=ufs					
		LOCAL: The default partition for a command if no <i>FSType</i> is specified.					
	/etc/vfstab	list of default parameters for each file system					
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:						
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>			ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWcsu						
SEE ALSO	vfstab(4), attributes(5), largefile(5) Manual pages for the <i>FSType</i> -specific modules of fsdb.						
NOTES	This command may not be supported for all <i>FSTypes</i> .						

fsdb_udfs(1M)

NAME	fsdb_udfs – udfs file system debugger
SYNOPSIS	fsdb [-F] udfs [<i>generic_option</i>] [-o <i>specific_option</i>] <i>special</i>
DESCRIPTION	The <code>fsdb_udfs</code> command is an interactive tool that can be used to patch up a damaged udfs file system. <code>fsdb_udfs</code> has conversions to translate block and i-numbers into their corresponding disk addresses. Mnemonic offsets to access different parts of an inode are also included. Mnemonic offsets greatly simplify the process of correcting control block entries or descending the file system tree. <code>fsdb</code> contains several error-checking routines to verify inode and block addresses. These can be disabled if necessary by invoking <code>fsdb</code> with the <code>-o</code> option or by using the <code>o</code> command. <code>fsdb</code> reads one block at a time, and therefore works with raw as well as block I/O devices. A buffer management routine is used to retain commonly used blocks of data in order to reduce the number of read system calls. All assignment operations result in an immediate write-through of the corresponding block. In order to modify any portion of the disk, <code>fsdb</code> must be invoked with the <code>-w</code> option. Wherever possible, <code>adb</code>-like syntax has been adopted to promote the use of <code>fsdb</code> through familiarity.
OPTIONS	The following options are supported: -o <i>specific_option</i> Specify udfs file system specific options in a comma-separated list with no intervening spaces. The following specific options are supported: - o Override some error conditions. - p=<i>string</i> Set prompt to <i>string</i>. - w Open for write. ? Display usage.
USAGE	Numbers are considered hexadecimal by default. The user has control over how data is to be displayed or accepted. The <code>base</code> command displays or sets the input and output base. Once set, all input defaults to this base and all output displays in this base. The base can be overridden temporarily for input by preceding hexadecimal numbers by <code>0x</code>, preceding decimal numbers with a <code>0t</code>, or octal numbers with a <code>0</code>. Hexadecimal numbers beginning with <code>a-f</code> or <code>A-F</code> must be preceded with a <code>0x</code> to distinguish them from commands. Disk addressing by <code>fsdb</code> is at the byte level. However, <code>fsdb</code> offers many commands to convert a desired inode, directory entry, block, and so forth, to a byte address. After the address has been calculated, <code>fsdb</code> records the result in the current address (<code>dot</code>).

Several global values are maintained by `fsdb`:

- Current base (referred to as `base`)
- Current address (referred to as `dot`)
- Current inode (referred to as `inode`)
- Current count (referred to as `count`)
- Current type (referred to as `type`)

Most commands use the preset value of `dot` in their execution. For example,

```
> 2:inode
```

first sets the value of `dot` (.) to 2, colon (:), signifies the start of a command, and the `inode` command sets `inode` to 2. A count is specified after a comma (,). Once set, count remains at this value until a new command is encountered that resets the value back to 1 (the default).

So, if

```
> 2000,400/X
```

is entered, 400 hex longs are listed from 2000, and when completed, the value of `dot` is $2000 + 400 * \text{sizeof}(\text{long})$. If a RETURN is then entered, the output routine uses the current values of `dot`, `count`, and `type` and displays 400 more hex longs. An asterisk (*) causes the entire block to be displayed. An example showing several commands and the use of RETURN would be:

```
> 2:ino; 0:dir?d
or
```

```
> 2:ino; 0:db:block?d
```

The two examples are synonymous for getting to the first directory entry of the root of the file system. Once there, subsequently entering a RETURN, plus (+), or minus (-) advances to subsequent entries. Notice that

```
> 2:inode; :ls
or
```

```
> :ls /
```

is again synonymous.

Expressions

The following symbols are recognized by `fsdb`:

RETURN

Update the value of `dot` by the current value of *type* and *display* using the current value of *count*.

#

Update the value of `dot` by specifying a numeric expression. Specify numeric expressions using addition, subtraction, multiplication, and division operators (+, -, *, and %). Numeric expressions are evaluated from left to right and can use parentheses. After evaluation, the value of `dot` is updated.

, *count*

Update the count indicator. The global value of *count* is updated to *count*. The value of *count* remains until a

	new command is run. A <i>count</i> specifier of * attempts to show a blocks's worth of information. The default for <i>count</i> is 1.
? <i>f</i>	Display in structured style with format specifier <i>f</i> . See Formatted Output.
/ <i>f</i>	Display in unstructured style with format specifier <i>f</i> . See Formatted Output.
.	Display the value of dot.
+ <i>e</i>	Increment the value of dot by the expression <i>e</i> . The amount actually incremented is dependent on the size of type: <code>dot = dot + e * sizeof (type)</code> The default for <i>e</i> is 1.
- <i>e</i>	Decrement the value of dot by the expression <i>e</i> . See +.
* <i>e</i>	Multiply the value of dot by the expression <i>e</i> . Multiplication and division don't use <i>type</i> . In the above calculation of dot, consider the <code>sizeof (type)</code> to be 1.
% <i>e</i>	Divide the value of dot by the expression <i>e</i> . See *.
< <i>name</i>	Restore an address saved in register <i>name</i> . <i>name</i> must be a single letter or digit.
> <i>name</i>	Save an address in register <i>name</i> . <i>name</i> must be a single letter or digit.
= <i>f</i>	Display indicator. If <i>f</i> is a legitimate format specifier (see Formatted Output), then the value of dot is displayed using format specifier <i>f</i> . Otherwise, assignment is assumed. See = [<i>s</i>] [<i>e</i>].
= [<i>s</i>] [<i>e</i>]	Change the value of dot using an assignment indicator. The address pointed to by dot has its contents changed to the value of the expression <i>e</i> or to the ASCII representation of the quoted (") string <i>s</i> . This can be useful for changing directory names or ASCII file information.
=+ <i>e</i>	Change the value of dot using an incremental assignment. The address pointed to by dot has its contents incremented by expression <i>e</i> .
=- <i>e</i>	Change the value of dot using a decremental assignment. Decrement the contents of the address pointed to by dot by expression <i>e</i> .

Commands	A command must be prefixed by a colon (:). Only enough letters of the command to uniquely distinguish it are needed. Multiple commands can be entered on one line by separating them by a SPACE, TAB, or semicolon (;). To view a potentially unmounted disk in a reasonable manner, <code>fsdb</code> supports the <code>cd</code>, <code>pwd</code>, <code>ls</code>, and <code>find</code> commands. The functionality of each of these commands basically matches that of its UNIX counterpart. See <code>cd(1)</code>, <code>pwd(1)</code>, <code>ls(1)</code>, and <code>find(1)</code> for details. The <code>*</code>, <code>,</code>, <code>?</code>, and <code>-</code> wildcard characters are also supported. The following commands are supported:
<code>base[=<i>b</i>]</code>	Display or set the base. All input and output is governed by the current base. Without the <code>= <i>b</i></code>, displays the current base. Otherwise, sets the current base to <i>b</i>. Base is interpreted using the old value of base, so to ensure correctness use the <code>0</code>, <code>0t</code>, or <code>0x</code> prefix when changing the base. The default for base is hexadecimal.
<code>block</code>	Convert the value of dot to a block address.
<code>cd [<i>dir</i>]</code>	Change the current directory to directory <i>dir</i>. The current values of inode and dot are also updated. If <i>dir</i> is not specified, changes directories to inode 2, root (/).
<code>directory</code>	If the current inode is a directory, converts the value of dot to a directory slot offset in that directory, and dot now points to this entry.
<code>file</code>	Set the value of dot as a relative block count from the beginning of the file. The value of dot is updated to the first byte of this block.
<code>find <i>dir</i> [-name <i>n</i>] [-inum <i>i</i>]</code>	Find files by name or i-number. Recursively searches directory <i>dir</i> and below for file names whose i-number matches <i>i</i> or whose name matches pattern <i>n</i>. Only one of the two options (<code>-name</code> or <code>-inum</code>) can be used at one time. The <code>find -print</code> is not necessary or accepted.
<code>fill=<i>p</i></code>	Fill an area of disk with pattern <i>p</i>. The area of disk is delimited by dot and count.
<code>inode</code>	Convert the value of dot to an inode address. If successful, the current value of inode is updated as well as the value of dot. As a convenient shorthand, if <code>:inode</code>

Inode Commands

	appears at the beginning of the line, the value of dot is set to the current inode and that inode is displayed in inode format.
<code>ls [-R] [-l] <i>pat1 pat2...</i></code>	List directories or files. If no file is specified, the current directory is assumed. Either or both of the options can be used (but, if used, must be specified before the filename specifiers). Wild card characters are available and multiple arguments are acceptable. The long listing shows only the i-number and the name; use the inode command with <code>?i</code> to get more information.
<code>override</code>	Toggle the value of override. Some error conditions might be overridden if override is toggled to on.
<code>prompt "<i>p</i>"</code>	Change the <code>fsdb</code> prompt to <i>p</i> . <i>p</i> must be enclosed in quotes.
<code>pwd</code>	Display the current working directory.
<code>quit</code>	Quit <code>fsdb</code> .
<code>tag</code>	Convert the value of dot and if this is a valid tag, print the volume structure according to the tag.
<code>!</code>	Escape to the shell.
In addition to the above commands, several other commands deal with inode fields and operate directly on the current inode (they still require the colon (:)). They can be used to more easily display or change the particular fields. The value of dot is only used by the <code>:db</code> and <code>:ib</code> commands. Upon completion of the command, the value of dot is changed so that it points to that particular field. For example,	
<pre>> :ln=+1</pre> increments the link count of the current inode and sets the value of dot to the address of the link count field.	
The following inode commands are supported:	
<code>at</code>	Access time
<code>bs</code>	Block size
<code>ct</code>	Creation time
<code>gid</code>	Group id
<code>ln</code>	Link number
<code>mt</code>	Modification time

md	Mode
maj	Major device number
min	Minor device number
nm	This command actually operates on the directory name field. Once poised at the desired directory entry (using the <code>directory</code> command), this command allows you to change or display the directory name. For example, <pre>> 7:dir:nm="foo"</pre> gets the 7th directory entry of the current inode and changes its name to <code>foo</code>. Directory names cannot be made larger than the field allows. If an attempt is made to make a directory name larger than the field allows,, the string is truncated to fit and a warning message is displayed.
sz	File size
uid	User ID
uniq	Unique ID

Formatted Output Formatted output comes in two styles and many format types. The two styles of formatted output are: structured and unstructured. Structured output is used to display inodes, directories, and so forth. Unstructured output displays raw data.

Format specifiers are preceded by the slash (/) or question mark (?) character. *type* is updated as necessary upon completion.

The following format specifiers are preceded by the ? character:

i	Display as inodes in the current base.
d	Display as directories in the current base.

The following format specifiers are preceded by the / character:

b	Display as bytes in the current base.
c	Display as characters.
o O	Display as octal shorts or longs.
d D	Display as decimal shorts or longs.
x X	Display as hexadecimal shorts or longs.

EXAMPLES **EXAMPLE 1** Using fsdb as a calculator for complex arithmetic

The following command displays 2010 in decimal format, and is an example of using fsdb as a calculator for complex arithmetic.

```
> 2000+400%(20+20)=D
```

EXAMPLE 2 Using fsdb to display an i-number in inode format

The following command displays the i-number 386 in inode format. 386 becomes the current inode.

```
> 386:ino?i
```

EXAMPLE 3 Using fsdb to change the link count

The following command changes the link count for the current inode to 4.

```
> :ln=4
```

EXAMPLE 4 Using fsdb to increment the link count

The following command increments the link count by 1.

```
> :ln+=1
```

EXAMPLE 5 Using fsdb to display the creation time as a hexadecimal long

The following command displays the creation time as a hexadecimal long.

```
> :ct=X
```

EXAMPLE 6 Using fsdb to display the modification time in time format

The following command displays the modification time in time format.

```
> :mt=t
```

EXAMPLE 7 Using fsdb to display in ASCII

The following command displays, in ASCII, block 0 of the file associated with the current inode.

```
> 0:file/c
```

EXAMPLE 8 Using fsdb to display the directory entries for the root inode

The following command displays the first block's directory entries for the root inode of this file system. This command stops prematurely if the EOF is reached.

```
> 2:ino,*?d
```

EXAMPLE 9 Using fsdb to change the current inode

The following command changes the current inode to that associated with the 5th directory entry (numbered from 0) of the current inode. The first logical block of the file is then displayed in ASCII.

EXAMPLE 9 Using fsdb to change the current inode (Continued)

```
> 5:dir:inode; 0:file,*/c
```

EXAMPLE 10 Using fsdb to change the i-number

The following command changes the i-number for the 7th directory slot in the root directory to 3.

```
> 2:inode; 7:dir=3
```

EXAMPLE 11 Using fsdb to change the name field

The following command changes the *name* field in the directory slot to name.

```
> 7:dir:nm="name"
```

EXAMPLE 12 Using fsdb to display the a block

The following command displays the 3rd block of the current inode as directory entries.

EXAMPLE 13 Using fsdb to set the contents of address

The following command sets the contents of address 2050 to 0xffffffff. 0xffffffff can be truncated, depending on the current type.

```
> 2050=0xfffff
```

EXAMPLE 14 Using fsdb to place an ASCII string at an address

The following command places the ASCII string *this is some text* at address 1c92434.

```
> 1c92434="this is some text"
```

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWudf

SEE ALSO clri(1M), fsck_udfs(1M), dir(4), attributes(5)

fsdb_ufs(1M)

NAME	fsdb_ufs – ufs file system debugger
SYNOPSIS	fsdb -F ufs [<i>generic_options</i>] [<i>specific_options</i>] <i>special</i>
DESCRIPTION	The <code>fsdb_ufs</code> command is an interactive tool that can be used to patch up a damaged UFS file system. It has conversions to translate block and i-numbers into their corresponding disk addresses. Also included are mnemonic offsets to access different parts of an inode. These greatly simplify the process of correcting control block entries or descending the file system tree. <code>fsdb</code> contains several error-checking routines to verify inode and block addresses. These can be disabled if necessary by invoking <code>fsdb</code> with the <code>-o</code> option or by the use of the <code>o</code> command. <code>fsdb</code> reads a block at a time and will therefore work with raw as well as block I/O devices. A buffer management routine is used to retain commonly used blocks of data in order to reduce the number of read system calls. All assignment operations result in an immediate write-through of the corresponding block. Note that in order to modify any portion of the disk, <code>fsdb</code> must be invoked with the <code>w</code> option. Wherever possible, <code>adb</code>-like syntax was adopted to promote the use of <code>fsdb</code> through familiarity.
OPTIONS	The following option is supported: -o Specify UFS file system specific options. These options can be any combination of the following separated by commas (with no intervening spaces). The options available are: ? Display usage - o Override some error conditions - p='string' set prompt to string - w open for write
USAGE	Numbers are considered hexadecimal by default. However, the user has control over how data is to be displayed or accepted. The <code>base</code> command will display or set the input/output base. Once set, all input will default to this base and all output will be shown in this base. The base can be overridden temporarily for input by preceding hexadecimal numbers with <code>'0x'</code>, preceding decimal numbers with <code>'0t'</code>, or octal numbers with <code>'0'</code>. Hexadecimal numbers beginning with <code>a-f</code> or <code>A-F</code> must be preceded with <code>'0x'</code> to distinguish them from commands. Disk addressing by <code>fsdb</code> is at the byte level. However, <code>fsdb</code> offers many commands to convert a desired inode, directory entry, block, superblock and so forth to a byte address. Once the address has been calculated, <code>fsdb</code> will record the result in dot (<code>.</code>). Several global values are maintained by <code>fsdb</code>: ■ the current base (referred to as <code>base</code>),

- the current address (referred to as `dot`),
- the current inode (referred to as `inode`),
- the current count (referred to as `count`),
- and the current type (referred to as `type`).

Most commands use the preset value of `dot` in their execution. For example,

```
> 2:inode
```

will first set the value of `dot` to 2, `'.'`, will alert the start of a command, and the `inode` command will set `inode` to 2. A count is specified after a `'.'`. Once set, `count` will remain at this value until a new command is encountered which will then reset the value back to 1 (the default). So, if

```
> 2000,400/X
```

is typed, 400 hex longs are listed from 2000, and when completed, the value of `dot` will be `2000 + 400 * sizeof (long)`. If a `RETURN` is then typed, the output routine will use the current values of `dot`, `count`, and `type` and display 400 more hex longs. A `'*'` will cause the entire block to be displayed.

End of fragment, block and file are maintained by `fsdb`. When displaying data as fragments or blocks, an error message will be displayed when the end of fragment or block is reached. When displaying data using the `db`, `ib`, `directory`, or `file` commands an error message is displayed if the end of file is reached. This is mainly needed to avoid passing the end of a directory or file and getting unknown and unwanted results.

An example showing several commands and the use of `RETURN` would be:

```
> 2:ino; 0:dir?d
      or
> 2:ino; 0:db:block?d
```

The two examples are synonymous for getting to the first directory entry of the root of the file system. Once there, any subsequent `RETURN` (or `+`, `-`) will advance to subsequent entries. Note that

```
> 2:inode; :ls
      or
> :ls /
```

is again synonymous.

Expressions

The symbols recognized by `fsdb` are:

<code>RETURN</code>	update the value of <code>dot</code> by the current value of <code>type</code> and display using the current value of <code>count</code> .

#	numeric expressions may be composed of +, -, *, and % operators (evaluated left to right) and may use parentheses. Once evaluated, the value of <code>dot</code> is updated.
, <i>count</i>	count indicator. The global value of <code>count</code> will be updated to <code>count</code> . The value of <code>count</code> will remain until a new command is run. A count specifier of '*' will attempt to show a <i>blocks's</i> worth of information. The default for <code>count</code> is 1.
? <i>f</i>	display in structured style with format specifier <i>f</i> . See <code>FormattedOutput</code> .
/ <i>f</i>	display in unstructured style with format specifier <i>f</i> . See <code>FormattedOutput</code> .
.	the value of <code>dot</code> .
+ <i>e</i>	increment the value of <code>dot</code> by the expression <i>e</i> . The amount actually incremented is dependent on the size of <code>type</code> : <code>dot = dot + e * sizeof (type)</code> The default for <i>e</i> is 1.
- <i>e</i>	decrement the value of <code>dot</code> by the expression <i>e</i> . See +.
* <i>e</i>	multiply the value of <code>dot</code> by the expression <i>e</i> . Multiplication and division don't use <code>type</code> . In the above calculation of <code>dot</code> , consider the <code>sizeof (type)</code> to be 1.
% <i>e</i>	divide the value of <code>dot</code> by the expression <i>e</i> . See *.
< <i>name</i>	restore an address saved in register <i>name</i> . <i>name</i> must be a single letter or digit.
> <i>name</i>	save an address in register <i>name</i> . <i>name</i> must be a single letter or digit.
= <i>f</i>	display indicator. If <i>f</i> is a legitimate format specifier, then the value of <code>dot</code> is displayed using the format specifier <i>f</i> . See <code>FormattedOutput</code> . Otherwise, assignment is assumed. See =.
= [<i>s</i>] [<i>e</i>]	assignment indicator. The address pointed to by <code>dot</code> has its contents changed to the value of the expression <i>e</i> or to the ASCII representation of the quoted (") string <i>s</i> . This may be useful for changing directory names or ASCII file information.
+= <i>e</i>	incremental assignment. The address pointed to by <code>dot</code> has its contents incremented by expression <i>e</i> .
-= <i>e</i>	decremental assignment. The address pointed to by <code>dot</code> has its contents decremented by expression <i>e</i> .

Commands	A command must be prefixed by a ':' character. Only enough letters of the command to uniquely distinguish it are needed. Multiple commands may be entered on one line by separating them by a SPACE, TAB or ';'.
	In order to view a potentially unmounted disk in a reasonable manner, <code>fsdb</code> offers the <code>cd</code> , <code>pwd</code> , <code>ls</code> and <code>find</code> commands. The functionality of these commands substantially matches those of its UNIX counterparts. See individual commands for details. The '*', '?', and '['-'] wild card characters are available.
<code>base=b</code>	display or set base. As stated above, all input and output is governed by the current base. If the <code>=b</code> is omitted, the current base is displayed. Otherwise, the current base is set to <i>b</i> . Note that this is interpreted using the old value of base, so to ensure correctness use the '0', '0t', or '0x' prefix when changing the base. The default for base is hexadecimal.
<code>block</code>	convert the value of <code>dot</code> to a block address.
<code>cd dir</code>	change the current directory to directory <i>dir</i> . The current values of <code>inode</code> and <code>dot</code> are also updated. If no <i>dir</i> is specified, then change directories to inode 2 ("/").
<code>cg</code>	convert the value of <code>dot</code> to a cylinder group.
<code>directory</code>	If the current <code>inode</code> is a directory, then the value of <code>dot</code> is converted to a directory slot offset in that directory and <code>dot</code> now points to this entry.
<code>file</code>	the value of <code>dot</code> is taken as a relative block count from the beginning of the file. The value of <code>dot</code> is updated to the first byte of this block.
<code>find dir [-name n] [-inum i]</code>	find files by name or i-number. <code>find</code> recursively searches directory <i>dir</i> and below for filenames whose i-number matches <i>i</i> or whose name matches pattern <i>n</i> . Note that only one of the two options (<code>-name</code> or <code>-inum</code>) may be used at one time. Also, the <code>-print</code> is not needed or accepted.
<code>fill=p</code>	fill an area of disk with pattern <i>p</i> . The area of disk is delimited by <code>dot</code> and <code>count</code> .

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fragment	convert the value of <i>dot</i> to a fragment address. The only difference between the <code>fragment</code> command and the <code>block</code> command is the amount that is able to be displayed.
inode	convert the value of <i>dot</i> to an inode address. If successful, the current value of <code>inode</code> will be updated as well as the value of <i>dot</i> . As a convenient shorthand, if ' <code>inode</code> ' appears at the beginning of the line, the value of <i>dot</i> is set to the current <code>inode</code> and that inode is displayed in inode format.
log_chk	run through the valid log entries without printing any information and verify the layout.
log_delta	count the number of deltas into the log, using the value of <i>dot</i> as an offset into the log. No checking is done to make sure that offset is within the head/tail offsets.
log_head	display the header information about the file system logging. This shows the block allocation for the log and the data structures on the disk.
log_otodb	return the physical disk block number, using the value of <i>dot</i> as an offset into the log.
log_show	display all deltas between the beginning of the log (BOL) and the end of the log (EOL).
ls	[-R] [-l] <i>pat1 pat2</i> . . . list directories or files. If no file is specified, the current directory is assumed. Either or both of the options may be used (but, if used, <i>must</i> be specified before the filename specifiers). Also, as stated above, wild card characters are available and multiple arguments may be given. The long listing shows only the i-number and the name; use the <code>inode</code> command with ' <code>?i</code> ' to get more information.
override	toggle the value of <code>override</code> . Some error conditions may be overridden if <code>override</code> is toggled on.

prompt <i>p</i>	change the fsdb prompt to <i>p</i> . <i>p</i> must be surrounded by (")s.
pwd	display the current working directory.
quit	quit fsdb.
sb	the value of <i>dot</i> is taken as a cylinder group number and then converted to the address of the superblock in that cylinder group. As a shorthand, 'sb' at the beginning of a line will set the value of <i>dot</i> to the superblock and display it in superblock format.
shadow	if the current inode is a shadow inode, then the value of <i>dot</i> is set to the beginning of the shadow inode data.
!	escape to shell

Inode Commands

In addition to the above commands, there are several commands that deal with inode fields and operate directly on the current inode (they still require the ':'). They may be used to more easily display or change the particular fields. The value of *dot* is only used by the ':db' and ':ib' commands. Upon completion of the command, the value of *dot* is changed to point to that particular field. For example,

```
> :ln+=1
```

would increment the link count of the current inode and set the value of *dot* to the address of the link count field.

at access time.

bs block size.

ct creation time.

db use the current value of *dot* as a direct block index, where direct blocks number from 0 - 11. In order to display the block itself, you need to 'pipe' this result into the block or fragment command. For example,

```
> 1:db:block,20/X
```

would get the contents of data block field 1 from the inode and convert it to a block address. 20 longs are then displayed in hexadecimal. See `FormattedOutput`.

gid group id.

ib use the current value of *dot* as an indirect block index where indirect blocks number from 0 - 2. This will only get the indirect block itself (the block containing the pointers to the actual blocks). Use the file command and start at block 12 to get to the actual blocks.

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ln	link count.
mt	modification time.
md	mode.
maj	major device number.
min	minor device number.
nm	although listed here, this command actually operates on the directory name field. Once poised at the desired directory entry (using the <i>directory</i> command), this command will allow you to change or display the directory name. For example, > 7:dir:nm="foo" will get the 7th directory entry of the current inode and change its name to foo. Note that names cannot be made larger than the field is set up for. If an attempt is made, the string is truncated to fit and a warning message to this effect is displayed.
si	shadow inode.
sz	file size.
uid	user id.

Formatted Output

There are two styles and many format types. The two styles are structured and unstructured. Structured output is used to display inodes, directories, superblocks and the like. Unstructured displays raw data. The following shows the different ways of displaying:

?

c	display as cylinder groups
i	display as inodes
d	display as directories
s	display as superblocks
S	display as shadow inode data

/

b	display as bytes
c	display as characters
o O	display as octal shorts or longs
d D	display as decimal shorts or longs
x X	display as hexadecimal shorts or longs

The format specifier

immediately follows the '/' or '?' character. The values displayed by '/b' and all '?' formats are displayed in the current base. Also, type is appropriately updated upon completion.

EXAMPLES

EXAMPLE 1 Displaying in Decimal

The following command displays 2010 in decimal (use of fsdb as a calculator for complex arithmetic):

```
> 2000+400%(20+20)=D
```

EXAMPLE 2 Displaying an i-number in Inode Format

The following command displays i-number 386 in an inode format. This now becomes the current inode:

```
> 386:ino?i
```

EXAMPLE 3 Changing the Link Count

The following command changes the link count for the current inode to 4:

```
> :ln=4
```

EXAMPLE 4 Incrementing the Link Count

The following command increments the link count by 1:

```
> :ln+=1
```

EXAMPLE 5 Displaying the Creation Time

The following command displays the creation time as a hexadecimal long:

```
> :ct=X
```

EXAMPLE 6 Displaying the Modification Time

The following command displays the modification time in time format:

```
> :mt=t
```

EXAMPLE 7 Displaying in ASCII

The following command displays in ASCII, block zero of the file associated with the current inode:

```
> 0:file/c
```

EXAMPLE 8 Displaying the First Block's Worth of Directory Entries

The following command displays the first block's worth of directory entries for the root inode of this file system. It will stop prematurely if the EOF is reached:

```
> 2:ino,*?d
```

EXAMPLE 9 Displaying Changes to the Current Inode

The following command displays changes the current inode to that associated with the 5th directory entry (numbered from zero) of the current inode. The first logical block of the file is then displayed in ASCII:

```
> 5:dir:inode; 0:file,*/c
```

EXAMPLE 10 Displaying the Superblock

The following command displays the superblock of this file system:

```
> :sb
```

EXAMPLE 11 Displaying the Cylinder Group

The following command displays cylinder group information and summary for cylinder group 1:

```
> 1:cg?c
```

EXAMPLE 12 Changing the i-number

The following command changes the i-number for the seventh directory slot in the root directory to 3:

```
> 2:inode; 7:dir=3
```

EXAMPLE 13 Displaying as Directory Entries

The following command displays the third block of the current inode as directory entries:

```
> 2:db:block,*?d
```

EXAMPLE 14 Changing the Name Field

The following command changes the name field in the directory slot to *name*:

```
> 7:dir:nm="name"
```

EXAMPLE 15 Getting and Filling Elements

The following command gets fragment 3c3 and fill 20 type elements with 0x20:

```
> 3c3:fragment,20:fill=0x20
```

EXAMPLE 16 Setting the Contents of an Address

The following command sets the contents of address 2050 to 0xffffffff. 0xffffffff may be truncated depending on the current type:

```
> 2050=0xfffff
```

EXAMPLE 17 Placing ASCII

The following command places the ASCII for the string at 1c92434:

```
> 1c92434="this is some text"
```

EXAMPLE 18 Displaying Shadow Inode Data

The following command displays all of the shadow inode data in the shadow inode associated with the root inode of this file system:

```
> 2:ino:si:ino;0:shadow,*?S
```

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `clri(1M)`, `fsck_ufs(1M)`, `dir_ufs(4)`, `attributes(5)`, `ufs(7FS)`

WARNINGS Since `fsdb` reads the disk raw, extreme caution is advised in determining its availability of `fsdb` on the system. Suggested permissions are 600 and owned by bin.

NOTES The old command line syntax for clearing i-nodes using the ufs-specific ' -z i-number ' option is still supported by the new debugger, though it is obsolete and will be removed in a future release. Use of this flag will result in correct operation, but an error message will be printed warning of the impending obsolescence of this option to the command. The equivalent functionality is available using the more flexible `clri(1M)` command.

fsirand(1M)

NAME	fsirand – install random inode generation numbers				
SYNOPSIS	fsirand [-p] <i>special</i>				
DESCRIPTION	fsirand installs random inode generation numbers on all the inodes on device <i>special</i>, and also installs a file system ID in the superblock. This helps increase the security of file systems exported by NFS. fsirand must be used only on an unmounted file system that has been checked with fsck(1M). The only exception is that it can be used on the root file system in single-user mode, if the system is immediately re-booted afterwards.				
OPTIONS	-p Print out the generation numbers for all the inodes, but do not change the generation numbers.				
USAGE	See largefile(5) for the description of the behavior of fsirand when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	fsck(1M), attributes(5), largefile(5)				

NAME	fssnap – create temporary snapshots of a file system											
SYNOPSIS	fssnap [-F <i>FSType</i>] [-V] -o <i>special_options</i> /mount/point fssnap -d [-F <i>FSType</i>] [-V] /mount/point <i>dev</i> fssnap -i [-F <i>FSType</i>] [-V] [-o <i>special_options</i>] [/mount/point <i>dev</i>]											
DESCRIPTION	The fssnap command creates a stable, read-only snapshot of a file system when given either an active mount point or a special device containing a mounted file system, as in the first form of the synopsis. A snapshot is a temporary image of a file system intended for backup operations. While the snapshot file system is stable and consistent, an application updating files when the snapshot is created might leave these files in an internally inconsistent, truncated, or otherwise unusable state. In such a case, the snapshot will contain these partially written or corrupted files. It is a good idea to ensure active applications are suspended or checkpointed and their associated files are also consistent during snapshot creation. File access times are not updated while the snapshot is being created. A path to the virtual device that contains this snapshot is printed to standard output when a snapshot is created.											
OPTIONS	The following options are supported: <table><tr><td>-d</td><td>Deletes the snapshot associated with the given file system.</td></tr><tr><td>-F <i>FSType</i></td><td>Specifies the file system type to be used. The <i>FSType</i> should either be specified here or be determined by matching the block special device with an entry in the <i>/etc/vfstab</i> table, or by consulting <i>/etc/default/fs</i>.</td></tr><tr><td>-i</td><td>Displays the state of any given <i>FSType</i> snapshot. If a mount-point or device is not given, a list of all snapshots on the system is displayed. When a mount-point or device is specified, detailed information is provided for the specified file system snapshot by default. The format and meaning of this information is file-system dependent. See the <i>FSType</i>-specific fssnap man page for details.</td></tr><tr><td>-o <i>special_options</i></td><td>See the <i>FSType</i>-specific man page for fssnap.</td></tr><tr><td>-V</td><td>Echoes the complete command line, but does not execute the command.</td></tr></table>		-d	Deletes the snapshot associated with the given file system.	-F <i>FSType</i>	Specifies the file system type to be used. The <i>FSType</i> should either be specified here or be determined by matching the block special device with an entry in the <i>/etc/vfstab</i> table, or by consulting <i>/etc/default/fs</i> .	-i	Displays the state of any given <i>FSType</i> snapshot. If a mount-point or device is not given, a list of all snapshots on the system is displayed. When a mount-point or device is specified, detailed information is provided for the specified file system snapshot by default. The format and meaning of this information is file-system dependent. See the <i>FSType</i> -specific fssnap man page for details.	-o <i>special_options</i>	See the <i>FSType</i> -specific man page for fssnap .	-V	Echoes the complete command line, but does not execute the command.
-d	Deletes the snapshot associated with the given file system.											
-F <i>FSType</i>	Specifies the file system type to be used. The <i>FSType</i> should either be specified here or be determined by matching the block special device with an entry in the <i>/etc/vfstab</i> table, or by consulting <i>/etc/default/fs</i> .											
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-o <i>special_options</i>	See the <i>FSType</i> -specific man page for fssnap .											
-V	Echoes the complete command line, but does not execute the command.											
OPERANDS	The following operands are supported: <table><tr><td>/mount/point</td><td>The directory where the file system resides.</td></tr></table>		/mount/point	The directory where the file system resides.								
/mount/point	The directory where the file system resides.											

fssnap(1M)

EXAMPLES See FSType-specific man pages for examples.

EXIT STATUS The following exit values are returned:

0 Successful completion.

>0 An error occurred.

FILES /etc/vfstab Specifies file system type.

/etc/default/fs Specifies the default local file system type.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO fssnap_ufs(1M), attributes(5)

NOTES This command might not be supported for all FSTypes.

NAME	fssnap_ufs – create a temporary snapshot of a UFS file system
SYNOPSIS	<pre>fssnap [-F] [ufs] [generic-options] -o backing-store=path, [specific-options] mount-point special fssnap [-F ufs] [-d] [generic-options] [-o specific-options] mount-point special fssnap [-F ufs] [-i] [generic-options] [-o specific-options] mount-point special</pre>
DESCRIPTION	The <code>fssnap</code> command queries, creates, or deletes a temporary snapshot of a UFS file system. A snapshot is a point-in-time image of a file system that provides a stable and unchanging device interface for backups. When creating a file system snapshot, you must specify the file system to be captured and the backing-store file. The backing-store file is one in which the snapshot subsystem saves old file system data before it is overwritten. The destination path must have enough free space to hold the backing-store file, whose size varies with the amount of activity on the file system. This location must be different from the file system that is being captured in a snapshot. The backing-store file can reside on any type of file system, including another UFS file system or an NFS-mounted file system.
OPTIONS	The following options are supported: -d Deletes the snapshot associated with the given file system. -i Displays the state of one or all UFS snapshots. If a mount-point or device is not specified, a list of all snapshots on the system is displayed. When a mount-point or device is specified, detailed information is provided for the specified file system snapshot by default. Use the <code>-o</code> options with the <code>-i</code> option to specify what snapshot information is displayed. Since this feature is provided primarily for use in scripts and on the command line, no labels are displayed for the data. Sizes are all in bytes, and the output is not internationalized or localized. The information is displayed on one line per option. Unrecognized options display a single <code>?</code> on the line. One line per option guarantees that there are the same number of lines as options specified and there is a one-to-one correspondence between an output line and an option. The following <code>-o</code> options display specific information for a given snapshot. See the EXAMPLES section for examples of how to use these options. - snapnumber Display the snapshot number. - blockdevname Display the block device path.

fssnap_ufs(1M)

`rawdevname`
Display the raw device path.

`mountpoint`
Display the mount point of the master file system.

`state`
Display the state of the snapshot device.

`backing-store`
Display the location of the backing-store file.

`backing-store-len`
Display the size of the backing-store file.

`maxsize`
Display the max size of the backing-store file.

`createtime`
Display the time that the snapshot was created.

`chunksize`
Display the copy-on-write granularity.

`-o specific-options`
Without `-d` or `-i`, the default action is to create a snapshot. Specify the following options when creating a snapshot. All of these options are discretionary, except for the backing-store file (`bs`), which is required.

`backing-store=path`
Uses *path* as the backing-store file. *path* must not reside on the file system that is being captured in a snapshot.

path must exist, and must be either a directory or a regular file. If *path* is a directory, then a temporary file is created and held open. That device is then used as-is. The option can be abbreviated as `bf=path` or `bs=path`.

`unlink`
Unlinks the backing-store file after the snapshot is created. This option specifies that the backing-store file does not need to be removed manually when the snapshot is deleted. This might make administration more difficult since the file is not visible in the file system. If this option is not specified, the backing-store files should be removed manually after the snapshot is deleted.

`chunksize=n [k,m,g]`
Uses *n* for the chunk size. Chunk size is the granularity of the data that is sent to the backing store.

Specify `chunksize` in the following units: `k` for kilobytes, `m` for megabytes, or `g` for gigabytes. By default, chunk size is four times the block size of the file system (typically 32k).

`maxsize=n[k,m,g]`

Does not allow the size of the backing-store file to exceed *n*, where *n* is the unit specified. The snapshot is deleted automatically when the backing-store file exceeds `maxsize`.

Specify `maxsize` in the following units: k for kilobytes, m for megabytes, or g for gigabytes.

`raw`

Displays to standard output the name of the raw device instead of the block device when a snapshot is created. The block device is printed by default (when `raw` is not specified). This option makes it easier to embed `fssnap` commands in the command line for commands that require the raw device instead. Both devices are always created. This option affects only the output.

OPERANDS The following operands are supported:

<i>mount-point</i>	The directory where the file system resides.
<i>special</i>	The physical device for the file system, such as <code>/dev/dsk/c0t0d0s7</code> .

EXAMPLES **EXAMPLE 1** Creating a Snapshot of a File System

The following example creates a snapshot of a file system. The block special device created for the snapshot is `/dev/fssnap/0`.

```
# fssnap -F ufs -o backing-store=/var/tmp /export/home
/dev/fssnap/0
```

EXAMPLE 2 Backing Up a File System Snapshot Without Having To Unmount the File System

The following example backs up a file system snapshot without having to unmount the file system. Since `ufsdump` requires the path to a raw device, the `raw` option is used. The `/export/home` file system snapshot is removed in the second command.

```
# ufsdump 0uf /dev/rmt/0 `fssnap -F ufs
-o raw,bs=/export/snap /export/home`
<output from ufsdump>
# fssnap -F ufs -d /export/home
```

EXAMPLE 3 Backing Up a File System

When backing up a file system, do not let the backing-store file exceed 400 Mbytes. The second command removes the `/export/home` file system snapshot.

```
# ufsdump 0uf /dev/rmt/0 `fssnap -F ufs
-o maxsize=400m,backing-store=/export/snap,raw
/export/home`
# fssnap -F ufs -d /export/home
```

EXAMPLE 3 Backing Up a File System (Continued)**EXAMPLE 4** Performing an Incremental Dump of a Snapshot

The following example uses `ufsdump` to back up a snapshot of `/dev/rdisk/c0t3d0s2`. Note the use of the `N` option to `ufsdump`, which writes the name of the device being dumped, rather than the name of the snapshot device, to `/etc/dumpdates` file. See `ufsdump(1M)` for details on the `N` flag.

```
# ufsdump lfNu /dev/rmt/0 /dev/rdisk/c0t3d0s2 `fssnap -F ufs
-o raw,bs=/export/scratch,unlink /dev/rdisk/c0t3d0s2`
```

EXAMPLE 5 Finding Out What Snapshots Currently Exist

The following command displays the currently existing snapshots.

```
# fssnap -i
0 /src
1 /export/home
<output continues>
```

EXAMPLE 6 Mounting a File System Snapshot

The following example creates a file system snapshot. After you create a file system snapshot, mount it on `/tmp/mount` for temporary read-only access.

```
# fssnap -F ufs -o backing-store=/nfs/server/scratch /export/home
/dev/fssnap/1
# mkdir /tmp/mount
# mount -F ufs -o ro /dev/fssnap/1 /tmp/mount
```

EXAMPLE 7 Creating a File System Snapshot and Unlinking the Backing-store File

The following example creates a file system snapshot and unlinks the backing-store file. After creating a file system snapshot and unlinking the backing-store file, check the state of the snapshot.

```
# fssnap -o bs=/scratch,unlink /src
/dev/fssnap/0
# fssnap -i /src
Snapshot number           : 0
Block Device              : /dev/fssnap/0
Raw Device                : /dev/rfssnap/0
Mount point               : /src
Device state              : active
Backing store path        : /scratch/snapshot2 <UNLINKED>
Backing store size        : 192 KB
Maximum backing store size : Unlimited
Snapshot create time      : Sat May 06 10:55:11 2000
Copy-on-write granularity : 32 KB
```

EXAMPLE 7 Creating a File System Snapshot and Unlinking the Backing-store File
(Continued)

EXAMPLE 8 Displaying the Size and Location of the Backing-store File and the Creation Time for the Snapshot

The following example displays the size of the backing-store file in bytes, the location of the backing store, and the creation time for the snapshot of the /test file system.

```
# fssnap -i -o backing-store-len,backing-store,createtime /test
196608
/snapshot2
Sat May 6 10:55:11 2000
```

EXIT STATUS The following exit values are returned:

0 Successful completion.

>0 An error occurred.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

The script-readable output mode is a stable interface that can be added to, but will not change. All other interfaces are subject to change.

NOTES The fssnap device files should be treated like a regular disk block or character device.

The association between a file system and the snapshot is lost when the snapshot is deleted or the system reboots. Snapshot persistence across reboots is not currently supported.

To avoid unnecessary performance impacts, perform the snapshot and system backup when the system is least active.

fstyp(1M)

NAME	fstyp – determine file system type				
SYNOPSIS	fstyp [-v] <i>special</i>				
DESCRIPTION	fstyp allows the user to determine the file system type of unmounted file systems using heuristic programs. An fstyp module for each file system type to be checked is executed; each of these modules applies an appropriate heuristic to determine whether the supplied <i>special</i> file is of the type for which it checks. If it is, the program prints on standard output the usual file system identifier for that type (for example, “ufs”) and exits with a return code of 0; if none of the modules succeed, the error message <code>unknown_fstyp</code> (no matches) is returned and the exit status is 1. If more than one module succeeds, the error message <code>unknown_fstyp</code> (multiple matches) is returned and the exit status is 2.				
OPTIONS	-v Produce verbose output. This is usually information about the file systems superblock and varies across different <i>FSTypes</i>. See <code>ufs(7FS)</code>, <code>mkfs_ufs(1M)</code>, and <code>tunefs(1M)</code> for details.				
USAGE	See <code>largefile(5)</code> for the description of the behavior of fstyp when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>mkfs_ufs(1M)</code> , <code>tunefs(1M)</code> , <code>attributes(5)</code> , <code>largefile(5)</code> , <code>ufs(7FS)</code> , <code>hsfs(7FS)</code> , <code>pcfs(7FS)</code>				
NOTES	The use of heuristics implies that the result of fstyp is not guaranteed to be accurate.				

NAME	ftppaddhost – set up a virtual FTP host
SYNOPSIS	ftppaddhost -c -l [-b] [-x <i>xferlog</i>] <i>hostname</i> <i>root_dir</i>
DESCRIPTION	The <i>ftppaddhost</i> script is executed by the super user to set up virtual FTP hosts. The <i>ftppaddhost</i> command configures the virtual host <i>hostname</i> under directory <i>root_dir</i> . The value of <i>hostname</i> can be an IP address or the name of a host.
OPTIONS	The <i>ftppaddhost</i> script supports the following options: -b Create a banner for the virtual host. This option is useful to confirm that the virtual host is working. -c Configure complete virtual hosting. This option allows each virtual host to have its own version of the <i>ftpaccess</i>, <i>ftpconversions</i>, <i>ftpgroups</i>, <i>ftphosts</i>, and <i>ftpusers</i> files. The master version of each of these configuration files is copied from the <i>/etc/ftpd</i> directory and placed in the <i>/etc/ftpd/virtual-ftpd/hostname</i> directory. If the <i>/etc/ftpusers</i> file exists it is appended to the virtual <i>ftpusers</i> file. If a virtual host lacks its own version of a configuration file, the master version is used. -l Configure limited virtual hosting. This option allows a small number of parameters to be configured differently for a virtual host. See the <i>virtual</i> keyword on the <i>ftpaccess</i>(4) manual page. -x <i>xferlog</i> Create a logfile entry such that the transfer logs for the virtual host are written to the specified file. An absolute path must be specified for the <i>xferlog</i> file.
OPERANDS	The following operands are supported: <i>hostname</i> The host name or IP address of the virtual server. <i>root_dir</i> The absolute pathname of the directory under which the virtual server is set up.
EXIT STATUS	The following exit values are returned: 0 Successful completion 1 Improper usage of the command 2 Command failed
FILES	<i>/etc/ftpd/virtual-ftpd/hostname</i> The configuration files directory for the virtual host <i>hostname</i>.

ftpaddhost(1M)

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWftpu

SEE ALSO

ftpconfig(1M), in.ftpd(1M), ftpaccess(4), ftpconversions(4),
ftpgroups(4), ftphosts(4), ftpusers(4), xferlog(4), attributes(5)

NAME	ftpconfig – set up anonymous FTP				
SYNOPSIS	ftpconfig [<i>ftpd</i> dir] ftpconfig -d <i>ftpd</i> dir				
DESCRIPTION	The ftpconfig script is executed by the super user to set up anonymous FTP. Anonymous FTP allows users to remotely log on to the FTP server by specifying the user name ftp or anonymous and the user's email address as password. The anonymous users are logged on to the FTP Server and given access to a restricted file area with its own file system root. See chroot(2). The FTP area has its own minimal system files. This command will copy and set up all the components needed to operate an anonymous FTP server, including creating the <i>ftp</i> user account, creating device nodes, copying /usr/lib files, and copying timezone data. The passwd and group files set up have been stripped down to prevent malicious users from finding login names on the server. The anonymous file area will be placed under <i>ftpd</i>dir. If the <i>ftp</i> user account already exists, then the current FTP area is used, and the system files in it are updated. All other files are left untouched. This command should be run to update the anonymous FTP area's configuration whenever a system patch is installed, or the system is upgraded.				
OPTIONS	-d Create a new or update an existing <i>ftpd</i> dir without creating or updating the <i>ftp</i> user account. Use this option when creating guest FTP user accounts.				
OPERANDS	The following operands are supported: <i>ftpd</i>dir The absolute pathname of the directory under which the anonymous FTP area is set up.				
EXIT STATUS	The following exit values are returned: 0 Successful completion 1 Improper usage of the command 2 Command failed				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWftpu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWftpu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWftpu				
SEE ALSO	ftppaddhost(1M), in.ftpd(1M), useradd(1M), chroot(2), attributes(5)				

ftprestart(1M)

NAME	ftprestart – restart previously shutdown FTP Servers				
SYNOPSIS	ftprestart [-V]				
DESCRIPTION	Use the <code>ftprestart</code> command to restart an FTP Server previously shut down by means of <code>ftpshut(1M)</code> . The <code>ftprestart</code> command reads the shutdown capability from the <code>ftpaccess(4)</code> file to determine the path of the shutdown message files. It then reenables the FTP Server by removing any shutdown message files in the anonymous and virtual FTP Server area, as well as the system wide shutdown message file.				
OPTIONS	The <code>ftprestart</code> command supports the following options: -V Display program copyright and version information, then terminate.				
EXAMPLES	EXAMPLE 1 Sample Output from <code>ftprestart</code> The following example shows sample output from the <code>ftprestart</code> command: example% ftprestart ftprestart: /export/home/ftp/etc/ftpd/shutdown.msg removed. ftprestart: /export/home/virtual1/etc/ftpd/shutdown.msg removed. ftprestart: /etc/ftpd/shutdown.msg removed.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.				
FILES	/etc/ftpd/ftpaccess /etc/ftpd/ftpservers				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWftpu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWftpu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWftpu				
SEE ALSO	<code>ftpshut(1M)</code> , <code>in.ftpd(1M)</code> , <code>ftpaccess(4)</code> , <code>ftpservers(4)</code> , <code>attributes(5)</code>				

NAME	ftpsht – close down the FTP Servers at a given time																								
SYNOPSIS	ftpsht [-V] [-v] [-l <i>min</i>] [-d <i>min</i>] <i>time</i> [<i>warning-message...</i>]																								
DESCRIPTION	The ftpsht command provides an automated shutdown procedure that the superuser can use to notify FTP users when the FTP Server is shutting down. Ten minutes before shutdown, or immediately if the value of <i>time</i> is less than ten minutes, any new FTP Server connections will be disabled. You may adjust the shutdown of new FTP Server connections by means of the -l option. Five minutes before shutdown, or immediately if the value of <i>time</i> is less than five minutes, all current FTP connections will be disconnected. You may adjust the shutdown of current FTP connections by means of the -d option. The ftpsht command creates shutdown message files that the FTP Server uses to determine when to shutdown. Separate shutdown message files are created in the anonymous and virtual host FTP Server areas, in addition to the system wide shutdown message file. Once the shutdown occurs, the server continues to refuse connections until the appropriate shutdown message file is removed. This normally is done by using the ftprestart(1M) command. The location of the shutdown message file is specified by the shutdown capability in the ftpassess file. The following magic cookies are available: <table> <tr><td>%s</td><td>The time system is going to shut down.</td></tr> <tr><td>%r</td><td>The time new connections will be denied.</td></tr> <tr><td>%d</td><td>The time current connections will be dropped.</td></tr> <tr><td>%C</td><td>The current working directory.</td></tr> <tr><td>%E</td><td>The maintainer's email address as defined in the ftpassess file.</td></tr> <tr><td>%F</td><td>The free space in the partition of CWD, in kilobytes.</td></tr> <tr><td>%L</td><td>The local host name.</td></tr> <tr><td>%M</td><td>The maximum allowed number of users in this class.</td></tr> <tr><td>%N</td><td>The current number of users in this class.</td></tr> <tr><td>%R</td><td>The remote host name.</td></tr> <tr><td>%T</td><td>The local time (form Thu Nov 15 17:12:42 1990).</td></tr> <tr><td>%U</td><td>The username given at login time.</td></tr> </table>	%s	The time system is going to shut down.	%r	The time new connections will be denied.	%d	The time current connections will be dropped.	%C	The current working directory.	%E	The maintainer's email address as defined in the ftpassess file.	%F	The free space in the partition of CWD, in kilobytes.	%L	The local host name.	%M	The maximum allowed number of users in this class.	%N	The current number of users in this class.	%R	The remote host name.	%T	The local time (form Thu Nov 15 17:12:42 1990).	%U	The username given at login time.
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OPTIONS	The ftpsht command supports the following options: <table> <tr><td>-V</td><td>Display program copyright and version information, then terminate.</td></tr> <tr><td>-d <i>min</i></td><td>The time ahead of shutdown, in minutes, that existing connections will be disconnected upon completion of their current or next (if idle) FTP request.</td></tr> </table>	-V	Display program copyright and version information, then terminate.	-d <i>min</i>	The time ahead of shutdown, in minutes, that existing connections will be disconnected upon completion of their current or next (if idle) FTP request.																				
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-d <i>min</i>	The time ahead of shutdown, in minutes, that existing connections will be disconnected upon completion of their current or next (if idle) FTP request.																								

ftpsht(1M)

	-l <i>min</i> The time ahead of shutdown, in minutes, that new connections will be refused. -v Verbose. Output the pathname of the shutdown message files created.				
OPERANDS	The ftpshut command supports the following operands: <i>time</i> The <i>time</i> at which ftpshut will bring the FTP Servers down. <i>time</i> can have a value of now, which indicates an immediate shutdown. Alternatively, <i>time</i> can specify a future time in one of two formats: +<i>number</i> or HHMM. The first form brings the FTP Server down in <i>number</i> minutes. The second brings the FTP Server down at the time of day indicated, using a 24-hour clock format. When using the absolute time format, you can only specify times between now and 23:59. <i>warning-message</i> The message to display that warns of the imminent shutdown. The <i>warning-message</i> will be formatted at 70 characters wide. ftpshut knows the actual string length of the magic cookies. If no warning-message is supplied, the default message "System shutdown at %s" is used.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.				
FILES	/etc/ftpd/ftpaccess /etc/ftpd/ftpservers				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWftpu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWftpu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWftpu				
SEE ALSO	in.ftpd(1M), ftprestart(1M), shutdown(1M), ftpaccess(4), ftpservers(4), attributes(5)				

NAME	fuser – identify processes using a file or file structure
SYNOPSIS	/usr/sbin/fuser [-c -f] [-nu] [-k -s <i>sig</i>] <i>files</i> [[-] [-c -f] [-nu] [-k -s <i>sig</i>] <i>files</i>] ...
DESCRIPTION	The fuser utility displays the process IDs of the processes that are using the <i>files</i> specified as arguments. Each process ID is followed by a letter code. These letter codes are interpreted as follows. If the process is using the file as c Indicates that the process is using the file as its current directory. m Indicates that the process is using a file mapped with <code>mmap(2)</code>. See <code>mmap(2)</code> for details. n Indicates that the process is holding a non-blocking mandatory lock on the file. o Indicates that the process is using the file as an open file. r Indicates that the process is using the file as its root directory. t Indicates that the process is using the file as its text file. y Indicates that the process is using the file as its controlling terminal. For block special devices with mounted file systems, all processes using any file on that device are listed. For all types of files (text files, executables, directories, devices, and so forth), only the processes using that file are reported. If more than one group of files are specified, the options may be respecified for each additional group of files. A lone dash cancels the options currently in force. The process IDs are printed as a single line on the standard output, separated by spaces and terminated with a single new line. All other output is written on standard error. Any user can run fuser, but only the superuser can terminate another user's process.
OPTIONS	The following options are supported: -c Reports on files that are mount points for file systems, and any files within that mounted file system. -f Prints a report for the named file, not for files within a mounted file system. -k Sends the <code>SIGKILL</code> signal to each process. Since this option spawns kills for each process, the kill messages may not show up immediately (see <code>kill(2)</code>). -n Lists only processes with non-blocking mandatory locks on a file.

fuser(1M)

- s *sig* Sends a signal to each process. The *sig* option argument specifies one of the symbolic names defined in the `<signal.h>` header, or a decimal integer signal number. If *sig* is a symbolic name, it is recognized in a case-independent fashion, without the SIG prefix. The -k option is equivalent to -s KILL or -s 9.
- u Displays the user login name in parentheses following the process ID.

EXAMPLES

EXAMPLE 1 Reporting on the mount point and files

The following example reports on the mount point and files within the mounted file system.

```
example% fuser -c /export/foo
```

EXAMPLE 2 Restricting output when reporting on the mount point and files

The following example reports on the mount point and files within the mounted file system, but the output is restricted to processes that hold non-blocking mandatory locks.

```
example% fuser -cn /export/foo
```

EXAMPLE 3 Sending SIGTERM to processes holding a non-blocking mandatory lock

The following command sends SIGTERM to any processes that hold a non-blocking mandatory lock on file `/export/foo/my_file`.

```
example% fuser -fn -s term /export/foo/my_file
```

ENVIRONMENT VARIABLES

See `environ(5)` for descriptions of the following environment variables that affect the execution of `fuser`: `LANG`, `LC_ALL`, `LC_CTYPE`, `LC_MESSAGES`, and `NLSPATH`.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	Standard

SEE ALSO

`ps(1)`, `mount(1M)`, `kill(2)`, `mmap(2)`, `signal(3C)`, `attributes(5)`, `environ(5)`, `standards(5)`

NOTES

Because `fuser` works with a snapshot of the system image, it may miss processes that begin using a file while `fuser` is running. Also, processes reported as using a file may have stopped using it while `fuser` was running. These factors should discourage the use of the -k option.

NAME	fwtmp, wtmpfix – manipulate connect accounting records				
SYNOPSIS	<pre>/usr/lib/acct/fwtmp [-ic] /usr/lib/acct/wtmpfix [file...]</pre>				
DESCRIPTION	fwtmp reads from the standard input and writes to the standard output, converting binary records of the type found in /var/adm/wtmpx to formatted ASCII records. The ASCII version is useful when it is necessary to edit bad records. wtmpfix examines the standard input or named files in utmpx format, corrects the time/date stamps to make the entries consistent, and writes to the standard output. A hyphen (-) can be used in place of <i>file</i> to indicate the standard input. If time/date corrections are not performed, acctcon(1M) will fault when it encounters certain date-change records. Each time the date is set, a pair of date change records are written to /var/adm/wtmpx. The first record is the old date denoted by the string "old time" placed in the <i>line</i> field and the flag OLD_TIME placed in the <i>type</i> field of the utmpx structure. The second record specifies the new date and is denoted by the string new time placed in the <i>line</i> field and the flag NEW_TIME placed in the <i>type</i> field. wtmpfix uses these records to synchronize all time stamps in the file. In addition to correcting time/date stamps, wtmpfix will check the validity of the <i>name</i> field to ensure that it consists solely of alphanumeric characters or spaces. If it encounters a name that is considered invalid, it will change the login name to INVALID and write a diagnostic to the standard error. In this way, wtmpfix reduces the chance that acctcon will fail when processing connect accounting records.				
OPTIONS	-ic Denotes that input is in ASCII form, and output is to be written in binary form.				
FILES	/var/adm/wtmpx history of user access and administration information				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWaccu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWaccu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWaccu				
SEE ALSO	acctcom(1), ed(1), acct(1M), acctcms(1M), acctcon(1M), acctmerg(1M), acctprc(1M), acctsh(1M), runacct(1M), acct(2), acct(3HEAD), utmpx(4), attributes(5) <i>System Administration Guide: Basic Administration</i>				

getdev(1M)

NAME	getdev – lists devices based on criteria								
SYNOPSIS	getdev [-ae] [<i>criteria...</i>] [<i>device...</i>]								
DESCRIPTION	getdev generates a list of devices that match certain criteria. The criteria includes a list of attributes (given in expressions) and a list of devices. If no criteria are given, all devices are included in the list. Devices must satisfy at least one of the criteria in the list unless the -a option is used. Then, only those devices which match all of the criteria in a list will be included. Devices which are defined on the command line and which match the criteria are included in the generated list. However, if the -e option is used, the list becomes a set of devices to be <i>excluded</i> from the list. See OPTIONS and OPERANDS.								
OPTIONS	The following options are supported: -a Specifies that a device must match all criteria to be included in the list generated by this command. The option has no effect if no criteria are defined. -e Specifies that the list of devices which follows on the command line should be <i>excluded</i> from the list generated by this command. Without the -e the named devices are <i>included</i> in the generated list. The flag has no effect if no devices are defined.								
OPERANDS	The following operands are supported: <i>criteria</i> Defines the criteria that a device must match to be included in the generated list. <i>criteria</i> is specified by expressions. There are four possible expression types which the criteria specified in the <i>criteria</i> argument may follow: <table><tr><td><i>attribute=value</i></td><td>Selects all devices whose attribute <i>attribute</i> is defined and is equal to <i>value</i>.</td></tr><tr><td><i>attribute!=value</i></td><td>Selects all devices whose attribute <i>attribute</i> is defined and does not equal <i>value</i>.</td></tr><tr><td><i>attribute:*</i></td><td>Selects all devices which have the attribute <i>attribute</i> defined.</td></tr><tr><td><i>attribute!:*</i></td><td>Selects all devices which do not have the attribute <i>attribute</i> defined.</td></tr></table> See the putdev(1M) manual page for a complete listing and description of available attributes. <i>device</i> Defines the devices which should be included in the generated list. This can be the pathname of the device or the device alias.	<i>attribute=value</i>	Selects all devices whose attribute <i>attribute</i> is defined and is equal to <i>value</i> .	<i>attribute!=value</i>	Selects all devices whose attribute <i>attribute</i> is defined and does not equal <i>value</i> .	<i>attribute:*</i>	Selects all devices which have the attribute <i>attribute</i> defined.	<i>attribute!:*</i>	Selects all devices which do not have the attribute <i>attribute</i> defined.
<i>attribute=value</i>	Selects all devices whose attribute <i>attribute</i> is defined and is equal to <i>value</i> .								
<i>attribute!=value</i>	Selects all devices whose attribute <i>attribute</i> is defined and does not equal <i>value</i> .								
<i>attribute:*</i>	Selects all devices which have the attribute <i>attribute</i> defined.								
<i>attribute!:*</i>	Selects all devices which do not have the attribute <i>attribute</i> defined.								

EXIT STATUS The following exit values are returned:

- 0 Successful completion.
- 1 Command syntax was incorrect, invalid option was used, or an internal error occurred.
- 2 Device table could not be opened for reading.

FILES /etc/device.tab

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO devattr(1M), getdgrp(1M), putdev(1M), putdgrp(1M), attributes(5)

getdgrp(1M)

NAME	getdgrp – lists device groups which contain devices that match criteria						
SYNOPSIS	<code>/usr/sbin/getdgrp [-ael] [criteria...] [dgroup...]</code>						
DESCRIPTION	getdgrp generates a list of device groups that contain devices matching the given criteria. The criteria is given in the form of expressions.						
OPTIONS	The following options are supported: -a Specifies that a device must match all criteria to be included in the list generated by this command. The option has no effect if no criteria are defined. -e Specifies that the list of device groups on the command line should be <i>excluded</i> from the list generated by this command. Without the -e option the named device groups are <i>included</i> in the generated list. The flag has no effect if no devices are defined. -l Specifies that all device groups (subject to the -e option and the <i>dgroup</i> list) should be listed even if they contain no valid device members. This option has no affect if <i>criteria</i> is specified on the command line.						
OPERANDS	The following operands are supported: <i>criteria</i> Defines criteria that a device must match before a device group to which it belongs can be included in the generated list. Specify <i>criteria</i> as an expression or a list of expressions which a device must meet for its group to be included in the list generated by getdgrp. If no criteria are given, all device groups are included in the list. Devices must satisfy at least one of the criteria in the list. However, the -a option can be used to define that a "logical and" operation should be performed. Then, only those groups containing devices which match all of the criteria in a list will be included. There are four possible expressions types which the criteria specified in the <i>criteria</i> argument may follow: <table> <tr> <td><i>attribute=value</i></td><td>Selects all device groups with a member whose attribute <i>attribute</i> is defined and is equal to <i>value</i>.</td></tr> <tr> <td><i>attribute!=value</i></td><td>Selects all device groups with a member whose attribute <i>attribute</i> is defined and does not equal <i>value</i>.</td></tr> <tr> <td><i>attribute:*</i></td><td>Selects all device groups with a member which has the attribute <i>attribute</i> defined.</td></tr> </table>	<i>attribute=value</i>	Selects all device groups with a member whose attribute <i>attribute</i> is defined and is equal to <i>value</i> .	<i>attribute!=value</i>	Selects all device groups with a member whose attribute <i>attribute</i> is defined and does not equal <i>value</i> .	<i>attribute:*</i>	Selects all device groups with a member which has the attribute <i>attribute</i> defined.
<i>attribute=value</i>	Selects all device groups with a member whose attribute <i>attribute</i> is defined and is equal to <i>value</i> .						
<i>attribute!=value</i>	Selects all device groups with a member whose attribute <i>attribute</i> is defined and does not equal <i>value</i> .						
<i>attribute:*</i>	Selects all device groups with a member which has the attribute <i>attribute</i> defined.						

attribute! : *

Selects all device groups with a member which does not have the attribute *attribute* defined.

See `putdev(1M)` for a complete listing and description of available attributes.

dgroup

Defines a set of device groups which should be included in or excluded from the generated list. Device groups that are defined and which contain devices matching the criteria are included.

If the `-e` option is used, this list defines a set of device groups to be excluded. When the `-e` option is used and *criteria* is also defined, the generated list will include device groups containing devices which match the criteria and are not in the command line list.

EXIT STATUS The following exit values are returned:

- 0 Successful completion of the task.
- 1 Command syntax was incorrect, invalid option was used, or an internal error occurred.
- 2 Device table or device group table could not be opened for reading.

FILES `/etc/device.tab`
`/etc/dgroup.tab`

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `devattr(1M)`, `getdev(1M)`, `putdev(1M)`, `putdgrp(1M)`, `attributes(5)`

getent(1M)

NAME	getent – get entries from administrative database																			
SYNOPSIS	getent <i>database</i> [<i>key</i> ...]																			
DESCRIPTION	getent gets a list of entries from the administrative database specified by <i>database</i>. The information generally comes from one or more of the sources that are specified for the <i>database</i> in <i>/etc/nsswitch.conf</i>. <i>database</i> is the name of the database to be examined. This can be <i>passwd</i>, <i>group</i>, <i>hosts</i>, <i>ipnodes</i>, <i>services</i>, <i>protocols</i>, <i>ethers</i>, <i>networks</i>, or <i>netmasks</i>. For each of these databases, getent uses the appropriate library routines described in <i>getpwnam</i>(3C), <i>getgrnam</i>(3C), <i>gethostbyaddr</i>(3NSL), <i>gethostbyname</i>(3NSL), <i>getipnodebyaddr</i>(3SOCKET), <i>getipnodebyname</i>(3SOCKET), <i>getservbyname</i>(3SOCKET), <i>getprotobyname</i>(3SOCKET), <i>ethers</i>(3SOCKET), and <i>getnetbyname</i>(3SOCKET), respectively. Each <i>key</i> must be in a format appropriate for searching on the respective database. For example, it can be a <i>username</i> or <i>numeric-uid</i> for <i>passwd</i>; <i>hostname</i> or <i>IP address</i> for <i>hosts</i>; or <i>service</i>, <i>service/protocol</i>, <i>port</i>, or <i>port/proto</i> for <i>services</i>. getent prints out the database entries that match each of the supplied keys, one per line, in the format of the matching administrative file: <i>passwd</i>(4), <i>group</i>(4), <i>hosts</i>(4), <i>ipnodes</i>(4), <i>services</i>(4), <i>protocols</i>(4), <i>ethers</i>(3SOCKET), <i>networks</i>(4), or <i>netmasks</i>(4). If no key is given, all entries returned by the corresponding enumeration library routine, for example, <i>getpwent</i> () or <i>gethostent</i> (), are printed. Enumeration is not supported on <i>ipnodes</i>.																			
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>1</td><td>Command syntax was incorrect, an invalid option was used, or an internal error occurred.</td></tr><tr><td>2</td><td>At least one of the specified entry names was not found in the database.</td></tr><tr><td>3</td><td>There is no support for enumeration on this database.</td></tr></table>		0	Successful completion.	1	Command syntax was incorrect, an invalid option was used, or an internal error occurred.	2	At least one of the specified entry names was not found in the database.	3	There is no support for enumeration on this database.										
0	Successful completion.																			
1	Command syntax was incorrect, an invalid option was used, or an internal error occurred.																			
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3	There is no support for enumeration on this database.																			
FILES	<table><tr><td><i>/etc/nsswitch.conf</i></td><td>name service switch configuration file</td></tr><tr><td><i>/etc/passwd</i></td><td>password file</td></tr><tr><td><i>/etc/group</i></td><td>group file</td></tr><tr><td><i>/etc/inet/hosts</i></td><td>IPv4 host name database</td></tr><tr><td><i>/etc/inet/ipnodes</i></td><td>IPv4 and IPv6 host name database</td></tr><tr><td><i>/etc/services</i></td><td>Internet services and aliases</td></tr><tr><td><i>/etc/protocols</i></td><td>protocol name database</td></tr><tr><td><i>/etc/ethers</i></td><td>Ethernet address to hostname database or domain</td></tr><tr><td><i>/etc/networks</i></td><td>network name database</td></tr></table>	<i>/etc/nsswitch.conf</i>	name service switch configuration file	<i>/etc/passwd</i>	password file	<i>/etc/group</i>	group file	<i>/etc/inet/hosts</i>	IPv4 host name database	<i>/etc/inet/ipnodes</i>	IPv4 and IPv6 host name database	<i>/etc/services</i>	Internet services and aliases	<i>/etc/protocols</i>	protocol name database	<i>/etc/ethers</i>	Ethernet address to hostname database or domain	<i>/etc/networks</i>	network name database	
<i>/etc/nsswitch.conf</i>	name service switch configuration file																			
<i>/etc/passwd</i>	password file																			
<i>/etc/group</i>	group file																			
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<i>/etc/networks</i>	network name database																			

getent(1M)

/etc/netmasks network mask database

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO ethers(3SOCKET), getgrnam(3C), gethostbyaddr(3NSL),
gethostbyname(3NSL), gethostent(3NSL), getipnodebyaddr(3SOCKET),
getipnodebyname(3SOCKET), getnetbyname(3SOCKET),
getprotobyname(3SOCKET), getpwnam(3C), getservbyname(3SOCKET),
group(4), hosts(4), ipnodes(4), netmasks(4), networks(4), nsswitch.conf(4),
passwd(4), protocols(4), services(4), attributes(5)

gettable(1M)

NAME	gettable – get DoD Internet format host table from a host				
SYNOPSIS	<code>/usr/sbin/gettable host</code>				
DESCRIPTION	gettable is a simple program used to obtain the DoD Internet host table from a “hostname” server. The specified <i>host</i> is queried for the table. The table is placed in the file <code>hosts.txt</code>. gettable operates by opening a TCP connection to the port indicated in the service specification for “hostname”. A request is then made for all names and the resultant information is placed in the output file. gettable is best used in conjunction with the <code>htable(1M)</code> program which converts the DoD Internet host table format to that used by the network library lookup routines.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWnisu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnisu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWnisu				
SEE ALSO	<code>htable(1M)</code> , <code>attributes(5)</code> Harrenstien, Ken, Mary Stahl, and Elizabeth Feinler, <i>HOSTNAME Server</i> , RFC 953, Network Information Center, SRI International, Menlo Park, California, October 1985.				
NOTES	Should allow requests for only part of the database.				

NAME	getty – set terminal type, modes, speed, and line discipline
SYNOPSIS	<pre>/usr/lib/saf/ttymon [-h] [-t <i>timeout</i>] <i>line</i> [<i>speed</i> [<i>type</i> [<i>linedisc</i>]]]</pre> <pre>/usr/lib/saf/ttymon -c <i>file</i></pre>
DESCRIPTION	getty sets terminal type, modes, speed, and line discipline. getty is a symbolic link to /usr/lib/saf/ttymon. It is included for compatibility with previous releases for the few applications that still call getty directly. getty can only be executed by the super-user, (a process with the user ID root). Initially getty prints the login prompt, waits for the user's login name, and then invokes the login command. getty attempts to adapt the system to the terminal speed by using the options and arguments specified on the command line. Without optional arguments, getty specifies the following: The <i>speed</i> of the interface is set to 300 baud, either parity is allowed, NEWLINE characters are converted to carriage return-line feed, and tab expansion is performed on the standard output. getty types the login prompt before reading the user's name a character at a time. If a null character (or framing error) is received, it is assumed to be the result of the user pressing the BREAK key. This will cause getty to attempt the next <i>speed</i> in the series. The series that getty tries is determined by what it finds in /etc/ttydefs .
OPTIONS	The following options are supported: -h If the -h flag is not set, a hangup will be forced by setting the speed to zero before setting the speed to the default or a specified speed. -t <i>timeout</i> Specifies that getty should exit if the open on the line succeeds and no one types anything in <i>timeout</i> seconds. -c <i>file</i> The -c option is no longer supported. Instead use /usr/sbin/sttydefs -l to list the contents of the /etc/ttydefs file and perform a validity check on the file.
OPERANDS	The following operands are supported: <i>line</i> The name of a TTY line in /dev to which getty is to attach itself. getty uses this string as the name of a file in the /dev directory to open for reading and writing. <i>speed</i> The <i>speed</i> argument is a label to a speed and TTY definition in the file /etc/ttydefs. This definition tells getty at what speed to run initially, what the initial TTY settings are, and what speed to try next, (should the user press the BREAK key to indicate that the speed is inappropriate). The default <i>speed</i> is 300 baud. <i>type</i> and <i>linedisc</i> These options are obsolete and will be ignored.
FILES	/etc/ttydefs

getty(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsr

SEE ALSO `ct(1C)`, `login(1)`, `sttydefs(1M)`, `ttymon(1M)`, `ioctl(2)`, `attributes(5)`, `tty(7D)`

NAME	getvol – verifies device accessibility
SYNOPSIS	<pre>/usr/bin/getvol -n [-l <i>label</i>] <i>device</i> /usr/bin/getvol [-f -F] [-ow] [-l <i>label</i> -x <i>label</i>] <i>device</i></pre>
DESCRIPTION	getvol verifies that the specified device is accessible and that a volume of the appropriate medium has been inserted. The command is interactive and displays instructional prompts, describes errors, and shows required label information.
OPTIONS	The following options are supported: -n Runs the command in non-interactive mode. The volume is assumed to be inserted upon command invocation. -l <i>label</i> Specifies that the label <i>label</i> must exist on the inserted volume (can be overridden by the -o option). -f Formats the volume after insertion, using the format command defined for this device in the device table. -F Formats the volume after insertion and places a file system on the device. Also uses the format command defined for this device in the device table. -o Allows the administrator to override a label check. -w Allows administrator to write a new label on the device. User is prompted to supply the label text. This option is ineffective if the -n option is enabled. -x <i>label</i> Specifies that the label <i>label</i> must exist on the device. This option should be used in place of the -l option when the label can only be verified by visual means. Use of the option causes a message to be displayed asking the administrator to visually verify that the label is indeed <i>label</i>.
OPERANDS	The following operands are supported: <i>device</i> Specifies the device to be verified for accessibility.
EXIT STATUS	The following exit values are returned: 0 Successful completion. 1 Command syntax was incorrect, invalid option was used, or an internal error occurred. 3 Device table could not be opened for reading.
FILES	/etc/device.tab

getvol(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `attributes(5)`

NOTES This command uses the device table to determine the characteristics of the device when performing the volume label checking.

NAME	gkadmin – Kerberos database administration GUI, SEAM Administration Tool	
SYNOPSIS	/usr/sbin/gkadmin	
DESCRIPTION	gkadmin is an interactive graphical user interface (GUI) that enables you to maintain Kerberos principals and policies. gkadmin provides much the same functionality as the kadmin(1M) command. gkadmin does not support the management of keytabs. You must use kadmin for keytabs management. gkadmin uses Kerberos authentication and an encrypted RPC to operate securely from anywhere on the network. When gkadmin is invoked, the login window is populated with default values. For the principal name, gkadmin determines your user name from the USER environment variable. It appends /admin to the name (<i>username/admin</i>) to create a default user instance in the same manner as kadmin. It also selects appropriate defaults for realm and master KDC (<i>admin_server</i>) from the <i>/etc/krb5/krb5.conf</i> file. You can change these defaults on the login window. When you enter your password, a session is started with kadmind. Operations performed are subject to permissions that are granted or denied to the chosen user instance by the Kerberos ACL file. See <i>kadm5.acl(4)</i>. After the session is started, a tabbed folder is displayed that contains a principal list and a policy list. The functionality is mainly the same as kadmin, with addition, deletion, and modification of principal and policy data available. In addition, gkadmin provides the following features: ■ New principal or policy records can be added either from default values or from the settings of an existing principal. ■ A comment field is available for principals. ■ Default values are saved in <i>\$HOME/.gkadmin</i>. ■ A logout option permits you to log back in as another user instance without exiting the tool. ■ Principal and policy lists and attributes can be printed or saved to a file. ■ Online context-sensitive help and general help is available in the Help menu.	
FILES	<i>/etc/krb5/krb5.conf</i>	Kerberos configuration information on a Kerberos client. Used to search for default realm and master KDC (<i>admin_server</i>), including a port number for the master KDC.
	<i>\$HOME/.gkadmin</i>	Default parameters used to initialize new principals created during the session.

gkadmin(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkdcu
Interface Stability	Evolving

SEE ALSO `kpasswd(1)`, `kadmin(1M)`, `kadmind(1M)`, `kadmin.local(1M)`, `kdb5_util(1M)`, `kadm5.acl(4)`, `kdc.conf(4)`, `krb5.conf(4)`, `attributes(5)`, `SEAM(5)`

DIAGNOSTICS The `gkadmin` interface is currently incompatible with the MIT `kadmind` daemon interface, so you cannot use this interface to administer an MIT-based Kerberos database. However, SEAM-based Kerberos clients can still use an MIT-based KDC.

NAME	groupadd – add (create) a new group definition on the system
SYNOPSIS	/usr/sbin/groupadd [-g <i>gid</i> [-o]] <i>group</i>
DESCRIPTION	The groupadd command creates a new group definition on the system by adding the appropriate entry to the <code>/etc/group</code> file.
OPTIONS	The following options are supported: -g <i>gid</i> Assigns the group id <i>gid</i> for the new group. This group id must be a non-negative decimal integer below MAXUID as defined in <code>/usr/include/sys/param.h</code>. The group ID defaults to the next available (unique) number above the highest number currently assigned. For example, if groups 100, 105, and 200 are assigned as groups, the next default group number will be 201. (Group IDs from 0–99 are reserved by SunOS for future applications.) -o Allows the <i>gid</i> to be duplicated (non-unique).
OPERANDS	The following operands are supported: <i>group</i> A string consisting of characters from the set of lower case alphabetic characters and numeric characters. A warning message will be written if the string exceeds MAXGLEN, which is usually set at eight characters. The <i>group</i> field must contain at least one character; it accepts lower case or numeric characters or a combination of both, and must not contain a colon (:) or NEWLINE.
EXIT STATUS	The following exit values are returned: 0 Successful completion. 2 Invalid command syntax. A usage message for the groupadd command is displayed. 3 An invalid argument was provided to an option. 4 The <i>gid</i> is not unique (when -o option is not used). 9 The <i>group</i> is not unique. 10 The <code>/etc/group</code> file cannot be updated.
FILES	<code>/etc/group</code> <code>/usr/include/userdefs.h</code>
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

groupadd(1M)

SEE ALSO users(1B), groupdel(1M), groupmod(1M), grpck(1M), logins(1M), pwck(1M), useradd(1M), userdel(1M), usermod(1M), group(4), attributes(5)

NOTES groupadd only adds a group definition to the local system. If a network name service such as NIS or NIS+ is being used to supplement the local `/etc/group` file with additional entries, groupadd cannot change information supplied by the network name service. However, groupadd will verify the uniqueness of group name and group ID against the external name service.

NAME	groupdel – delete a group definition from the system				
SYNOPSIS	/usr/sbin/groupdel <i>group</i>				
DESCRIPTION	The groupdel utility deletes a group definition from the system. It deletes the appropriate entry from the <i>/etc/group</i> file.				
OPERANDS	<i>group</i> An existing group name to be deleted.				
EXIT STATUS	The following exit values are returned: 0 Success. 2 Invalid command syntax. A usage message for the groupdel command is displayed. 6 <i>group</i> does not exist. 10 Cannot update the <i>/etc/group</i> file.				
FILES	<i>/etc/group</i> system file containing group definitions				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1" data-bbox="461 945 1430 1035"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	users(1B), groupadd(1M), groupmod(1M), logins(1M), useradd(1M), userdel(1M), usermod(1M), attributes(5)				
NOTES	The groupdel utility only deletes a group definition that is in the local <i>/etc/group</i> file. If a network nameservice such as NIS or NIS+ is being used to supplement the local <i>/etc/group</i> file with additional entries, groupdel cannot change information supplied by the network nameservice.				

groupmod(1M)

NAME	groupmod – modify a group definition on the system
SYNOPSIS	/usr/sbin/groupmod [-g <i>gid</i> [-o]] [-n <i>name</i>] <i>group</i>
DESCRIPTION	The groupmod command modifies the definition of the specified group by modifying the appropriate entry in the <i>/etc/group</i> file.
OPTIONS	The following options are supported: -g <i>gid</i> Specify the new group ID for the group. This group ID must be a non-negative decimal integer less than MAXUID, as defined in <i><param.h></i>. The group ID defaults to the next available (unique) number above 99. (Group IDs from 0-99 are reserved by SunOS for future applications.) -n <i>name</i> Specify the new name for the group. The <i>name</i> argument is a string of no more than eight bytes consisting of characters from the set of lower case alphabetic characters and numeric characters. A warning message will be written if these restrictions are not met. A future Solaris release may refuse to accept group fields that do not meet these requirements. The <i>name</i> argument must contain at least one character and must not include a colon (:) or NEWLINE (\n). -o Allow the <i>gid</i> to be duplicated (non-unique).
OPERANDS	The following operands are supported: <i>group</i> An existing group name to be modified.
EXIT STATUS	The groupmod utility exits with one of the following values: 0 Success. 2 Invalid command syntax. A usage message for the groupmod command is displayed. 3 An invalid argument was provided to an option. 4 <i>gid</i> is not unique (when the -o option is not used). 6 <i>group</i> does not exist. 9 <i>name</i> already exists as a group name. 10 Cannot update the <i>/etc/group</i> file.
FILES	<i>/etc/group</i> group file
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

groupmod(1M)

SEE ALSO users(1B), groupadd(1M), groupdel(1M), logins(1M), useradd(1M),
userdel(1M), usermod(1M), group(4), attributes(5)

NOTES The groupmod utility only modifies group definitions in the `/etc/group` file. If a network name service such as NIS or NIS+ is being used to supplement the local `/etc/group` file with additional entries, groupmod cannot change information supplied by the network name service. The groupmod utility will, however, verify the uniqueness of group name and group ID against the external name service.

growfs(1M)

NAME	growfs – non-destructively expand a UFS file system
SYNOPSIS	/usr/sbin/growfs [-M <i>mount-point</i>] [<i>newfs-options</i>] [<i>raw-device</i>]
DESCRIPTION	growfs non-destructively expands a mounted or unmounted UNIX file system (UFS) to the size of the file system's slice(s). Typically, disk space is expanded by first adding a slice to a metadvice, then running the growfs command. When adding space to a mirror, you expand each submirror before expanding the file system. On a trans metadvice, the master device is expanded, not the trans metadvice. Then the growfs command is run on the trans metadvice. (You can add space to a logging device, but you do not need to run the growfs command. The new space is automatically recognized.) growfs will "write-lock" (see lockfs(1M)) a mounted file system when expanding. The length of time the file system is write-locked can be shortened by expanding the file system in stages. For instance, to expand a 1 Gbyte file system to 2 Gbytes, the file system can be grown in 16 Mbyte stages using the -s option to specify the total size of the new file system at each stage. The argument for -s is the number of sectors, and must be a multiple of the cylinder size. Note: The file system cannot be grown if a cylinder size of less than 2 is specified. Refer to the newfs(1M) man page for information on the options available when growing a file system. growfs displays the same information as mkfs during the expansion of the file system. If growfs is aborted, recover any lost free space by unmounting the file system and running the fsck command, or run the growfs command again.
OPTIONS	Root privileges are required for all of the following options. <i>-M mount-point</i> The file system to be expanded is mounted on <i>mount-point</i>. File system locking (lockfs) will be used. <i>newfs-options</i> The options are documented in the newfs man page. <i>raw-device</i> Specifies the name of a raw metadvice or raw special device, residing in /dev/md/rdisk, or /dev/rdisk, respectively, including the disk slice, where you want the file system to be grown.
EXAMPLES	EXAMPLE 1 Expanding nonmetadvice slice for /export file system The following example expands a nonmetadvice slice for the /export file system. In this example, the existing slice, /dev/dsk/c1t0d0s3, is converted to a metadvice so additional slices can be concatenated. <pre># metainit -f d8 2 1 c1t0d0s3 1 c2t0d0s3 # umount /export</pre>

EXAMPLE 2 Associate /export with new metadvice

Edit the /etc/vfstab file to change the entry for /export to the newly defined metadvice, d8.

```
# mount /export
# growfs -M /export /dev/md/rdisk/d8
```

The first example starts by running the metainit command with the -f option to force the creation of a new concatenated metadvice d8, which consists of the existing slice /dev/dsk/c1t0d0s3 and a new slice /dev/dsk/c2t0d0s3. Next, the file system on /export must be unmounted. The /etc/vfstab file is edited to change the entry for /export to the newly defined metadvice name, rather than the slice name. After the file system is remounted, the growfs command is run to expand the file system. The file system will span the entire metadvice when growfs completes. The -M option enables the growfs command to expand a mounted file system. During the expansion, write access for /export is suspended until growfs unlocks the file system. Read access is not affected, though access times are not kept when the lock is in effect.

EXAMPLE 3 Dynamic Expansion of /export file system

The following example picks up from the previous one. Here, the /export file system mounted on metadvice d8 is dynamically expanded.

```
# metattach d8 c0t1d0s2
# growfs -M /export /dev/md/rdisk/d8
```

This example begins by using the metattach command to dynamically concatenate a new slice, /dev/dsk/c0t1d0s2, to the end of an existing metadvice, d8. Next, the growfs command specifies that the mount-point is /export and that it is to be expanded onto the raw metadvice /dev/md/rdisk/d8. The file system will span the entire metadvice when growfs completes. During the expansion, write access for /export is suspended until growfs unlocks the file system. Read access is not affected, though access times are not kept when the lock is in effect.

EXAMPLE 4 Expanding mounted file system to existing mirror

The following example expands a mounted file system /files, to an existing mirror, d80, which contains two submirrors, d9 and d10.

```
# metattach d9 c0t2d0s5
# metattach d10 c0t3d0s5
# growfs -M /files /dev/md/rdisk/d80
```

In this example, the metattach command dynamically concatenates the new slices to each submirror. The metattach command must be run for each submirror. The mirror will automatically grow when the last submirror is dynamically concatenated. The mirror will grow to the size of the smallest submirror. The growfs command then expands the file system. The growfs command specifies that the mount-point is /files and that it is to be expanded onto the raw metadvice /dev/md/rdisk/d80.

growfs(1M)

EXAMPLE 4 Expanding mounted file system to existing mirror (Continued)

The file system will span the entire mirror when the `growfs` command completes. During the expansion, write access for the file system is suspended until `growfs` unlocks the file system. Read access is not affected, though access times are not kept when the lock is in effect.

EXIT STATUS The following exit values are returned:

0 Successful completion.
>0 An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdu

SEE ALSO `fsck(1M)`, `lockfs(1M)`, `mkfs(1M)`, `metattach(1M)`, `newfs(1M)`, `attributes(5)`

Solaris Volume Manager Administration Guide

LIMITATIONS Only UFS file systems (either mounted or unmounted) can be expanded using the `growfs` command. Once a file system is expanded, it cannot be decreased in size. The following conditions prevent you from expanding file systems: When `acct` is activated and the accounting file is on the target device. When C2 security is activated and the logging file is on the target file system. When there is a local swap file in the target file system. When the file system is root (`/`), `/usr`, or swap.

NAME	gsscred – add, remove and list gsscred table entries																
SYNOPSIS	<pre> gsscred [-n <i>user</i> [-o <i>oid</i>] [-u <i>uid</i>]] [-c <i>comment</i>] -m <i>mech</i> -a gsscred [-n <i>user</i> [-o <i>oid</i>]] [-u <i>uid</i>] [-m <i>mech</i>] -r gsscred [-n <i>user</i> [-o <i>oid</i>]] [-u <i>uid</i>] [-m <i>mech</i>] -l </pre>																
DESCRIPTION	The <code>gsscred</code> utility is used to create and maintain a mapping between a security principal name and a local UNIX <i>uid</i>. The format of the user name is assumed to be <code>GSS_C_NT_USER_NAME</code>. You can use the <code>-o</code> option to specify the object identifier of the <i>name</i> type. The OID must be specified in dot-separated notation, for example: <code>1.2.3.45464.3.1</code>. The <code>gsscred</code> table is used on server machines to lookup the <i>uid</i> of incoming clients connected using <code>RPCSEC_GSS</code>. When adding users, if no <i>user</i> name is specified, an entry is created in the table for each user from the <code>passwd</code> table. If no <i>comment</i> is specified, the <code>gsscred</code> utility inserts a comment that specifies the user name as an ASCII string and the GSS-API security mechanism that applies to it. The security mechanism will be in string representation as defined in the <code>/etc/gss/mech</code> file. The parameters are interpreted the same way by the <code>gsscred</code> utility to delete users as they are to create users. At least one of the following options must be specified: <code>-n</code>, <code>-u</code>, or <code>-m</code>. If no security mechanism is specified, then all entries will be deleted for the user identified by either the <i>uid</i> or <i>user</i> name. If only the security mechanism is specified, then all <i>user</i> entries for that security mechanism will be deleted. Again, the parameters are interpreted the same way by the <code>gsscred</code> utility to search for users as they are to create users. If no options are specified, then the entire table is returned. If the <i>user</i> name or <i>uid</i> is specified, then all entries for that <i>user</i> are returned. If a security mechanism is specified, then all <i>user</i> entries for that security mechanism are returned.																
OPTIONS	<table> <tr> <td><code>-a</code></td><td>Add a table entry.</td></tr> <tr> <td><code>-c <i>comment</i></code></td><td>Insert comment about this table entry.</td></tr> <tr> <td><code>-l</code></td><td>Search table for entry.</td></tr> <tr> <td><code>-m <i>mech</i></code></td><td>Specify the mechanism for which this name is to be translated.</td></tr> <tr> <td><code>-n <i>user</i></code></td><td>Specify the optional principal name.</td></tr> <tr> <td><code>-o <i>oid</i></code></td><td>Specify the OID indicating the name type of the user.</td></tr> <tr> <td><code>-r</code></td><td>Remove the entry from the table.</td></tr> <tr> <td><code>-u <i>uid</i></code></td><td>Specify the <i>uid</i> for the <i>user</i> if the <i>user</i> is not local.</td></tr> </table>	<code>-a</code>	Add a table entry.	<code>-c <i>comment</i></code>	Insert comment about this table entry.	<code>-l</code>	Search table for entry.	<code>-m <i>mech</i></code>	Specify the mechanism for which this name is to be translated.	<code>-n <i>user</i></code>	Specify the optional principal name.	<code>-o <i>oid</i></code>	Specify the OID indicating the name type of the user.	<code>-r</code>	Remove the entry from the table.	<code>-u <i>uid</i></code>	Specify the <i>uid</i> for the <i>user</i> if the <i>user</i> is not local.
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gsscred(1M)

EXAMPLES

EXAMPLE 1 Creating a gsscred Table for the Kerberos v5 Security Mechanism

The following shows how to create a gsscred table for the kerberos v5 security mechanism. gsscred obtains *user* names and *uid*'s from the *passwd* table to populate the table.

```
example% gsscred -m kerberos_v5 -a
```

EXAMPLE 2 Adding an Entry for root/host1 for the Kerberos v5 Security Mechanism

The following shows how to add an entry for root/host1 with a specified *uid* of 0 for the kerberos v5 security mechanism.

```
example% gsscred -m kerberos_v5 -n root/host1 -u 0 -a
```

EXAMPLE 3 Listing All User Mappings for the Kerberos v5 Security Mechanism

The following lists all user mappings for the kerberos v5 security mechanism.

```
example% gsscred -m kerberos_v5 -l
```

EXAMPLE 4 Listing All Mappings for All Security Mechanism for a Specified User

The following lists all mappings for all security mechanisms for the user bsimpson..

```
example% gsscred -n bsimpson -l
```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
>0	An error occurred.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWgss

SEE ALSO

gssd(1m),attributes(5)

NAME	gssd – generates and validates GSS-API tokens for kernel RPC				
SYNOPSIS	<code>/usr/lib/gss/gssd</code>				
DESCRIPTION	<code>gssd</code> is the user mode daemon that operates between the kernel rpc and the Generic Security Service Application Program Interface (GSS-API) to generate and validate GSS-API security tokens. In addition, <code>gssd</code> maps the GSS-API principal names to the local user and group ids. By default, all groups that the requested user belongs to will be included in the grouplist credential. <code>gssd</code> is invoked by the Internet daemon <code>inetd(1m)</code> the first time that the kernel RPC requests GSS-API services.				
EXIT STATUS	The following exit values are returned: <table> <tr> <td>0</td><td>Successful completion.</td></tr> <tr> <td>>0</td><td>An error occurred.</td></tr> </table>	0	Successful completion.	>0	An error occurred.
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>0	An error occurred.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWgssk</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWgssk
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWgssk				
SEE ALSO	<code>gsscred(1m)</code> , <code>attributes(5)</code> <i>RFC 2078</i>				

halt(1M)

NAME	halt, poweroff – stop the processor				
SYNOPSIS	<pre>/usr/sbin/halt [-dlngy] /usr/sbin/poweroff [-dlngy]</pre>				
DESCRIPTION	The <code>halt</code> and <code>poweroff</code> utilities write any pending information to the disks and then stop the processor. The <code>poweroff</code> utility will have the machine remove power, if possible. The <code>halt</code> and <code>poweroff</code> utilities normally log the system shutdown to the system log daemon, <code>syslogd(1M)</code>, and place a shutdown record in the login accounting file <code>/var/adm/wtmpx</code>. These actions are inhibited if the <code>-n</code> or <code>-q</code> options are present.				
OPTIONS	The following options are supported: <code>-d</code> Force a system crash dump before rebooting. See <code>dumpadm(1M)</code> for information on configuring system crash dumps. <code>-l</code> Suppress sending a message to the system log daemon, <code>syslogd(1M)</code>, about who executed <code>halt</code>. <code>-n</code> Prevent the <code>sync(1M)</code> before stopping. <code>-q</code> Quick halt. No graceful shutdown is attempted. <code>-y</code> Halt the system, even from a dialup terminal.				
FILES	<table><tr><td><code>/var/adm/wtmpx</code></td><td>History of user access and administration information.</td></tr></table>	<code>/var/adm/wtmpx</code>	History of user access and administration information.		
<code>/var/adm/wtmpx</code>	History of user access and administration information.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>dumpadm(1M)</code> , <code>init(1M)</code> , <code>reboot(1M)</code> , <code>shutdown(1M)</code> , <code>sync(1M)</code> , <code>syslogd(1M)</code> , <code>attributes(5)</code>				
NOTES	The <code>halt</code> utility does not execute the scripts in <code>/etc/rc<num>.d</code> or execute shutdown actions in <code>inittab(4)</code>. To ensure a complete shutdown of system services, use <code>shutdown(1M)</code> or <code>init(1M)</code> to reboot a Solaris system. The <code>poweroff</code> utility is equivalent to <code>init 5</code>.				

NAME	hostconfig – configure a system’s host parameters
SYNOPSIS	/usr/sbin/hostconfig -p <i>protocol</i> [-d] [-h] [-n] [-v] [-i <i>interface</i>] [-f <i>hostname</i>]
DESCRIPTION	The <code>hostconfig</code> program uses a network protocol to acquire a machine’s <i>host parameters</i> and set these parameters on the system. The program selects which protocol to use based on the argument to the required -p flag. Different protocols may set different host parameters. Currently, only one protocol (<code>bootparams</code>) is defined.
OPTIONS	The following options are supported: -d Enable debug output. -f <i>hostname</i> Run the protocol as if this machine were named <i>hostname</i>. -h Echo the received <i>hostname</i> to <code>stdout</code>, rather than setting <i>hostname</i> using the system name directly. -i <i>interface</i> Use only the named network interface to run the protocol. -n Run the network protocol, but do not set the acquired parameters into the system. -p <i>protocol</i> Run <code>hostconfig</code> using <i>protocol</i>. Currently, only one protocol (<code>bootparams</code>) is available. This option is required. Specifying the -p <code>bootparams</code> option uses the <code>whoami</code> call of the RPC <code>bootparams</code> protocol. This sets the system’s <i>hostname</i>, <i>domainname</i>, and default IP router parameters. -v Enable verbose output.
EXAMPLES	EXAMPLE 1 Configuring Host Parameters with Verbose Output The following command configures a machine’s host parameters using the <code>whoami</code> call of the RPC <code>bootparams</code> protocol with a verbose output. <pre>example# hostconfig -p bootparams -v</pre> EXAMPLE 2 Displaying Host Parameters The following command displays the parameters that would be set using the <code>whoami</code> call of the RPC <code>bootparams</code> protocol. <pre>example# hostconfig -p bootparams -n -v</pre>

hostconfig(1M)

EXAMPLE 3 Configuring Host Parameters Less the System Name

The following command configures a machine's host parameters, less the system name, using the whoami call of the RPC bootparams protocol.

```
example# hostconfig='hostconfig -p bootparams -h'
```

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO hostname(1), domainname(1M), route(1M), attributes(5)

NAME	htable – convert DoD Internet format host table				
SYNOPSIS	/usr/sbin/htable <i>filename</i>				
DESCRIPTION	htable converts a host table in the format specified by RFC 952 to the format used by the network library routines. Three files are created as a result of running htable: <i>hosts</i>, <i>networks</i>, and <i>gateways</i>. The <i>hosts</i> file is used by the <i>gethostbyname(3NSL)</i> routines in mapping host names to addresses. The <i>networks</i> file is used by the <i>getnetbyname(3SOCKET)</i> routines in mapping network names to numbers. The <i>gateways</i> file is used by the routing daemon to identify “passive” Internet gateways. If any of the files <i>localhosts</i>, <i>localnetworks</i>, or <i>localgateways</i> are present in the current directory, the file’s contents is prepended to the output file without interpretation. This allows sites to maintain local aliases and entries which are not normally present in the master database. htable is best used in conjunction with the <i>gettable(1M)</i> program which retrieves the DoD Internet host table from a host.				
FILES	<i>localhosts</i> <i>localnetworks</i> <i>localgateways</i>				
ATTRIBUTES	See <i>attributes(5)</i> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWnisu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnisu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWnisu				
SEE ALSO	<i>gettable(1M)</i>, <i>gethostbyname(3NSL)</i>, <i>getnetbyname(3SOCKET)</i>, <i>attributes(5)</i> Harrenstien, Ken, Mary Stahl, and Elizabeth Feinler, <i>DoD Internet Host Table Specification</i>, RFC 952, Network Information Center, SRI International, Menlo Park, California, October 1985.				
NOTES	htable does not properly calculate the <i>gateways</i> file.				

ickey(1M)

NAME	ickey – install a client key for WAN boot						
SYNOPSIS	<pre>/usr/lib/inet/wanboot/ickey [-d] [-o type=3des] /usr/lib/inet/wanboot/ickey [-d] [-o type=aes] /usr/lib/inet/wanboot/ickey [-d] [-o type=sha1]</pre>						
DESCRIPTION	The <code>ickey</code> command is used to install WAN boot keys on a running UNIX system so that they can be used the next time the system is installed. You can store three different types of keys: 3DES and AES for encryption and an HMAC SHA-1 key for hashed verification. <code>ickey</code> reads the key from standard input using <code>getpassphrase(3C)</code> so that it does not appear on the command line. When installing keys on a remote system, you must take proper precautions to ensure that any keying materials are kept confidential. At a minimum, use <code>ssh(1)</code> to prevent interception of data in transit. Keys are expected to be presented as strings of hexadecimal digits; they can (but need not) be preceded by a <code>0x</code> or <code>0X</code>. The <code>ickey</code> command has a single option, described below. An argument of the type <code>-o type=keytype</code> is required.						
OPTIONS	The <code>ickey</code> command the following option. <code>-d</code> Delete the key specified by the <i>keytype</i> argument.						
EXIT STATUS	On success, <code>ickey</code> exits with status 0; if a problem occurs, a diagnostic message is printed and <code>ickey</code> exits with non-zero status.						
FILES	<code>/dev/openprom</code> WAN boot key storage driver						
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:						
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWwbsup</td></tr><tr><td>Interface Stability</td><td>Unstable</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWwbsup	Interface Stability	Unstable
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWwbsup						
Interface Stability	Unstable						
SEE ALSO	<code>ssh(1)</code> , <code>openprom(7D)</code> , <code>attributes(5)</code>						

NAME	id – return user identity
SYNOPSIS	<pre> /usr/bin/id [-p] [user] /usr/bin/id -a [-p] [user] /usr/xpg4/bin/id [-p] [user] /usr/xpg4/bin/id -G [-n] [user] /usr/xpg4/bin/id -g [-nr] [user] /usr/xpg4/bin/id -u [-nr] [user] </pre>
DESCRIPTION	If no <i>user</i> operand is provided, the <i>id</i> utility writes the user and group IDs and the corresponding user and group names of the invoking process to standard output. If the effective and real IDs do not match, both are written. If multiple groups are supported by the underlying system, <i>/usr/xpg4/bin/id</i> also writes the supplementary group affiliations of the invoking process. If a <i>user</i> operand is provided and the process has the appropriate privileges, the user and group IDs of the selected user are written. In this case, effective IDs are assumed to be identical to real IDs. If the selected user has more than one allowable group membership listed in the group database, <i>/usr/xpg4/bin/id</i> writes them in the same manner as the supplementary groups described in the preceding paragraph.
Formats	The following formats are used when the LC_MESSAGES locale category specifies the "C" locale. In other locales, the strings <i>uid</i>, <i>gid</i>, <i>eid</i>, <i>egid</i>, and <i>groups</i> may be replaced with more appropriate strings corresponding to the locale. <pre> "uid=%u(%s) gid=%u(%s)\n" <real user ID>, <user-name>, <real group ID>, <group-name> </pre> If the effective and real user IDs do not match, the following are inserted immediately before the <i>\n</i> character in the previous format: <pre> " eid=%u(%s) " </pre> with the following arguments added at the end of the argument list: <pre> <effective user ID>, <effective user-name> </pre> If the effective and real group IDs do not match, the following is inserted directly before the <i>\n</i> character in the format string (and after any addition resulting from the effective and real user IDs not matching): <pre> " egid=%u(%s) " </pre> with the following arguments added at the end of the argument list: <pre> <effectivegroup-ID>, <effectivegroupname> </pre> If the process has supplementary group affiliations or the selected user is allowed to belong to multiple groups, the first is added directly before the NEWLINE character in the format string:

id(1M)

	<pre>" groups=%u(%s) "</pre> with the following arguments added at the end of the argument list: <pre><supplementary group ID>, <supplementary group name></pre> and the necessary number of the following added after that for any remaining supplementary group IDs: <pre>", %u(%s) "</pre> and the necessary number of the following arguments added at the end of the argument list: <pre><supplementary group ID>, <supplementary group name></pre> If any of the user ID, group ID, effective user ID, effective group ID or supplementary/multiple group IDs cannot be mapped by the system into printable user or group names, the corresponding (%s) and name argument is omitted from the corresponding format string. When any of the options are specified, the output format is as described under OPTIONS.		
OPTIONS	The following option is supported by both /usr/bin/id and /usr/xpg4/bin/id. For /usr/xpg4/bin/id, -p is invalid if specified with any of the -G, -g, or -u options. <table><tr><td>-p</td><td>Reports additionally the current project membership of the invoking process. The project is reported using the format:</td></tr></table> <pre>"projid=%u(%s) "</pre> which is inserted prior to the \n character of the default format described in the <code>Formats</code> section. The arguments <pre><project ID>, <project name></pre> are appended to the end of the argument list. If the project ID cannot be mapped by the system into a printable project name, the corresponding (%s) and name argument is omitted from the corresponding format string.	-p	Reports additionally the current project membership of the invoking process. The project is reported using the format:
-p	Reports additionally the current project membership of the invoking process. The project is reported using the format:		
/usr/bin/id	The following option is supported for /usr/bin/id only: <table><tr><td>-a</td><td>Reports user name, user ID and all the groups to which the user belongs.</td></tr></table>	-a	Reports user name, user ID and all the groups to which the user belongs.
-a	Reports user name, user ID and all the groups to which the user belongs.		
/usr/xpg4/bin/id	The following options are supported for /usr/xpg4/bin/id only:		

	-G Outputs all different group IDs (effective, real and supplementary) only, using the format "%u\n". If there is more than one distinct group affiliation, output each such affiliation, using the format " %u", before the NEWLINE character is output. -g Outputs only the effective group ID, using the format "%u\n". -n Outputs the name in the format "%s" instead of the numeric ID using the format "%u". -r Outputs the real ID instead of the effective ID. -u Outputs only the effective user ID, using the format "%u\n".						
OPERANDS	The following operand is supported: <i>user</i> The user (login) name for which information is to be written.						
ENVIRONMENT VARIABLES	See <code>environ(5)</code> for descriptions of the following environment variables that affect the execution of <code>id</code> : <code>LANG</code> , <code>LC_ALL</code> , <code>LC_CTYPE</code> , <code>LC_MESSAGES</code> , and <code>NLSPATH</code> .						
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.						
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:						
/usr/bin/id	<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu, SUNWcar</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu, SUNWcar		
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWcsu, SUNWcar						
/usr/xpg4/bin/id	<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWxcu4</td></tr> <tr> <td>Interface Stability</td><td>Standard</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWxcu4	Interface Stability	Standard
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWxcu4						
Interface Stability	Standard						
SEE ALSO	<code>fold(1)</code> , <code>logname(1)</code> , <code>who(1)</code> , <code>getgid(2)</code> , <code>getgroups(2)</code> , <code>getprojid(2)</code> , <code>getuid(2)</code> , <code>attributes(5)</code> , <code>environ(5)</code> , <code>standards(5)</code>						
NOTES	Output produced by the <code>-G</code> option and by the default case could potentially produce very long lines on systems that support large numbers of supplementary groups.						

idsconfig(1M)

NAME	idsconfig – prepare an iPlanet Directory Server (iDS) to be populated with data and serve LDAP clients						
SYNOPSIS	<code>/usr/lib/ldap/idsconfig [-v] [-i <i>input_configfile</i>] [-o <i>output_configfile</i>]</code>						
DESCRIPTION	Use the <code>idsconfig</code> tool to set up an iPlanet Directory Server (iDS). You can specify the input configuration file with the <code>-i</code> option on the command line. Alternatively, the tool will prompt the user for configuration information. The input configuration file is created by <code>idsconfig</code> with the <code>-o</code> option on a previous run. The first time a server is set up, the user is prompted for all the required information. Future installations on that machine can use the configuration file previously generated by <code>idsconfig</code> using the <code>-o</code> option. The output configuration file contains the directory administrator's password in clear text. Thus, if you are creating an output configuration file, take appropriate security precautions. You should back up the directory server's configuration and data prior to running this command.						
OPTIONS	The following options are supported: <table> <tr> <td><code>-i <i>input_configfile</i></code></td><td>Specify the file name for <code>idsconfig</code> to use as a configuration file. This file will be read by <code>idsconfig</code>, and the values in the file will be used to configure the server. Do not manually edit <i>input_configfile</i>. The <i>input_configfile</i> is only partially validated, as <code>idsconfig</code> assumes that the file was created by a previous invocation of the command.</td></tr> <tr> <td><code>-o <i>output_configfile</i></code></td><td>Create a configuration file.</td></tr> <tr> <td><code>-v</code></td><td>Verbose output.</td></tr> </table>	<code>-i <i>input_configfile</i></code>	Specify the file name for <code>idsconfig</code> to use as a configuration file. This file will be read by <code>idsconfig</code> , and the values in the file will be used to configure the server. Do not manually edit <i>input_configfile</i> . The <i>input_configfile</i> is only partially validated, as <code>idsconfig</code> assumes that the file was created by a previous invocation of the command.	<code>-o <i>output_configfile</i></code>	Create a configuration file.	<code>-v</code>	Verbose output.
<code>-i <i>input_configfile</i></code>	Specify the file name for <code>idsconfig</code> to use as a configuration file. This file will be read by <code>idsconfig</code> , and the values in the file will be used to configure the server. Do not manually edit <i>input_configfile</i> . The <i>input_configfile</i> is only partially validated, as <code>idsconfig</code> assumes that the file was created by a previous invocation of the command.						
<code>-o <i>output_configfile</i></code>	Create a configuration file.						
<code>-v</code>	Verbose output.						
OPERANDS	The following operands are supported: <table> <tr> <td><i>input_configfile</i></td><td>Name of configuration file for <code>idsconfig</code> to use.</td></tr> <tr> <td><i>output_configfile</i></td><td>Configuration file created by <code>idsconfig</code>.</td></tr> </table>	<i>input_configfile</i>	Name of configuration file for <code>idsconfig</code> to use.	<i>output_configfile</i>	Configuration file created by <code>idsconfig</code> .		
<i>input_configfile</i>	Name of configuration file for <code>idsconfig</code> to use.						
<i>output_configfile</i>	Configuration file created by <code>idsconfig</code> .						
EXAMPLES	EXAMPLE 1 Prompting the User for Input In the following example, the user is prompted for information to set up iDS. <pre>example# idsconfig</pre> EXAMPLE 2 Creating an Output Configuration File In the following example, the user is prompted for information to set up iDS, and an output configuration file, <code>config.1</code>, is created when completed. <pre>example# idsconfig -o config.1</pre>						

EXAMPLE 3 Setting up iDS Using the Specified Configuration File

In the following example, iDS is set up by using the values specified in the configuration file, `config.1`. The verbose mode is specified, so detailed information will print to the screen.

```
example# idsconfig -v -i config.1
```

EXIT STATUS The following exit values are returned:

0 Successful completion.
>0 An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu
Interface Stability	Evolving

SEE ALSO `ldap(1)`, `ldapadd(1)`, `ldapdelete(1)`, `ldaplist(1)`, `ldapmodify(1)`, `ldapmodrdn(1)`, `ldapsearch(1)`, `ldap_cachemgr(1M)`, `ldapaddent(1M)`, `ldapclient(1M)`, `suninstall(1M)`, `resolv.conf(4)`, `attributes(5)`

ifconfig(1M)

NAME	ifconfig – configure network interface parameters
SYNOPSIS	<pre> /sbin/ifconfig interface [address_family] [address [/prefix_length] [dest_address]] [addif address [/prefix_length]] [removeif address [/prefix_length]] [arp -arp] [auth_algs authentication algorithm] [encr_algs encryption algorithm] [encr_auth_algs authentication algorithm] [auto-revarp] [broadcast address] [deprecated -deprecated] [destination dest_address] [[failover] [-failover]] [group [[name] ""]] [index {if_index}] [metric n] [modlist] [modinsert mod_name@pos] [modremove mod_name@pos] [mtu n] [netmask mask] [plumb] [unplumb] [private -private] [nud -nud] [set [address] [/netmask]] [[standby] [-standby]] [subnet subnet_address] [tdst tunnel_dest_address] [token address/prefix_length] [tsrc tunnel_src_address] [trailers -trailers] [up] [down] [xmit -xmit] [encaplimit n -encaplimit] [thoplimit n] /usr/sbin/ifconfig interface [address_family] [address [/prefix_length] [dest_address]] [addif address [/prefix_length]] [removeif address [/prefix_length]] [arp -arp] [auth_algs authentication algorithm] [encr_algs encryption algorithm] [encr_auth_algs authentication algorithm] [auto-revarp] [broadcast address] [deprecated -deprecated] [destination dest_address] [[failover] [-failover]] [group [[name] ""]] [index {if_index}] [metric n] [modlist] [modinsert mod_name@pos] [modremove mod_name@pos] [mtu n] [netmask mask] [plumb] [unplumb] [private -private] [nud -nud] [set [address] [/netmask]] [[standby] [-standby]] [subnet subnet_address] [tdst tunnel_dest_address] [token address/prefix_length] [tsrc tunnel_src_address] [trailers -trailers] [up] [down] [xmit -xmit] [encaplimit n -encaplimit] [thoplimit n] /sbin/ifconfig interface {auto-dhcp dhcp} [primary] [wait seconds] drop extend inform ping release start status /usr/sbin/ifconfig interface {auto-dhcp dhcp} [primary] [wait seconds] drop extend inform ping release start status </pre>
DESCRIPTION	The command <code>ifconfig</code> is used to assign an address to a network interface and to configure network interface parameters. The <code>ifconfig</code> command must be used at boot time to define the network address of each interface present on a machine; it may also be used at a later time to redefine an interface's address or other operating parameters. If no option is specified, <code>ifconfig</code> displays the current configuration for a network interface. If an address family is specified, <code>ifconfig</code> reports only the details specific to that address family. Only the superuser may modify the configuration of a network interface. Options appearing within braces (<code>{ }</code>) indicate that one of the options must be specified.

DHCP Configuration

The two versions of `ifconfig`, `/sbin/ifconfig` and `/usr/sbin/ifconfig`, behave differently with respect to name services. The order in which names are looked up by `/sbin/ifconfig` when the system is booting is fixed and cannot be changed. In contrast, changing `/etc/nsswitch.conf` may affect the behavior of `/usr/sbin/ifconfig`. The system administrator may configure the source and lookup order in the tables by means of the name service switch. See `nsswitch.conf(4)` for more information.

The third and fourth forms of this command are used to control the Dynamic Host Configuration Protocol (“DHCP”) configuring of the interface. DHCP is only available on interfaces for which the address family is `inet`. In this mode, `ifconfig` is used to control operation of `dhcpgent(1M)`, the DHCP client daemon. Once an interface is placed under DHCP control by using the `start` operand, `ifconfig` should not, in normal operation, be used to modify the address or characteristics of the interface. If the address of an interface under DHCP is changed, `dhcpgent` will remove the interface from its control.

OPTIONS

The following options are supported:

`addif address`

Create the next unused logical interface on the specified physical interface.

`arp`

Enable the use of the Address Resolution Protocol (“ARP”) in mapping between network level addresses and link level addresses (default). This is currently implemented for mapping between IPv4 addresses and 10Mb/s Ethernet addresses.

`-arp`

Disable the use of the ARP.

`auth_algs authentication algorithm`

For a tunnel, enable IPsec AH with the authentication algorithm specified. The algorithm can be either a number or an algorithm name, including *any* to express no preference in algorithm. All IPsec tunnel properties must be specified on the same command line. To disable tunnel security, specify an `auth_alg` of *none*.

`auto-dhcp`

Use DHCP to automatically acquire an address for this interface. This option has a completely equivalent alias called `dhcp`.

`primary`

Defines the interface as the `primary`. The interface is defined as the preferred one for the delivery of client-wide configuration data. Only one interface can be the `primary` at any given time. If another interface is subsequently selected as the `primary`, it replaces the previous one. Nominating an interface as the `primary` one will not have much significance once the client work station has booted, as many applications will already have started and been configured with data read from the previous `primary` interface.

ifconfig(1M)

<i>wait seconds</i>	The <code>ifconfig</code> command will wait until the operation either completes or for the interval specified, whichever is the sooner. If no wait interval is given, and the operation is one that cannot complete immediately, <code>ifconfig</code> will wait 30 seconds for the requested operation to complete. The symbolic value <code>forever</code> may be used as well, with obvious meaning.
<i>drop</i>	Remove the specified interface from DHCP control. Additionally, set the IP address to zero and mark the interface as "down".
<i>extend</i>	Attempt to extend the lease on the interface's IPv4 address. This is not required, as the agent will automatically extend the lease well before it expires.
<i>inform</i>	Obtain network configuration parameters from DHCP without obtaining a lease on an IP address. This is useful in situations where an IP address is obtained through mechanisms other than DHCP.
<i>ping</i>	Check whether the interface given is under DHCP control, which means that the interface is managed by the DHCP agent and is working properly. An exit status of 0 means success. This subcommand has no meaning when the named interface represents more than one interface.
<i>release</i>	Relinquish the IPv4 address on the interface, and mark the interface as "down."
<i>start</i>	Start DHCP on the interface.
<i>status</i>	Display the DHCP configuration status of the interface.
<i>auto-revarp</i>	Use the Reverse Address Resolution Protocol ("RARP") to automatically acquire an address for this interface.
<i>broadcast address</i>	For IPv4 only. Specify the address to use to represent broadcasts to the network. The default broadcast address is the address with a host part of all 1's. A "+" (plus sign) given for the broadcast value causes the broadcast address to be reset to a default appropriate for the (possibly new) address and netmask. The arguments of <code>ifconfig</code> are interpreted left to right. Therefore <pre>example% ifconfig -a netmask + broadcast +</pre> and <pre>example% ifconfig -a broadcast + netmask +</pre> may result in different values being assigned for the broadcast addresses of the interfaces.

deprecated

Marks the address as a deprecated address. Addresses marked as deprecated will not be used as source address for outbound packets unless either there are no other addresses available on this interface or the application has bound to this address explicitly. The status display shows `DEPRECATED` as part of flags. See `INTERFACE FLAGS` for information on the flags supported by `ifconfig`.

-deprecated

Marks the address as not deprecated.

destination *dest_address*

Set the destination address for a point-to point interface.

dhcp

This option is an alias for option `auto-dhcp`

down

Mark an interface "down". When an interface is marked "down", the system does not attempt to transmit messages through that interface. If possible, the interface is reset to disable reception as well. This action does not automatically disable routes using the interface.

encaplimit *n*

Set the tunnel encapsulation limit for the interface to *n*. This option applies to IPv4-in-IPv6 and IPv6-in-IPv6 tunnels only. The tunnel encapsulation limit controls how many more tunnels a packet may enter before it leaves any tunnels, that is, the tunnel nesting level.

-encaplimit

Disable generation of the tunnel encapsulation limit. This option applies only to IPv4-in-IPv6 and IPv6-in-IPv6 tunnels.

encr_auth_algs *authentication algorithm*

For a tunnel, enable IPsec ESP with the authentication algorithm specified. It can be either a number or an algorithm name, including any or none, to indicate no algorithm preference. If an ESP encryption algorithm is specified but the authentication algorithm is not, the default value for the ESP authentication algorithm will be any.

encr_algs *encryption algorithm*

For a tunnel, enable IPsec ESP with the encryption algorithm specified. It can be either a number or an algorithm name. Note that all IPsec tunnel properties must be specified on the same command line. To disable tunnel security, specify the value of `encr_alg` as none. If an ESP authentication algorithm is specified, but the encryption algorithm is not, the default value for the ESP encryption will be null.

-failover

Mark the address as a non-failover address. Addresses marked this way will not failover when the interface fails. Status display shows "NOFAILOVER" as part of flags.

ifconfig(1M)

failover

Mark the address as a failover address. This address will failover when the interface fails. Status display does not show "NOFAILOVER" as part of flags.

group [*name* | " "]

Insert the interface in the multipathing group specified by *name*. To delete an interface from a group, use a null string " ". When invoked on the logical interface with id zero, the status display shows the group name.

index *n*

Change the interface index for the interface. The value of *n* must be an interface index (*if_index*) that is not used on another interface. *if_index* will be a non-zero positive number that uniquely identifies the network interface on the system.

metric *n*

Set the routing metric of the interface to *n*; if no value is specified, the default is 0. The routing metric is used by the routing protocol. Higher metrics have the effect of making a route less favorable. Metrics are counted as addition hops to the destination network or host.

modinsert *mod_name@pos*

Insert a module with name *mod_name* to the stream of the device at position *pos*. The position is relative to the stream head. Position 0 means directly under stream head.

Based upon the example in the `modlist` option, use the following command to insert a module with name `ipqos` under the `ip` module and above the firewall module:

```
example% ifconfig hme0 modinsert ipqos@2
```

A subsequent listing of all the modules in the stream of the device follows:

```
example% ifconfig hme0 modlist
0 arp
1 ip
2 ipqos
3 firewall
4 hme
```

modlist

List all the modules in the stream of the device.

The following example lists all the modules in the stream of the device:

```
example% ifconfig hme0 modlist
0 arp
1 ip
2 firewall
4 hme
```

modremove *mod_name@pos*

Remove a module with name *mod_name* from the stream of the device at position *pos*. The position is relative to the stream head.

Based upon the example in the `modinsert` option, use the following command to remove the firewall module from the stream after inserting the `ipqos` module:

```
example% ifconfig hme0 modremove firewall@3
```

A subsequent listing of all the modules in the stream of the device follows:

```
example% ifconfig hme0 modlist
0 arp
1 ip
2 ipqos
3 hme
```

Note that the core IP stack modules, for example, `ip` and `tun` modules, cannot be removed.

`mtu n`

Set the maximum transmission unit of the interface to *n*. For many types of networks, the `mtu` has an upper limit, for example, 1500 for Ethernet.

`netmask mask`

For IPv4 only. Specify how much of the address to reserve for subdividing networks into subnetworks. The mask includes the network part of the local address and the subnet part, which is taken from the host field of the address. The mask contains 1's for the bit positions in the 32-bit address which are to be used for the network and subnet parts, and 0's for the host part. The mask should contain at least the standard network portion, and the subnet field should be contiguous with the network portion. The mask can be specified in one of four ways:

1. with a single hexadecimal number with a leading 0x,
2. with a dot-notation address,
3. with a "+" (plus sign) address, or
4. with a pseudo host name/pseudo network name found in the network database `networks(4)`.

If a "+" (plus sign) is given for the netmask value, the mask is looked up in the `netmasks(4)` database. This lookup finds the longest matching netmask in the database by starting with the interface's IPv4 address as the key and iteratively masking off more and more low order bits of the address. This iterative lookup ensures that the `netmasks(4)` database can be used to specify the netmasks when variable length subnetmasks are used within a network number.

If a pseudo host name/pseudo network name is supplied as the netmask value, netmask data may be located in the `hosts` or `networks` database. Names are looked up by first using `gethostbyname(3NSL)`. If not found there, the names are looked up in `getnetbyname(3SOCKET)`. These interfaces may in turn use `nsswitch.conf(4)` to determine what data store(s) to use to fetch the actual value.

For both `inet` and `inet6`, the same information conveyed by *mask* can be specified as a *prefix_length* attached to the *address* parameter.

ifconfig(1M)

nud
Enables the neighbor unreachability detection mechanism on a point-to-go interface.

-nud
Disables the neighbor unreachability detection mechanism on a point-to-go interface.

plumb
Open the device associated with the physical interface name and set up the streams needed for IP to use the device. When used with a logical interface name, this command is used to create a specific named logical interface. An interface must be separately plumbed for use by IPv4 and IPv6. The *address_family* parameter controls whether the `ifconfig` command applies to IPv4 or IPv6.

Before an interface has been plumbed, the interface will not show up in the output of the `ifconfig -a` command.

private
Tells the `in.routed` routing daemon that the interface should not be advertised.

-private
Specify unadvertised interfaces.

removeif *address*
Remove the logical interface on the physical interface specified that matches the *address* specified.

set
Set the *address*, *prefix_length* or both, for an interface.

standby
Marks the physical interface as a standby interface. If the interface is marked STANDBY and is part of the multipathing group, the interface will not be selected to send out packets unless some other interface in the group has failed and the network access has been failed over to this standby interface.

The status display shows "STANDBY, INACTIVE" indicating that that the interface is a standby and is also inactive. `IFF_INACTIVE` will be cleared when some other interface belonging to the same multipathing group fails over to this interface. Once a failback happens, the status display will return to `INACTIVE`.

-standby
Turns off standby on this interface.

subnet
Set the subnet *address* for an interface.

tdst *tunnel_dest_address*
Set the destination address of a tunnel. The address should not be the same as the *dest_address* of the tunnel, because no packets leave the system over such a tunnel.

thoplimit *n*

Set the hop limit for a tunnel interface. The hop limit value is used as the TTL in the IPv4 header for the IPv6-in-IPv4 and IPv4-in-IPv4 tunnels. For IPv6-in-IPv6 and IPv4-in-IPv6 tunnels, the hop limit value is used as the hop limit in the IPv6 header.

token *address/prefix_length*

Set the IPv6 token of an interface to be used for address autoconfiguration.

example% **ifconfig hme0 inet6 token ::1/64**

trailers

This flag previously caused a nonstandard encapsulation of `inet` packets on certain link levels. Drivers supplied with this release no longer use this flag. It is provided for compatibility, but is ignored.

-trailers

Disable the use of a "trailer" link level encapsulation.

tsrc *tunnel_src_address*

Set the source address of a tunnel. This is the source address on an outer encapsulating IP header. It must be an address of another interface already configured using `ifconfig`.

unplumb

Close the device associated with this physical interface name and any streams that `ifconfig` set up for IP to use the device. When used with a logical interface name, the logical interface is removed from the system. After this command is executed, the device name will no longer appear in the output of `ifconfig -a`.

up

Mark an interface "up". This happens automatically when setting the first address on an interface. The `up` option enables an interface after an `ifconfig down`, which reinitializes the hardware.

xmit

Enable an interface to transmit packets. This is the default behavior when the interface is up.

-xmit

Disable transmission of packets on an interface. The interface will continue to receive packets.

OPERANDS

The *interface* operand, as well as address parameters that affect it, are described below.

interface

A string of one of the following forms:

- *name physical-unit*, for example, `le0` or `ie1`
- *name physical-unit : logical-unit*, for example, `le0 : 1`
- `ip.tunN` or `ip6.tunN`, for tunnels

ifconfig(1M)

If the interface name starts with a dash (-), it is interpreted as a set of options which specify a set of interfaces. In such a case, -a must be part of the options and any of the additional options below can be added in any order. If one of these interface names is given, the commands following it are applied to all of the interfaces that match.

- a Apply the command to all interfaces of the specified address family. If no address family is supplied, either on the command line or by means of `/etc/default/inet_type`, then all address families will be selected.
- d Apply the commands to all "down" interfaces in the system.
- D Apply the commands to all interfaces not under DHCP (Dynamic Host Configuration Protocol) control.
- u Apply the commands to all "up" interfaces in the system.
- 4 Apply the commands to all IPv4 interfaces.
- 6 Apply the commands to all IPv6 interfaces.

address_family

The address family is specified by the *address_family* parameter. The `ifconfig` command currently supports the following families: `ether`, `inet`, and `inet6`. If no address family is specified, the default is `inet`. No ether address information is provided to non-root users.

`ifconfig` honors the `DEFAULT_IP` setting in the `/etc/default/inet_type` file when it displays interface information. If `DEFAULT_IP` is set to `IP_VERSION4`, then `ifconfig` will omit information that relates to IPv6 interfaces. However, when you explicitly specify an address family (`inet` or `inet6`) on the `ifconfig` command line, the command line overrides the `DEFAULT_IP` settings.

address

For the IPv4 family (`inet`), the *address* is either a host name present in the host name data base (see `hosts(4)`) or in the Network Information Service (NIS) map `hosts`, or an IPv4 address expressed in the Internet standard "dot notation".

ifconfig(1M)

For the IPv6 family (`inet6`), the *address* is either a host name present in the host name data base (see `ipnodes(4)`) or in the Network Information Service (NIS) map `ipnode`, or an IPv6 address expressed in the Internet standard colon-separated hexadecimal format represented as `x::x::x::x::x::x` where *x* is a hexadecimal number between 0 and FFFF.

For the `ether` address family, the address is an Ethernet address represented as `x:x:x: x:x:x` where *x* is a hexadecimal number between 0 and FF.

Some, though not all, of the Ethernet interface cards have their own addresses. To use cards that do not have their own addresses, refer to section 3.2.3(4) of the IEEE 802.3 specification for a definition of the locally administered address space. The use of interface groups should be restricted to those cards with their own addresses (see `INTERFACE GROUPS`).

prefix_length

For the IPv4 and IPv6 families (`inet` and `inet6`), the *prefix_length* is a number between 0 and the number of bits in the address. For `inet`, the number of bits in the address is 32; for `inet6`, the number of bits in the address is 128. The *prefix_length* denotes the number of leading set bits in the netmask.

dest_address

If the *dest_address* parameter is supplied in addition to the *address* parameter, it specifies the address of the correspondent on the other end of a point-to-point link.

tunnel_dest_address

An address that is or will be reachable through an interface other than the tunnel being configured. This tells the tunnel where to send the tunneled packets. This address must not be the same as the *tunnel_dest_address* being configured.

tunnel_src_address

An address that is attached to an already configured interface that has been configured “up” with `ifconfig`.

INTERFACE FLAGS

The `ifconfig` command supports the following interface flags. The term “address” in this context refers to a logical interface, for example, `hme0:0`, while “interface” refers to the physical interface, for example, `hme0`.

`ADDRCONF`

The address is from stateless `addrconf`. The stateless mechanism allows a host to generate its own address using a combination of information advertised by routers and locally available information. Routers advertise prefixes that identify the subnet associated with the link, while the host generates an “interface

ifconfig(1M)

	identifier" that uniquely identifies an interface in a subnet. In the absence of information from routers, a host can generate link-local addresses. This flag is specific to IPv6.
ANYCAST	Indicates an anycast address. An anycast address identifies the nearest member of a group of systems that provides a particular type of service. An anycast address is assigned to a group of systems. Packets are delivered to the nearest group member identified by the anycast address instead of being delivered to all members of the group. This flag is specific to IPv6.
BROADCAST	This broadcast address is valid. This flag and POINTTOPOINT are mutually exclusive
CoS	This interface supports some form of Class of Service (CoS) marking. An example is the 802.1D user priority marking supported on VLAN interfaces.
DEPRECATED	This address is deprecated. This address will not be used as a source address for outbound packets unless there are no other addresses on this interface or an application has explicitly bound to this address. An IPv6 deprecated address will eventually be deleted when not used, whereas an IPv4 deprecated address is often used with IP network multipathing IPv4 test addresses, which are determined by the setting of the NOFAILOVER flag. Further, the DEPRECATED flag is part of the standard mechanism for renumbering in IPv6.
DHCP	DHCP is used to manage this address.
FAILED	The interface has failed. New addresses cannot be created on this interface. If this interface is part of an IP network multipathing group, a failover will occur to another interface in the group, if possible
INACTIVE	Only set on standby interfaces, this flag indicates no failover has occurred to the interface. New addresses cannot be created on this interface. This flag is cleared if a failover occurs to the interface.
LOOPBACK	Indicates that this is the loopback interface.
MIP	Indicates that mobile IP controls this interface.
MULTI_BCAST	Indicates that the broadcast address is used for multicast on this interface.
MULTICAST	The interface supports multicast. IP assumes that any interface that supports hardware broadcast, or that is a point-to-point link, will support multicast.
NOARP	There is no address resolution protocol (ARP) for this interface that corresponds to all interfaces for a device without a broadcast address. This flag is specific to IPv4.

NOFAILOVER	This address will not failover if the interface fails. IP network multipathing test addresses must be marked <code>nofailover</code> .
NOLOCAL	The interface has no address , just an on-link subnet.
NONUD	NONUD is disabled on this interface. NUD (neighbor unreachability detection) is used by a node to track the reachability state of its neighbors, to which the node actively sends packets, and to perform any recovery if a neighbor is detected to be unreachable. This flag is specific to IPv6.
NORTEXCH	The interface does not exchange routing information. For RIP-2, routing packets are not sent over this interface. Additionally, messages that appear to come over this interface receive no response. The subnet or address of this interface is not included in advertisements over other interfaces to other routers.
NOXMIT	Indicates that the address does not transmit packets. RIP-2 also does not advertise this address.
OFFLINE	Indicates that the interface has been offlined. New addresses cannot be created on this interface. Interfaces in an IP network multipathing group are offlined prior to removal and replacement using dynamic reconfiguration.
POINTOPOINT	Indicates that the address is a point-to-point link. This flag and BROADCAST are mutually exclusive
PRIVATE	Indicates that this address is not advertised. For RIP-2, this interface is used to send advertisements. However, neither the subnet nor this address are included in advertisements to other routers.
RUNNING	Indicates that the required resources for an interface are allocated. For some interfaces this also indicates that the link is up.
STANDBY	Indicates that this is a standby interface to be used on failures. Only interfaces in an IP network multipathing group should be designated as standby interfaces. If this interface is part of a IP network multipathing group, the interface will not be selected to send out packets unless some other interface in the group fails over to it.
UNNUMBERED	This flag is set when the local IP address on the link matches the local address of some other link in the system
UP	Indicates that the interface is up, that is, all the routing entries and the like for this interface have been set up.
XRESOLV	Indicates that the interface uses an IPv6 external resolver.

ifconfig(1M)

LOGICAL INTERFACES

Solaris TCP/IP allows multiple logical interfaces to be associated with a physical network interface. This allows a single machine to be assigned multiple IP addresses, even though it may have only one network interface. Physical network interfaces have names of the form *driver-name physical-unit-number*, while logical interfaces have names of the form *driver-name physical-unit-number : logical-unit-number*. A physical interface is configured into the system using the `plumb` command. For example:

```
example% ifconfig le0 plumb
```

Once a physical interface has been "plumbed", logical interfaces associated with the physical interface can be configured by separate `plumb` or `addif` options to the `ifconfig` command.

```
example% ifconfig le0:1 plumb
```

allocates a specific logical interface associated with the physical interface `le0`. The command

```
example% ifconfig le0 addif 192.9.200.1/24 up
```

allocates the next available logical unit number on the `le0` physical interface and assigns an *address* and *prefix_length*.

A logical interface can be configured with parameters (*address*, *prefix_length*, and so on) different from the physical interface with which it is associated. Logical interfaces that are associated with the same physical interface can be given different parameters as well. Each logical interface must be associated with an existing and "up" physical interface. So, for example, the logical interface `le0:1` can only be configured after the physical interface `le0` has been plumbed.

To delete a logical interface, use the `unplumb` or `removeif` options. For example,

```
example% ifconfig le0:1 down unplumb
```

will delete the logical interface `le0:1`.

INTERFACE GROUPS

If a physical interface shares an IP prefix with another interface, these interfaces are collected into an interface group. IP uses an interface group to rotate source address selection when the source address is unspecified, and in the case of multiple physical interfaces in the same group, to scatter traffic across different IP addresses on a per-IP-destination basis. See `netstat(1M)` for per-IP-destination information.

This feature may be enabled by using `ndd(1M)`.

One can also use the `group` keyword to form a multipathing group. When multipathing groups are used, the functionality of the `interface group` is subsumed into the functionality of the multipathing group. A multipathing group provides failure detection and repair detection for the interfaces in the group. See `in.mpathd(1M)` and *System Administration Guide, Volume 3*.

CONFIGURING IPv6 INTERFACES

ifconfig(1M)

The interface groups formed using `ndd(1M)` will be made obsolete in the future. Accordingly, it is advisable to use form multipathing groups using the `group` keyword.

When an IPv6 physical interface is plumbed and configured “up” with `ifconfig`, it is automatically assigned an IPv6 link-local address for which the last 64 bits are calculated from the MAC address of the interface.

```
example% ifconfig le0 inet6 plumb up
```

The following example shows that the link-local address has a prefix of `fe80::/10`.

```
example% ifconfig le0 inet6
le0: flags=2000841<UP,RUNNING,MULTICAST,IPv6>
      mtu 1500 index 2
      inet6 fe80::a00:20ff:fe8e:f3ad/10
```

If an advertising IPv6 router exists on the link advertising prefixes, then the newly plumbed IPv6 interface will autoconfigure logical interface(s) depending on the prefix advertisements. For example, for prefix advertisements `fec0:0:0:55::/64` and `3ff0:0:0:55::/64`, the autoconfigured interfaces will look like:

```
le0:1: flags=2080841<UP,RUNNING,MULTICAST,ADDRCONF,IPv6>
      mtu 1500 index 2
      inet6 fec0::55:a00:20ff:fe8e:f3ad/64
le0:2: flags=2080841<UP,RUNNING,MULTICAST,ADDRCONF,IPv6>
      mtu 1500 index 2
      inet6 3ff0::55:a00:20ff:fe8e:f3ad/64
```

Even if there are no prefix advertisements on the link, you can still assign site-local and global addresses manually, for example:

```
example% ifconfig le0 inet6 addif fec0::55:a00:20ff:fe8e:f3ad/64 up
example% ifconfig le0 inet6 addif 3ff0::55:a00:20ff:fe8e:f3ad/64 up
```

To configure boot-time defaults for the interface `le0`, place the following entries in the `/etc/hostname6.le0` file:

```
addif fec0::55:a00:20ff:fe8e:f3ad/64 up
addif 3ff0::55:a00:20ff:fe8e:f3ad/64 up
```

Link-local addresses are only used for on-link communication and are not visible to other subnets.

Configuring IPv6/IPv4 tunnels

An IPv6 over IPv4 tunnel interface can send and receive IPv6 packets encapsulated in an IPv4 packet. Create tunnels at both ends pointing to each other. IPv6 over IPv4 tunnels require the tunnel source and tunnel destination IPv4 and IPv6 addresses. Solaris 8 supports both automatic and configured tunnels. For automatic tunnels, an IPv4-compatible IPv6 address is used. The following demonstrates auto-tunnel configuration:

```
example% ifconfig ip.atun0 inet6 plumb
example% ifconfig ip.atun0 inet6 tsrsrc IPv4-address \
```

ifconfig(1M)

```
::IPv4 address/96 up
```

where IPv4-address is the IPv4 address of the interface through which the tunnel traffic will flow, and IPv4-address, ::<IPv4-address>, is the corresponding IPv4-compatible IPv6 address.

The following is an example of a configured tunnel:

```
example% ifconfig ip.tun0 inet6 plumb tsrc my-ipv4-address \  
          tdst peer-ipv4-address up
```

This creates a configured tunnel between my-ipv4-address and peer-ipv4-address with corresponding link-local addresses. For tunnels with global or site-local addresses, the logical tunnel interfaces need to be configured in the following form:

```
example% ifconfig ip.tun0 inet6 addif my-v6-address peer-v6-address up
```

For example,

```
example% ifconfig ip.tun0 inet6 plumb tsrc 109.146.85.57 \  
          tdst 109.146.85.212 up  
example% ifconfig ip.tun0 inet6 addif 2::45 2::46 up
```

To show all IPv6 interfaces that are up and configured:

```
example% ifconfig -au6  
ip.tun0: flags=2200851<UP, POINTOPOINT, RUNNING, MULTICAST, NONUD, IPv6>  
        mtu 1480 index 3  
        inet tunnel src 109.146.85.57    tunnel dst 109.146.85.212  
        tunnel hop limit 60  
        inet6 fe80::6d92:5539/10 --> fe80::6d92:55d4  
ip.tun0:1: flags=2200851<UP, POINTOPOINT, RUNNING, MULTICAST, NONUD, IPv6>  
        mtu 1480 index 3  
        inet6 2::45/128 --> 2::46
```

Configuring IPv4/IPv6 Tunnels

An IPv4 over IPv6 tunnel interface can send and receive IPv4 packets encapsulated in an IPv6 packet. Create tunnels at both ends pointing to each other. IPv4 over IPv6 tunnels require the tunnel source and tunnel destination IPv6 and IPv4 addresses. The following demonstrates auto-tunnel configuration:

```
example% ifconfig ip6.tun0 inet plumb tsrc my-ipv6-address \  
          tdst peer-ipv6-address my-ipv4-address \  
          peer-ipv4-address up
```

This creates a configured tunnel between my-ipv6-address and peer-ipv6-address with my-ipv4-address and peer-ipv4-address as the endpoints of the point-to-point interface, for example:

```
example% ifconfig ip6.tun0 inet plumb tsrc fe80::1 tdst fe80::2 10.0.0.208 \  
          10.0.0.210 up
```

To show all IPv4 interfaces that are up and configured:

```
example% ifconfig -au4
lo0: flags=1000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv4> mtu 8232 index 1
    inet 127.0.0.1 netmask ff000000
hme0: flags=1004843<UP,BROADCAST,RUNNING,MULTICAST,DHCP,IPv4> mtu 1500 index 2
    inet 129.153.128.208 netmask ffffffff broadcast 129.153.128.255
ip6.tun0: flags=10008d1<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST,IPv4> mtu \
    1460 index 3
    inet6 tunnel src fe80::1 tunnel dst fe80::2
    tunnel hop limit 60 tunnel encapsulation limit 4
    inet 10.0.0.208 --> 10.0.0.210 netmask ff000000
```

EXAMPLES**EXAMPLE 1** Using the ifconfig Command

If your workstation is not attached to an Ethernet, the `le0` interface should be marked "down" as follows:

```
example% ifconfig le0 down
```

EXAMPLE 2 Printing Addressing Information

To print out the addressing information for each interface, use the following command:

```
example% ifconfig -a
```

EXAMPLE 3 Resetting the Broadcast Address

To reset each interface's broadcast address after the netmasks have been correctly set, use the next command:

```
example% ifconfig -a broadcast +
```

EXAMPLE 4 Changing the Ethernet Address

To change the Ethernet address for interface `le0`, use the following command:

```
example% ifconfig le0 ether aa:1:2:3:4:5
```

EXAMPLE 5 Configuring an IP-in-IP Tunnel

To configure an IP-in-IP tunnel, first plumb it with the following command:

```
example% ifconfig ip.tun0 plumb
```

Then configure it as a point-to-point interface, supplying the tunnel source and the tunnel destination:

```
example% ifconfig ip.tun0 myaddr mydestaddr tsrc another_myaddr \
    tdst a_dest_addr up
```

Tunnel security properties must be configured on one invocation of `ifconfig`:

EXAMPLE 5 Configuring an IP-in-IP Tunnel (Continued)

```
example% ifconfig ip.tun0 encr_auth_algs md5 encr_algs 3des
```

EXAMPLE 6 Requesting a Service Without Algorithm Preference

To request a service without any algorithm preferences, specify any:

```
example% ifconfig ip.tun0 encr_auth_algs any encr_algs any
```

EXAMPLE 7 Disabling All Security

To disable all security, specify any security service with none as the algorithm value:

```
example% ifconfig ip.tun0 auth_algs none
```

or

```
example% ifconfig ip.tun0 encr_algs none
```

EXAMPLE 8 Configuring 6to4 Tunnels

To configure 6to4 tunnels, use the following commands:

```
example% ifconfig ip.6to4tun0 inet6 plumb
```

```
example% ifconfig ip.6to4tun0 inet6 tsrc IPv4-address 6to4-address/64 up
```

IPv4-address denotes the address of the encapsulating interface. *6to4-address* denotes the address of the local IPv6 address of form 2002:*IPv4-address*:*SUBNET-ID*:*HOSTID*.

The long form should be used to resolve any potential conflicts that might arise if the system administrator utilizes an addressing plan where the values for *SUBNET-ID* or *HOSTID* are reserved for something else.

After the interface is plumbed, a 6to4 tunnel can be configured as follows:

```
example% ifconfig ip.6to4tun0 inet6 tsrc IPv4-address up
```

This short form sets the address. It uses the convention:

```
2002:IPv4-address::1
```

The *SUBNET-ID* is 0, and the *HOSTID* is 1.

FILES /etc/netmasks netmask data

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

/usr/sbin

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability for options modlist, modinsert, and modremove	Evolving

/sbin

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsr
Interface Stability for options modlist, modinsert, and modremove	Evolving

SEE ALSO dhcpinfo(1), dhcpageant(1M), in.mpathd(1M), in.routed(1M), ndd(1M), netstat(1M), ethers(3SOCKET), gethostbyname(3NSL), getnetbyname(3SOCKET), hosts(4), netmasks(4), networks(4), nsswitch.conf(4), attributes(5), arp(7P), ipsecah(7P), ipsecesp(7P), tun(7M)

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DIAGNOSTICS ifconfig sends messages that indicate if:

- the specified interface does not exist
- the requested address is unknown
- the user is not privileged and tried to alter an interface's configuration

NOTES Do not select the names broadcast, down, private, trailers, up or other possible option names when you choose host names. If you choose any one of these names as host names, it can cause unusual problems that are extremely difficult to diagnose.

if_mpadm(1M)

NAME	if_mpadm – change operational status of interfaces within a multipathing group				
SYNOPSIS	<pre>/usr/sbin/if_mpadm -d interface_name /usr/sbin/if_mpadm -r interface_name</pre>				
DESCRIPTION	Use the <code>if_mpadm</code> utility to change the operational status of interfaces that are part of an IP multipathing group. If the interface is operational, you can use <code>if_mpadm -d</code> to detach or off-line the interface. If the interface is off-lined, use <code>if_mpadm -r</code> to revert it to its original state. When a network interface is off-lined, all network access fails over to a different interface in the IP multipathing group. Any addresses that do not failover are brought down. Network access includes unicast, broadcast, and multicast for IPv4 and unicast and multicast for IPv6. Addresses marked with <code>IFF_NOFAILOVER</code> do not failover. They are marked down. After an interface is off-lined, the system will not use the interface for any outbound or inbound traffic, and the interface can be safely removed from the system without any loss of network access. The <code>if_mpadm</code> utility can be applied only to interfaces that are part of an IP multipathing group.				
OPTIONS	The <code>if_mpadm</code> utility supports the following options: <table><tr><td><code>-d interface_name</code></td><td>Detach or off-line the interface specified by <i>interface_name</i>.</td></tr><tr><td><code>-r interface_name</code></td><td>Reattach or undo the previous detach or off-line operation on the interface specified by <i>interface_name</i>. Unless the <code>-d</code> option was used to detach or off-line the interface, this option will fail.</td></tr></table>	<code>-d interface_name</code>	Detach or off-line the interface specified by <i>interface_name</i> .	<code>-r interface_name</code>	Reattach or undo the previous detach or off-line operation on the interface specified by <i>interface_name</i> . Unless the <code>-d</code> option was used to detach or off-line the interface, this option will fail.
<code>-d interface_name</code>	Detach or off-line the interface specified by <i>interface_name</i> .				
<code>-r interface_name</code>	Reattach or undo the previous detach or off-line operation on the interface specified by <i>interface_name</i> . Unless the <code>-d</code> option was used to detach or off-line the interface, this option will fail.				
EXAMPLES	EXAMPLE 1 Detaching an Interface Use the following command to off-line or detach the interface. All network access will failover from <code>hme0</code> to other interfaces in the same IP multipathing group. If no other interfaces are in the same group, the operation will fail. <pre>example% if_mpadm -d hme0</pre> EXAMPLE 2 Reattaching an Off-line Interface Use the following command to undo the previous operation. Network access will failback to <code>hme0</code>. <pre>example% if_mpdadm -r hme0</pre>				

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	Unstable

SEE ALSO ifconfig(1M), in.mpathd(1M), attributes(5)

DIAGNOSTICS off-line failed as there is no other functional interface available in the multipathing group for failing over the network access.

This message means that other interfaces in the group are failed over already or the multipathing configuration was not suitable for completing a failover.

off-line cannot be undone because multipathing configuration is not consistent across all the interfaces in the group.

This message means that some interfaces in the IP multipathing group are not configured consistently with other interfaces in the group, for example, one of the interfaces in the group does not have an IFF_NOFAILOVER address.

ifparse(1M)

NAME	ifparse – parse ifconfig command line
SYNOPSIS	/sbin/ifparse [-fs] <i>addr_family commands</i>
DESCRIPTION	Use the ifparse command to parse the ifconfig(1M) command line options and output substrings, one per line, as appropriate. If no options are specified, ifparse returns the entire ifconfig command line as a series of substrings, one per line.
OPTIONS	The ifparse command supports the following options: -f Lists only substrings of the ifconfig command line that are relevant to IP network multipath failover -s Lists only substrings of the ifconfig command line that are not relevant to IP network multipath failover
OPERANDS	The ifparse command <i>does not</i> support the <i>interface</i> operand of the ifconfig command.
EXAMPLES	EXAMPLE 1 Parsing Command Line Options Relevant to Failover The following example shows the use of the ifparse command to parse the command line options relevant to IP network multipath failover: <pre>example# ifparse -f inet 1.2.3.4 up group one addif 1.2.3.5 -failover up set 1.2.3.4 up</pre> EXAMPLE 2 Parsing Command Line Options That Are Not Relevant to Failover The following example shows the use of the ifparse command to parse the command line options that are not relevant to IP network multipath failover: <pre>example# ifparse -s inet 1.2.3.4 up group one addif 1.2.3.5 -failover up group one addif 1.2.3.5 -failover up</pre> EXAMPLE 3 Parsing the Command Line For All Options The following example shows the use of the ifparse command to parse the command line for all ifconfig options: <pre>example# ifparse inet 1.2.3.4 up group one addif 1.2.3.5 -failover up group one set 1.2.3.4 up addif 1.2.3.5 -failover up</pre>
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsr
Stability Level	Obsolete

SEE ALSO ifconfig(1M), attributes(5)

DIAGNOSTICS usage: -fs <addr_family> <commands>
This message indicates an invalid command line.

ifparse: Not enough space
This message indicates insufficient memory.

ifparse: dhcp not supported for inet6
DHCP operations are not supported for the inet6 address family.

ifparse: Operation <operation> not supported for <addr_family>
Most operations cannot be used with all address families. For example, the broadcast operation is not supported on the inet6 address family.

ifparse: no argument for <operation>
Some operations, for example broadcast, require an argument.

NOTES The ifparse command is classified as an obsolete interface. It will likely be removed in a future release. You should not develop applications that depend upon this interface.

h1>ikeadm(1M)

NAME	ikeadm – manipulate Internet Key Exchange (IKE) parameters and state
SYNOPSIS	<pre>ikeadm [-np] ikeadm [-np] get [debug priv stats] ikeadm [-np] set [debug priv] [level] [file] ikeadm [-np] [get del] [pl rule preshared] [id] ikeadm [-np] add [rule preshared] { description } ikeadm [-np] [read write] [rule preshared] file ikeadm [-np] [dump pls rule preshared] ikeadm [-np] flush pls ikeadm help [get set add del read write dump flush]</pre>
DESCRIPTION	The <code>ikeadm</code> utility retrieves information from and manipulates the configuration of the Internet Key Exchange (IKE) protocol daemon, <code>in.iked(1M)</code>. <code>ikeadm</code> supports a set of operations, which may be performed on one or more of the supported object types. When invoked without arguments, <code>ikeadm</code> enters interactive mode which prints a prompt to the standard output and accepts commands from the standard input until the end-of-file is reached. Because <code>ikeadm</code> manipulates sensitive keying information, you must be superuser to use this command. Additionally, some of the commands available require that the daemon be running in a privileged mode, which is established when the daemon is started. For details on how to use this command securely see SECURITY.
OPTIONS	The following options are supported: -n Prevent attempts to print host and network names symbolically when reporting actions. This is useful, for example, when all name servers are down or are otherwise unreachable. -p Paranoid. Do not print any keying material, even if saving Security Associations. Instead of an actual hexadecimal digit, print an x when this flag is turned on.
USAGE	
Commands	The following commands are supported: add Add the specified object. This option can be used to add a new policy rule or a new preshared key to the current (running) <code>in.iked</code> configuration. When adding a new preshared key, the command cannot be invoked from the command line, as it will contain

		keying material. The rule or key being added is specified using appropriate id-value pairs as described in the ID FORMATS section.
	del	Delete a specific object from <code>in.iked</code> 's current configuration. This operation is available for IKE (Phase 1) SAs, policy rules, and preshared keys. The object to be deleted is specified as described in the ID FORMATS.
	dump	Display all objects of the specified type known to <code>in.iked</code> . This option can be used to display all Phase 1 SAs, policy rules, or preshared keys. A large amount of output may be generated by this command.
	flush	Remove all IKE (Phase 1) SAs from <code>in.iked</code> .
	get	Lookup and display the specified object. May be used to view the current debug or privilege level, global statistics for the daemon, or a specific IKE (Phase 1) SA, policy rule, or preshared key. The latter three object types require that identifying information be passed in; the appropriate specification for each object type is described below.
	help	Print a brief summary of commands, or, when followed by a command, prints information about that command.
	read	Update the current <code>in.iked</code> configuration by reading the policy rules or preshared keys from either the default location or from the file specified.
	set	Adjust the current debug or privilege level. If the debug level is being modified, an output file may optionally be specified; the output file <i>must</i> be specified if the daemon is running in the background and is not currently printing to a file. When changing the privilege level, adjustments may only be made to lower the access level; it cannot be increased using <code>ikeadm</code> .
	write	Write the current <code>in.iked</code> policy rule set or preshared key set to the specified file. A destination file must be specified. This command should not be used to overwrite the existing configuration files.
Object Types	debug	Specifies the daemon's debug level. This determines the amount and type of output provided by the daemon about its operations. The debug level is actually a bitmask, with individual bits enabling different types of information.

Description	Flag	Nickname
Certificate management	0x0001	cert
Key management	0x0002	key
Operational	0x0004	op
Phase 1 SA creation	0x0008	phase1
Phase 2 SA creation	0x0010	phase2
PF_KEY interface	0x0020	pfkey
Policy management	0x0040	policy
Proposal construction	0x0080	prop
Door interface	0x0100	door
Config file processing	0x0200	config
All debug flags	0x3ff	all

When specifying the debug level, either a number (decimal or hexadecimal) or a string of nicknames may be given. For example, 88, 0x58, and phase1+phase2+policy are all equivalent, and will turn on debug for phase 1 sa creation, phase 2 sa creation, and policy management. A string of nicknames may also be used to remove certain types of information; all-op has the effect of turning on all debug *except* for operational messages; it is equivalent to the numbers 1019 or 0x3fb.

priv

Specifies the daemon's access privilege level. The possible values are:

Description	Level	Nickname
Base level	0	base
Access to preshared key info	1	modkeys
Access to keying material	2	keymat

By default, in .iked is started at the base level. A command-line option can be used to start the daemon at a higher level. ikeadm can be used to lower the level, but it cannot be used to raise the level.

	Either the numerical level or the nickname may be used to specify the target privilege level. In order to get, add, delete, dump, read, or write preshared keys, the privilege level must at least give access to preshared key information. However, when viewing preshared keys (either using the get or dump command), the key itself will only be available if the privilege level gives access to keying material. This is also the case when viewing Phase 1 SAs.
stats	Global statistics from the daemon, covering both successful and failed Phase 1 SA creation. Reported statistics include: ■ Count of current P1 SAs which the local entity initiated ■ Count of current P1 SAs where the local entity was the responder ■ Count of all P1 SAs which the local entity initiated since boot ■ Count of all P1 SAs where the local entity was the responder since boot ■ Count of all attempted P1 SAs since boot, where the local entity was the initiator; includes failed attempts ■ Count of all attempted P1 SAs since boot, where the local entity was the responder; includes failed attempts ■ Count of all failed attempts to initiate a P1 SA, where the failure occurred because the peer did not respond ■ Count of all failed attempts to initiate a P1 SA, where the peer responded ■ Count of all failed P1 SAs where the peer was the initiator ■ Whether a PKCS#11 library is in use, and if applicable, the PKCS#11 library that is loaded. See Example 11.
p1	An IKE Phase 1 SA. A p1 object is identified by an IP address pair or a cookie pair; identification formats are described below.
rule	An IKE policy rule, defining the acceptable security characteristics for Phase 1 SAs between specified local and remote identities. A rule is identified by its label; identification formats are described below.
preshared	A preshared key, including the local and remote identification and applicable IKE mode. A preshared key is identified by an IP address pair or an identity pair; identification formats are described below.
Id Formats	Commands like add, del, and get require that additional information be specified on the command line. In the case of the delete and get commands, all that is required is to minimally identify a given object; for the add command, the full object must be specified.

Minimal identification is accomplished in most cases by a pair of values. For IP addresses, the local `addr` and then the remote `addr` are specified, either in dot-notation for IPv4 addresses, colon-separated hexadecimal format for IPv6 addresses, or a host name present in the host name database. If a host name is given that expands to more than one address, the requested operation will be performed multiple times, once for each possible combination of addresses.

Identity pairs are made up of a local type-value pair, followed by the remote type-value pair. Valid types are:

<code>prefix</code>	An address prefix.
<code>fqdn</code>	A fully-qualified domain name.
<code>domain</code>	Domain name, synonym for <code>fqdn</code> .
<code>user_fqdn</code>	User identity of the form <i>user@fqdn</i> .
<code>mailbox</code>	Synonym for <code>user_fqdn</code> .

A cookie pair is made up of the two cookies assigned to a Phase 1 Security Association (SA) when it is created; first is the initiator's, followed by the responder's. A cookie is a 64-bit number.

Finally, a label (which is used to identify a policy rule) is a character string assigned to the rule when it is created.

Formatting a rule or preshared key for the `add` command follows the format rules for the `in.iked` configuration files. Both are made up of a series of id-value pairs, contained in curly braces (`{` and `}`). See `ike.config(4)` and `ike.preshared(4)` for details on the formatting of rules and preshared keys.

SECURITY

The `ikeadm` command allows a privileged user to enter cryptographic keying information. If an adversary gains access to such information, the security of IPsec traffic is compromised. The following issues should be taken into account when using the `ikeadm` command.

- Is the TTY going over a network (interactive mode)?

If it is, then the security of the keying material is the security of the network path for this TTY's traffic. Using `ikeadm` over a clear-text telnet or rlogin session is risky. Even local windows may be vulnerable to attacks where a concealed program that reads window events is present.

- Is the file accessed over the network or readable to the world (read/write commands)?

A network-mounted file can be sniffed by an adversary as it is being read. A world-readable file with keying material in it is also risky.

If your source address is a host that can be looked up over the network, and your naming system itself is compromised, then any names used will no longer be trustworthy.

Security weaknesses often lie in misapplication of tools, not the tools themselves. It is recommended that administrators are cautious when using the `ikeadm` command. The safest mode of operation is probably on a console, or other hard-connected TTY.

For additional information regarding this subject, see the afterward by Matt Blaze in Bruce Schneier's *Applied Cryptography: Protocols, Algorithms, and Source Code in C*.

EXAMPLES

EXAMPLE 1 Emptying out all Phase 1 Security Associations

The following command empties out all Phase 1 Security Associations:

```
example# ikeadm flush pls
```

EXAMPLE 2 Displaying all Phase 1 Security Associations

The following command displays all Phase 1 Security Associations:

```
example# ikeadm dump pls
```

EXAMPLE 3 Deleting a Specific Phase 1 Security Association

The following command deletes the specified Phase 1 Security Associations:

```
example# ikeadm get pl local_ip remote_ip
```

EXAMPLE 4 Adding a Rule From a File

The following command adds a rule from a file:

```
example# ikeadm add rule rule_file
```

EXAMPLE 5 Adding a Preshared Key

The following command adds a preshared key:

```
example# ikeadm
ikeadm> add preshared { localidtype ip localid local_ip
remoteidtype ip remoteid remote_ip ike_mode main
key 1234567890abcdef1234567890abcdef }
```

EXAMPLE 6 Saving All Preshared Keys to a File

The following command saves all preshared keys to a file:

```
example# ikeadm write preshared target_file
```

EXAMPLE 7 Viewing a Particular Rule

The following command views a particular rule:

```
example# ikeadm get rule rule_label
```

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EXAMPLE 8 Reading in New Rules from ike.config

The following command reads in new rules from the ike.config file:

```
example# ikeadm read rules
```

EXAMPLE 9 Lowering the Privilege Level

The following command lowers the privilege level:

```
example# ikeadm set priv base
```

EXAMPLE 10 Viewing the debug level

The following command shows the current debug level

```
example# ikeadm get debug
```

EXAMPLE 11 Using stats to Verify Hardware Accelerator

The following example shows how stats may include an optional line at the end to indicate if IKE is using a PKCS#11 library to accelerate public-key operations, if applicable.

```
example# ikeadm get stats
Phase 1 SA counts:
  Current:   initiator:      0   responder:      0
  Total:     initiator:     21   responder:     27
  Attempted: initiator:     21   responder:     27
  Failed:    initiator:      0   responder:      0
             initiator fails include 0 time-out(s)
PKCS#11 library linked in from /opt/SUNWconn/lib/libpkcs11.so
example#
```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
non-zero	An error occurred. Writes an appropriate error message to standard error.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	Evolving

SEE ALSO

in.iked(1M), ike.config(4), ike.preshared(4), attributes(5), ipsec(7P)

ikeadm(1M)

Schneier, Bruce, *Applied Cryptography: Protocols, Algorithms, and Source Code in C*, Second Edition, John Wiley & Sons, New York, NY, 1996.

ikecert(1M)

NAME	ikecert – manipulates the machine’s on-filesystem public-key certificate databases				
SYNOPSIS	<pre> ikecert certlocal [-a -e -h -k -l -r] [-T PKCS#11 token identifier] [option_specific_arguments...] ikecert certdb [-a -e -h -l -r] [-T PKCS#11 token identifier] [option_specific_arguments...] ikecert certldb [-a -e -h -l -r] [option_specific_arguments...] ikecert tokens </pre>				
DESCRIPTION	The ikecert command manipulates the machine’s on-filesystem public-key certificate databases. See FILES. ikecert has three subcommands, one for each of the three major repositories, plus one for listing available hardware tokens: ■ certlocal deals with the private-key repository, ■ certdb deals with the public-key repository, and ■ certldb deals with the certificate revocation list (CRL) repository. ■ tokens shows the available PKCS#11 tokens for a given PKCS#11 library. The only supported PKCS#11 library and hardware is the Sun Cryptographic Accelerator 4000.				
OPTIONS	Except for tokens, each subcommand requires one option, possibly followed by one or more option-specific arguments. The tokens subcommand lists all available tokens in the PKCS#11 library specified in <code>/etc/inet/ike/config</code>. The following options are supported: -a <table border="0"> <tr> <td style="vertical-align: top; padding-right: 20px;">certlocal</td> <td>When specified with the certlocal subcommand, this option installs (adds) a private key into the Internet Key Exchange (IKE) local ID database. The key data is read from standard input, and is in a Solaris-only format.</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;">certdb</td> <td> This option cannot be used with PKCS#11 hardware objects. When specified with the certdb subcommand, this option reads a certificate from standard input and adds it to the IKE certificate database. The certificate must be a X.509 certificate in PEM Base64 or ASN.1 BER encoding. The certificate adopts the name of its identity. </td> </tr> </table>	certlocal	When specified with the certlocal subcommand, this option installs (adds) a private key into the Internet Key Exchange (IKE) local ID database. The key data is read from standard input, and is in a Solaris-only format.	certdb	This option cannot be used with PKCS#11 hardware objects. When specified with the certdb subcommand, this option reads a certificate from standard input and adds it to the IKE certificate database. The certificate must be a X.509 certificate in PEM Base64 or ASN.1 BER encoding. The certificate adopts the name of its identity.
certlocal	When specified with the certlocal subcommand, this option installs (adds) a private key into the Internet Key Exchange (IKE) local ID database. The key data is read from standard input, and is in a Solaris-only format.				
certdb	This option cannot be used with PKCS#11 hardware objects. When specified with the certdb subcommand, this option reads a certificate from standard input and adds it to the IKE certificate database. The certificate must be a X.509 certificate in PEM Base64 or ASN.1 BER encoding. The certificate adopts the name of its identity.				

	This option can import a certificate into a PKCS#11 hardware key store one of two ways: Either a matching public key object <i>and</i> an existing private key object were created using the <code>certlocal -kc</code> option, or if a PKCS#11 token is explicitly specified using the <code>-T</code> option.
<code>certldb</code>	When specified with the <code>certldb</code> subcommand, this option installs (adds) a CRL into the IKE database. The CRL reads from standard input.
<code>-e slot</code>	
<code>certlocal</code>	When specified with the <code>certlocal</code> subcommand, this option extracts a private key from the IKE local ID database. The key data are written to standard output. The slot specifies which private key to extract. Private keys are only extracted in binary/ber format. <i>Use this option with extreme caution. See SECURITY CONSIDERATIONS.</i> This option will not work with PKCS#11 hardware objects.
<code>-e [-f output-format] certspec</code>	
<code>certdb</code>	When specified with the <code>certdb</code> subcommand, this option extracts a certificate from the IKE certificate database which matches the <code>certspec</code> and writes it to standard output. The <i>output-format</i> option specifies the encoding format. Valid options are PEM and BER. This extracts the first matching identity. The default output format is PEM.
<code>certldb</code>	When specified with the <code>certldb</code> subcommand, this option extracts a CRL from the IKE database. The key data are written to standard output. The <code>certspec</code> specifies which CRL that is extracted. The first one that matches in the database is extracted. See PARAMETERS for details on <code>certspec</code> patterns.
<code>-kc -m keysize -t keytype -D dname -A altname[...]</code> <code>[-T PKCS#11 token identifier]</code>	
<code>certlocal</code>	When specified with the <code>certlocal</code> subcommand, this option generates a IKE public/private key pair and adds it into the local ID database. It also generates a certificate request and sends that to standard output. For details on the above options see PARAMETERS for details on the <i>dname</i> argument and see ALTERNATIVE NAMES for details on the <i>altname</i> argument(s) to this command. If <code>-T</code> is specified, the hardware token will generate the pair of keys.

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<code>-ks -m keysize -t keytype -D dname -A altname[...]</code> <code>[-f output-format] [-T PKCS#11 token identifier]</code>	
<code>certlocal</code>	When specified with the <code>certlocal</code> subcommand, generates a public/private key pair and adds it into the local ID database. This option also generates a self-signed certificate and installs it into the certificate database. See PARAMETERS for details on the <i>dname</i> and <i>altname</i> arguments to this command. If <code>-T</code> is specified, the hardware token will generate the pair of keys, and the self-signed certificate will also be stored in the hardware.
<code>-l [-v] [slot]</code>	
<code>certlocal</code>	When specified with the <code>certlocal</code> subcommand, this option lists private keys in the local ID database. The <code>-v</code> option switches output to a verbose mode where the entire certificate is printed. <i>Use the <code>-v</code> option with extreme caution. See SECURITY CONSIDERATIONS. The <code>-v</code> option will not work with PKCS#11 hardware objects.</i>
<code>-l [-v] [certspec]</code>	
<code>certdb</code>	When specified with the <code>certdb</code> subcommand, this option lists certificates in the IKE certificate database matching the <i>certspec</i>, if any pattern is given. The list displays the identity string of the certificates, as well as, the private key if in the key database. The <code>-v</code> switches the output to a verbose mode where the entire certificate is printed. If the matching certificate is on a hardware token, the token ID is also listed.
<code>certlrb</code>	When specified with the <code>certlrb</code> subcommand, this option lists the CRLs in the IKE database along with any certificates that reside in the database and match the Issuer Name. <i>certspec</i> can be used to specify to list a specific CRL. The <code>-v</code> option switches the output to a verbose mode where the entire certificate is printed. See PARAMETERS for details on <i>certspec</i> patterns.
<code>-r slot</code>	
<code>certlocal</code>	When specified with the <code>certlocal</code> subcommand, deletes the local ID in the specified slot. If there is a corresponding public key, it is not be deleted.

	If this is invoked on a PKCS#11 hardware object, it will also delete the PKCS#11 public key and private key objects. If the public key object was already deleted by <code>certdb -r</code>, that is not a problem. <code>-r certspec</code> <code>certdb</code> Removes certificates from the IKE certificate database. Certificates matching the specified certificate pattern are deleted. Any private keys in the <code>certlocal</code> database corresponding to these certificates are not deleted. This removes the first matching identity. If this is invoked on a PKCS#11 hardware object, it will also delete the certificate and the PKCS#11 public key object. If the public key object was already deleted by <code>certlocal -r</code>, that is not a problem. <code>certldb</code> When specified with the <code>certldb</code> subcommand, this option deletes the CRL with the given <code>certspec</code>.
PARAMETERS	The following parameters are supported: <code>certspec</code> Specifies the pattern matching of certificate specifications. Valid <code>certspecs</code> are the Subject Name, Issuer Name, and Subject Alternative Names. These can be specified as certificates that match the given <code>certspec</code> values and that do not match other <code>certspec</code> values. To signify a <code>certspec</code> value that is not supposed to be present in a certificate, place an <code>!</code> in front of the tag. Valid <code>certspecs</code> are: <pre><Subject Names> SUBJECT=<Subject Names> ISSUER=<Issuer Names> SLOT=<Slot Number in the certificate database></pre> Example: "ISSUER=C=US, O=SUN" IP=1.2.3.4 !DNS=example.com Example: "C=US, O=CALIFORNIA" IP=5.4.2.1 DNS=sun.com Valid arguments to the alternative names are as follows: <pre>IP=<IPv4 address> DNS=<Domain Name Server address> EMAIL=<email (RFC 822) address> URI=<Uniform Resource Indicator value> DN=<LDAP Directory Name value> RID=<Registered Identifier value></pre> Valid Slot numbers can be specified without the keyword tag. Alternative name can also be issued with keyword tags.

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- A Subject Alternative Names the certificate. The argument that follows the -A option should be in the form of *tag=value*. Valid tags are IP, DNS, EMAIL, URI, DN, and RID (See example below).
- D X.509 distinguished name for the certificate subject. It typically has the form of: C=country, O=organization, OU=organizational unit, CN=common name. Valid tags are: C, O, OU, and CN.
- f Encoding output format. pem for PEM Base64 or ber for ASN.1 BER. If -f is not specified, pem is assumed.
- m Key size. It can be 512, 1024, 2048, 3072, or 4096.

Note – Some hardware does not support all key sizes. For example, the Sun Cryptographic Accelerator 4000's keystore (when using the -T option, below), supports only up to 2048-bit keys for RSA and 1024-bit keys for DSA.
- t Key type. It can be rsa-sha1, rsa-md5, or dsa-sha1.
- T PKCS#11 token identifier for hardware key storage. This specifies a hardware device instance in conformance to the PKCS#11 standard. A PKCS#11 library must be specified in `/etc/inet/ike/config`. (See `ike.config(4)`).

A token identifier is a 32-character space-filled string. If the token given is less than 32 characters long, it will be automatically padded with spaces.

If there is more than one PKCS#11 library on a system, keep in mind that only one can be specified at a time in `/etc/inet/ike/config`. There can be multiple tokens (each with individual key storage) for a single PKCS#11 library instance.

SECURITY CONSIDERATIONS

This command can save private keys of a public-private key pair into a file. Any exposure of a private key may lead to compromise if the key is somehow obtained by an adversary.

The PKCS#11 hardware object functionality can address some of the shortcomings of on-disk private keys. Because IKE is a system service, user intervention at boot is not desirable. The token's PIN, however, is still needed. The PIN for the PKCS#11 token, therefore, is stored where normally the on-disk cryptographic keys would reside. This design decision is deemed acceptable because, with a hardware key store, *possession* of the key is still unavailable, only *use* of the key is an issue if the host is compromised. Beyond the PIN, the security of `ikecert` then reduces to the security of the PKCS#11 implementation. The PKCS#11 implementation should be scrutinized also.

Refer to the afterword by Matt Blaze in Bruce Schneier's *Applied Cryptography: Protocols, Algorithms, and Source Code in C* for additional information.

EXAMPLES**EXAMPLE 1** Generating a Self-Signed Certificate

The following is an example of a self-signed certificate:

```
example# ikecert certlocal -ks -m 512 -t rsa-md5 -D "C=US, O=SUN" -A
IP=1.2.3.4
Generating, please wait...
Certificate generated.
Certificate added to database.
-----BEGIN X509 CERTIFICATE-----
MIIBRDCB76ADAgECAGEBMA0GCSqGSIb3DQEBAUAMBsxCzAJBgNVBAYTAlVTMQww
CgYDVQQKEwNTVU4wHhcNMDEwMzE0MDEzMDE1WhcNMDEwMzE0MDEzMDE1WjAbMQsw
CQYDVQQGEwJVUzEMMAoGA1UEChMDU1VOMFowDQYJKoZIhvcNAQEBBQADSQAwwRgJB
APDhqpKgJgRoRUr6twTMTtSuNsReEnFoReVer!ztpXpQK6ybYlRH18JIqU/uCV/r
26R/cVXTy5qc5NbMwA40KzcCASOjIDAeMAsGA1UdDwQEAwIFoDAPBgNVHRECDAG
hwQBAgMEMA0GCSqGSIb3DQEBAUAA0EApTRD23KzN95GMvPD71hwwCluks1KLvg8
flxm9ZsHLPJLRxHFwsqjAad4j4wwwriiUmGAHLTGb0lJM18xsqxag==
-----END X509 CERTIFICATE-----
```

EXAMPLE 2 Generating a CA Request

Generating a CA request appears the same as the self-signed certificate. The only differences between the two is the option `-c` instead of `-s`, and the certificate data is a CA request.

```
example# ikecert certlocal -kc -m 512 -t rsa-md5 \
-D "C=US, O=SUN" -A IP=1.2.3.4
```

EXAMPLE 3 A CA Request Using a Hardware Key Store

The following example illustrates the specification of a token using the `-T` option.

```
example# # ikecert certlocal -kc -m 1024 -t rsa-md5 -T vca0-keystore \
-D "C=US, O=SUN" -A IP=1.2.3.4
```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
non-zero	An error occurred. Writes an appropriate error message to standard error.

FILES

```
/etc/inet/secret/ike.privatekeys/*
Private keys. A private key must have a matching public-key certificate with the
same filename in /etc/inet/ike/publickeys/.

/etc/inet/ike/publickeys/*
Public-key certificates. The names are only important with regard to matching
private key names.

/etc/inet/ike/crls/*
Public key certificate revocation lists.
```

ikecert(1M)

/etc/inet/ike/config

Consulted for the pathname of a PKCS#11 library.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	Evolving

SEE ALSO

in.iked(1M), ike.config(4), attributes(5)

Schneier, Bruce. *Applied Cryptography: Protocols, Algorithms, and Source Code in C*. Second Edition. John Wiley & Sons. New York, NY. 1996.

RSA Labs, PKCS#11 v2.11: *Cryptographic Token Interface Standards*, November 2001.

NAME	imqadmin – launch the Message Queue administration console				
SYNOPSIS	<pre> /usr/bin/imqadmin [-javahome path] /usr/bin/imqadmin -h /usr/bin/imqadmin -v </pre>				
DESCRIPTION	imqadmin launches the graphical user interface application that performs most Message Queue (MQ) administration tasks. Message Queue administration tasks include managing broker instances and physical destinations (imqcmd) and managing MQ administered objects (imqobjmgr).				
OPTIONS	The following options are supported: -h Display usage help. Nothing else on the command line is executed. -javahome <i>path</i> Specify a path to an alternate Java 2 compatible runtime. -v Display version information.				
ENVIRONMENT VARIABLES	The following environment variables affect the execution of this command: IMQ_JAVAHOME Specify the Java 2 compatible runtime. When this environment variable is not set it defaults to <code>/usr/j2se</code>.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.				
FILES	<code>\$HOME/.imq/admin/brokerlist.properties</code> Contains user settings, a list of broker instances being managed. <code>\$HOME/.imq/admin/objectstorelist.properties</code> Contains user settings, a list of object stores being managed.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWiqu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWiqu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWiqu				
SEE ALSO	imqbrokerd(1M), imqcmd(1M), imqdbmgr(1M), imqkeytool(1M), imqobjmgr(1M), imqusermgr(1M), attributes(5) <i>Sun ONE Message Queue Administrator's Guide</i>				

imqbrokerd(1M)

NAME	imqbrokerd – start a Message Queue broker instance
SYNOPSIS	<pre>/usr/bin/imqbrokerd [option...] /usr/bin/imqbrokerd -h</pre>
DESCRIPTION	imqbrokerd starts an instance of the Message Queue broker. The Message Queue broker is the main component of a Message Queue message server. The broker performs reliable delivery of messages to and from Java Message Service (JMS) clients. imqbrokerd uses command line options to specify broker configuration properties.
OPTIONS	The following options are supported: -backup <i>fileName</i> Back up a Master Broker's configuration change record to <i>fileName</i>. This option only applies to broker clusters. -cluster <i>brokerList</i> Specify the list of broker instances which are connected in a cluster. This list is merged with the list in the <code>imq.cluster.brokerlist</code> property. This option only applies to broker clusters. <i>brokerList</i> is a comma-separated list of broker instances, each specified by <i>hostName:port</i> (the host on which the broker instance is running and the port number it is using) If you don't specify a value for <i>hostName</i>, <code>localhost</code> is used. If you don't specify a value for <i>port</i>, the value of <code>7676</code> is used. For example: <code>host1:8899,host2,:7878</code>. -dbpassword <i>password</i> Specify the password for a plugged-in JDBC-compliant database used as an MQ data store. -dbpassword <i>password</i> Specify the password for a plugged-in JDBC-compliant database used as an MQ data store. -dbuser <i>userName</i> Specify the user name for a plugged-in JDBC-compliant data store. -D<i>property=value</i> Set the specified broker configuration property to the <i>value</i>. The system does not validate either the configuration property or <i>value</i>. Therefore, spelling, formatting, and case is important. MQ can not set incorrect values passed using the <code>-D</code> option. -force Perform action without user confirmation. This option only applies when you use the <code>-remove instance</code> option, which normally requires confirmation. -h Display usage help. Execute nothing else on the command line.

- javahome *path*
Specify the path to an alternate Java 2-compatible Java Development Kit (JDK) or Java Runtime Environment (JRE) The default is to use the runtime bundled with the operating system.
- ldappassword *password*
Specify the password for accessing a LDAP user repository when using an LDAP server (as opposed to a built-in flat-file repository) to authenticate users of an MQ message server.
- license [*name*]
Specify the license to load, if different from the default for your MQ product edition. If you don't specify a license name, this lists all licenses installed on the system. Depending on the installed MQ edition, the values for *name* are *pe* (Platform Edition-basic features), *try* (Platform Edition-90-day trial enterprise features), and *unl* (Enterprise Edition).
- loglevel *level*
Specify the logging level. Valid values for *level* are NONE, ERROR, WARNING, or INFO. The default value is INFO.
- metrics *int*
Report metrics at a specific interval. Specify *int* as the number of seconds.
- name *brokerName*
Specify the instance name of this broker and use the corresponding instance configuration file. If you do not specify a broker name, the name of the file is set to *imqbroker*. If you run more than one instance of a broker on the same host, each must have a unique name.
- passfile *filename*
Specify the name of the file from which to read the passwords for the SSL keystore, LDAP user repository, or JDBC-compliant database.
- password *keypassword*
Specify the password for the SSL certificate keystore.
- port *number*
Specify the broker's Port Mapper port number. By default, this is set to 7676. To run two instances of a broker on the same server, each broker's Port Mapper must have a different port number. JMS clients connect to the broker instance using this port number.
- remove *instance*
Remove the broker instance. Delete the instance configuration file, log files, data store, and other files and directories associated with the broker instance. This option requires user confirmation unless you also specify the *-force* option.
- reset *store | messages | durables | props*
Reset the data store (or a subset of the store) or resets the configuration properties of the broker instance when the broker instance is started. The action depends on the argument provided.

imqbrokerd(1M)

	store Clear all persistent data in the data store, including messages, durable subscriptions, and transaction information store. messages Clear all persistent messages durable. durables Clear all durable subscriptions. props Clear all configuration information in the <code>config.props</code> instance configuration file. All properties assume default values. -restore <i>filename</i> Replace the Master Broker's configuration change record with the specified backup file. This file must have been previously created using the <code>-backup</code> option. This option only applies to broker clusters. -shared Specify that the jms connection service be implemented using the shared threadpool model, in which threads are shared among connections to increase the number of connections supported by a broker instance. -silent Turn off logging to the console. -tty Display all messages be to the console. WARNING and ERROR level messages are displayed on the console by default. -version Display the version number of the installed product. -vmargs <i>are [[arg]...</i> Specify arguments to pass to the Java VM. Separate arguments with spaces. If you want to pass more than one argument or if an argument contains a space, use enclosing quotation marks. For example: <pre>imqbrokerd -tty -vmargs " -Xmx128m -Xincgc"</pre>
ENVIRONMENT VARIABLES	The following environment variables affect the execution of this command: IMQ_JAVAHOME Specify the Java 2 compatible runtime. When this environment variable is not set it defaults to <code>/usr/j2se</code>.
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.
FILES	<code>/etc/init.d/imq</code> Shell script for starting <code>imqbrokerd</code>. This file looks at the <code>/etc/imq/imqbrokerd.conf</code> file.

imqbrokerd(1M)

/etc/imq/imqbrokerd.conf

Configuration file which controls the behavior of the broker startup script.

/etc/imq/passwd

Flat file user repository for authenticating users.

/etc/imq/accesscontrol.properties

Controls client access to broker functionality.

/etc/imq/passfile.sample

Sample passfile used by the -passfile option.

/var/imq/instances/brokerName/props/config.properties

Broker instance configuration file.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWiqu

SEE ALSO imqadmin(1M), imqcmd(1M), imqdbmgr(1M), imqkeytool(1M), imqobjmgr(1M), imqusermgr(1M), attributes(5)

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imqcmd(1M)

NAME	imqcmd – manage Message Queue brokers																						
SYNOPSIS	<pre> /usr/bin/imqcmd subcommand argument [option...] /usr/bin/imqcmd [-h -H] /usr/bin/imqcmd -v </pre>																						
DESCRIPTION	imqcmd manages the Message Queue broker, including resources such as connection services, physical destinations, durable subscriptions, and transactions. The utility provides a number of subcommands for managing these resources. imqcmd supports many subcommands. Basic connection and authentication is required for the execution of every imqcmd subcommand. Use the <code>-secure</code> option to specify secure connections. Subcommands and their corresponding arguments and options follow the imqcmd command on the command line. See USAGE and OPTIONS.																						
OPTIONS	The following options are supported: <table> <tr> <td><code>-b <i>hostName:port</i></code></td><td> Specify the name of the host on which the broker instance is running and the port number it is using. The default value is <code>localhost:7676</code>. If you do not specify the <code>-b</code> option, imqcmd uses the default. To specify port only, use: <code>-b :7878</code>. This is equivalent to <code>-b localhost:7878</code> To specify name only, use: <code>-b somehost</code>. This is equivalent to <code>-b somehost:7676</code>. </td></tr> <tr> <td><code>-c <i>clientID</i></code></td><td>Specify the ID of the durable subscriber to a topic.</td></tr> <tr> <td><code>-d <i>topicName</i></code></td><td>Specify the name of the topic.</td></tr> <tr> <td></td><td>Use this option with the <code>list dur</code> and <code>destroy dur</code> subcommands.</td></tr> <tr> <td><code>-f</code></td><td>Perform action without user confirmation.</td></tr> <tr> <td></td><td>Use this option with any subcommand.</td></tr> <tr> <td><code>-h</code></td><td>Display usage help. Execute nothing else on the command line.</td></tr> <tr> <td><code>-H</code></td><td>Display usage help, attribute list, and examples. Execute nothing else on the command line.</td></tr> <tr> <td><code>-int <i>interval</i></code></td><td>Specify the interval, in seconds, at which imqcmd displays broker metrics.</td></tr> <tr> <td></td><td>Use this option with the <code>the metrics</code> subcommand.</td></tr> <tr> <td><code>-javahome</code></td><td>Specify an alternate Java 2 compatible runtime to use.</td></tr> </table>	<code>-b <i>hostName:port</i></code>	Specify the name of the host on which the broker instance is running and the port number it is using. The default value is <code>localhost:7676</code>. If you do not specify the <code>-b</code> option, imqcmd uses the default. To specify port only, use: <code>-b :7878</code>. This is equivalent to <code>-b localhost:7878</code> To specify name only, use: <code>-b somehost</code>. This is equivalent to <code>-b somehost:7676</code>.	<code>-c <i>clientID</i></code>	Specify the ID of the durable subscriber to a topic.	<code>-d <i>topicName</i></code>	Specify the name of the topic.		Use this option with the <code>list dur</code> and <code>destroy dur</code> subcommands.	<code>-f</code>	Perform action without user confirmation.		Use this option with any subcommand.	<code>-h</code>	Display usage help. Execute nothing else on the command line.	<code>-H</code>	Display usage help, attribute list, and examples. Execute nothing else on the command line.	<code>-int <i>interval</i></code>	Specify the interval, in seconds, at which imqcmd displays broker metrics.		Use this option with the <code>the metrics</code> subcommand.	<code>-javahome</code>	Specify an alternate Java 2 compatible runtime to use.
<code>-b <i>hostName:port</i></code>	Specify the name of the host on which the broker instance is running and the port number it is using. The default value is <code>localhost:7676</code>. If you do not specify the <code>-b</code> option, imqcmd uses the default. To specify port only, use: <code>-b :7878</code>. This is equivalent to <code>-b localhost:7878</code> To specify name only, use: <code>-b somehost</code>. This is equivalent to <code>-b somehost:7676</code>.																						
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<code>-int <i>interval</i></code>	Specify the interval, in seconds, at which imqcmd displays broker metrics.																						
	Use this option with the <code>the metrics</code> subcommand.																						
<code>-javahome</code>	Specify an alternate Java 2 compatible runtime to use.																						

<code>-m <i>metricType</i></code>	Specify the type of metric information to display. Use one of the following values to specify <i>metricType</i>: <code>ttl</code> Total of messages in and out of the broker (default) <code>rts</code> Provides the same information as <code>ttl</code>, but specifies the number of messages per second <code>cxn</code> Connections, virtual memory heap, threads Use this option with the either the <code>metrics bkr</code> or <code>metrics svc</code> subcommand. The following command displays connection, VM heap, and threads metric information for the default broker instance (<code>localhost:7676</code>) every five seconds: <pre>imqcmd metrics bkr -m cxn -int 5</pre>
<code>-n <i>argumentName</i></code>	Specify the name of the subcommand argument. Depending on the subcommand, this might be the name of a service, a physical destination, a durable subscription, or a transaction ID.
<code>-o <i>attribute=value</i></code>	Specify the value of an attribute. Depending on the subcommand argument, this might be the attribute of a broker, service, or destination.
<code>-p <i>password</i></code>	Specify the administrator password. If you omit this value, you are prompted for it.
<code>-s</code>	Silent mode. No output is displayed. Use this option with any subcommand.
<code>-secure</code>	Specify a secure administration connection to the broker instance. You must first configure the broker to enable a secure connection service. Use this option whenever you want a secure communication with the broker.
<code>-t <i>destinationType</i></code>	Specify the type of a destination: <code>t</code> (topic) or <code>q</code> (queue).
<code>-tmp</code>	Include temporary destinations when listing destinations using the <code>list dst</code> subcommand.
<code>-u <i>name</i></code>	Specify the administrator user name. If you omit this value, you are prompted for it.

imqcmd(1M)

	-v	Display version information. Execute nothing else on the command line.
USAGE		
Subcommands and Options	The following subcommands and associated arguments and options are supported:	
	commit txn -n <i>transaction_id</i>	Commit the specified transaction
	create dst -t <i>destinationType</i> -n <i>destName</i> [-o <i>attribute=value</i>] [-o <i>attribute=value1</i>]...	Create a destination of the specified type, with the specified name, and the specified attributes. Destination names must contain only alphanumeric characters (no spaces) and can begin with an alphabetic character or the underscore character (_).
	destroy dst -t <i>destinationType</i> -n <i>destName</i>	Destroy the destination of the specified type and name.
	destroy dur -n <i>subscrName</i> -c <i>client_id</i>	Destroy the specified durable subscription for the specified Client Identifier.
	list dst [-tmp]	List all destinations, with option of listing temporary destinations as well .
	list dur -d <i>destination</i>	List all durable subscriptions for the specified destination.
	list svc	List all connection services on the broker instance.
	list txn	List all transactions, being tracked by the broker.
	metrics bkr [-m <i>metricType</i>] [-int <i>interval</i>]	Display broker metrics for the broker instance.
	Use the -m option to specify the type of metric to display. Use one of the following values to specify <i>metricType</i> :	
	ttl	Total of messages in and out of the broker (default)
	rts	Provides the same information as ttl , but specifies the number of messages per second
	cxn	Connections, virtual memory heap, threads
	Use the -int option to specify the interval (in seconds) at which to display the metrics. The default is 5 seconds	

`metrics svc -n serviceName [-m metricType] [-int interval]`

List metrics for the specified service on the broker instance. Use the `-m` option to specify the type of metric to display. Use one of the following values to specify *metricType*:

`ttl`

Total of messages in and out of the broker (default)

`rts`

Provides the same information as `ttl`, but specifies the number of messages per second

`cxn`

Connections, virtual memory heap, threads

Use the `-int` option to specify the interval (in seconds) at which to display the metrics. The default is 5 seconds.

`pause bkr`

Pause the broker instance.

`pause svc -n serviceName`

Pause the specified service running on the broker instance. You cannot pause the administrative service.

`purge dst -t destinationType -n destName`

Purge messages at the destination with the specified type and name.

`purge dur -n subscrName -c client_id`

Purge all messages for the specified client identifier.

`query bkr`

List the current settings of properties of the broker instance. Show the list of running brokers (in a multi-broker cluster) that are connected to the specified broker.

`query dst -t destinationType -n destName`

List information about the destination of the specified type and name.

`query svc -n serviceName`

Display information about the specified service running on the broker instance.

`query txn -n transaction_id`

List information about the specified transaction.

`reload cls`

Forces all the brokers in a cluster to reload the `imq.cluster.brokerlist` property and update cluster information. This subcommand only applies to broker clusters.

imqcmd(1M)

restart bkr

Shut down and restart the broker instance. This command restarts the broker using the options specified when the broker was first started. If you want different options to be in effect, you must shut down the broker and then start it again, specifying the options you want.

resume bkr

Resume the broker instance.

resume svc -n *serviceName*

Resume the specified service running on the broker instance.

rollback txn -n *transaction_id*

Roll back the specified transaction.

shutdown bkr

Shut down the broker instance

update bkr -o *attribute=value* [-o *attribute=value*]...

Change the specified attributes for the broker instance.

update dst -t *destinationType* -n *destName* -o *attribute=value* [-o *attribute=value1*]...

Update the value of the specified attributes at the specified destination..

update svc -n *serviceName* -o *attribute=value* [-o *attribute=value1*]...

Update the specified attribute of the specified service running on the broker instance.

Attribute Value Pairs

You can specify attributes with the create and update subcommands. Applicable attributes depend on the subcommand arguments.

The following attributes are supported:

Queue (dst):

queueDeliveryPolicy

Value: String (f = Failover, r = Round Robin, s = Single)

Default: s

maxTotalMsgBytes

Value: Integer (maximum total size of messages, in bytes)

Default: 0 (unlimited)

maxBytesPerMsg

Value: Integer (maximum size of a single message, in bytes)

Default: 0 (unlimited)

maxNumMsgs

Value: Integer (maximum total number of messages)

Default: 0 (unlimited)

Topic (dst):

maxBytesPerMsg

Value: Integer (maximum size of a single message, in bytes)

Default: 0 (unlimited)

Broker (bkr):

imq.autocreate.queue

Value: Boolean

Default: true

imq.autocreate.topic

Value: Boolean

Default: true

imq.cluster.url

Value: String (location of cluster configuration file)

Default: none

imq.log.file.rolloverbytes

Value: Integer (maximum size of a log file, in bytes)

Default: 0 (no rollover based on size)

imq.log.file.rolloversecs

Value: Integer (maximum age of a log file, in seconds)

Default: 0 (no rollover based on age)

imq.log.level

Value: String (NONE, ERROR, WARNING, INFO)

Default: INFO

imq.message.max_size

Value: Integer (maximum size of a single message, in bytes)

Default: 70m

imq.portmapper.port

Value: Integer

Default: 7676

imq.queue.deliverypolicy

Value: String (f = Failover, r = Round Robin, s = Single)

Default: s

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`imq.system.max_count`
Value: Integer (maximum total number of messages)

Default: 0 (no limit)

`imq.system.max_size`
Value: Integer (maximum total size of messages, in bytes)

Default: 0 (no limit)

Service (svc):

`maxThreads`
Value: Integer (maximum threads assigned)

Default: Depends on service

`minThreads`
Value: Integer (minimum threads assigned)

Default: Depends on service

`port`
Value: Integer

Default: 0 (dynamically allocated)

EXAMPLES

EXAMPLE 1 Shutting Down a Broker

The following command shuts down a broker for hostname `myserver` on port `7676`:

```
mqcmd shutdown bkr -b myserver:7676
```

EXAMPLE 2 Restarting a Broker

The following command restarts a broker for hostname `myserver`:

```
imqcmd restart bkr -b myserver
```

EXAMPLE 3 Pausing a Service

The following command pauses a broker for hostname `localhost` on port `7676`, with a *serviceName* of `jms`:

```
imqcmd pause svc -n jms -b :7676
```

EXAMPLE 4 Resuming a Service

The following command resumes a service for hostname `localhost` on port `7676`, with a *serviceName* of `jms`:

```
imqcmd resume svc -n jms -b myserver:7676
```


EXAMPLE 5 Creating a Queue Destination

The following command creates a queue destination for hostname `myserver` on port `7676`, with a *destName* of `myFQ`, a *queueDeliveryPolicy* of `Failover`, and a *maxBytesPerMsg* of `10000`:

```
imqcmd create dst -n myFQ -t q -o "queueDeliveryPolicy=f" \
-o "maxBytesPerMsg=10000" -b myserver:7676
```

EXAMPLE 6 Purging a Queue Destination

The following command purges a queue destination for hostname `myserver` on port `7676`, with a *destName* of `myFQ`:

```
imqcmd purge dst -n myFQ -t q -b myserver:7676
```

EXAMPLE 7 Listing Destinations on a Broker

The following command lists destinations for hostname `myserver` on port `7676`:

```
imqcmd list dst -b myserver:7676
```

EXAMPLE 8 Updating a Portmapper Port

The following command updates a portmapper port on hostname `myserver` from port `7676` to `7878`:

```
imqcmd update bkr -o "imq.portmapper.port=7878"
```

EXAMPLE 9 Updating the Maximum Number of Messages in the Queue

The following command updates the maximum number of messages in the queue to `2000` for `myserver` on port `8080` with a *destName* of `TestQueue`:

```
imqcmd update dst -b myserver:8080 -n TestQueue -t q -o "maxNumMsgs=2000"
```

EXAMPLE 10 Updating the Maximum Threads

The following command updates the maximum threads `jms` connection service to `200` for hostname `localhost` on port `7676`:

```
imqcmd update svc -n jms -o "minThreads=200"
```

EXAMPLE 11 Listing Durable Subscriptions

The following command lists durable subscriptions for a topic with hostname `localhost` on port `7676` with a *destName* of `myTopic`:

```
imqcmd list dur -d myTopic
```

EXAMPLE 12 Destroying Durable Subscriptions

The following command destroys subscriptions for hostname `localhost` on port `7676` with a *dursubName* of `myDurSub` and a *client_ID* of `111.222.333.444`:

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EXAMPLE 12 Destroying Durable Subscriptions (Continued)

```
imqcmd destroy dur -n myDurSub -c "111.222.333.444"
```

EXAMPLE 13 Listing All Transactions

The following command lists all transactions on a broker with hostname `localhost` on port `7676`:

```
imqcmd list txn
```

EXAMPLE 14 Displaying Information About a Transaction

The following command displays information about a transaction with hostname `localhost` on port `7676`, and a *transactionID* of `1234567890`

```
imqcmd query txn -n 1234567890
```

EXAMPLE 15 Committing a Transaction

The following command commits a transaction with hostname `localhost` on port `7676`, and a *transactionID* of `1234567890`:

```
imqcmd commit txn -n 1234567890
```

ENVIRONMENT VARIABLES

The following environment variables affect the execution of this command:

IMQ_JAVAHOME Specify the Java 2 compatible runtime. When this environment variable is not set it defaults to `/usr/j2se`.

EXIT STATUS

The following exit values are returned:

0 Successful completion.

>0 An error occurred.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWiqu

SEE ALSO

`imqadmin(1M)`, `imqbrokerd(1M)`, `imqdbmgr(1M)`, `imqkeytool(1M)`, `imqobjmgr(1M)`, `imqusermgr(1M)`, `attributes(5)`

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NAME	imqdbmgr – manage a plugged-in JDBC-compliant Message Queue data store
SYNOPSIS	<pre> /usr/bin/imqdbmgr subcommand argument [[option...]] /usr/bin/imqdbmgr -h -help /usr/bin/imqdbmgr -v -version </pre>
DESCRIPTION	The imqdbmgr utility creates and manages a Java DataBase Connectivity (JDBC) compliant database used for MQ persistent storage. The database can either be embedded or external. To use a JDBC-compliant database (and the imqdbmgr utility), you need to first set a number of JDBC-related properties in the broker instance configuration file. See the <i>Sun ONE Message Queue Administrator's Guide</i> for additional information. imqdbmgr supports three management subcommands. These <i>subcommands</i>, and their corresponding <i>arguments</i> and <i>options</i> follow the imqdbmgr command on the command line. See USAGE and OPTIONS. The following subcommands are supported: create Create an MQ database schema. delete Delete MQ database tables in the current data store. recreate Delete MQ database tables and recreate MQ database schema in the current data store. The imqdbmgr subcommands support the following arguments: all Indicates an embedded data store. tbl Indicates an external data store.
OPTIONS	The following options are supported: -b [<i>brokerName</i>] Specify the broker instance name and corresponding instance configuration properties. If <i>brokerName</i> is not specified, the default broker instance is assumed. Use this option with the create, delete or recreate subcommands. -D <i>property=value</i> Set system property <i>property</i> to <i>value</i>. Use this option with the create, delete or recreate subcommands.

imqdbmgr(1M)

-h -help	Display usage help. Execute nothing else on the command line.
-p <i>password</i>	Specify the database password. Use this option with the <code>create</code> , <code>delete</code> or <code>recreate</code> subcommands.
-u <i>userName</i>	Specify the database user name. Use this option with the <code>create</code> , <code>delete</code> or <code>recreate</code> subcommands.
-v -version	Display version information. Execute nothing else on the command line.

USAGE

The following subcommands and associated arguments are supported:

`create all`

Create a new embedded data store and MQ database schema for a specified or default broker instance.

`create tbl [-u userName] [-p password]`

Create MQ database schema in an external data store for a specified or default broker instance.

`delete tbl [-u userName] [-p password]`

Delete MQ database tables in the current data store for a specified or default broker instance.

`recreate tbl [-u userName] [-p password]`

Delete MQ database tables and recreate MQ database schema in the current data store for a specified or default broker instance.

ENVIRONMENT VARIABLES

The following environment variables affect the execution of this command:

IMQ_JAVAHOME Specify the Java 2 compatible runtime. When this environment variable is not set it defaults to `/usr/j2se`.

EXIT STATUS

The following exit values are returned:

0 Successful completion.

>0 An error occurred.

FILES

`/var/imq/instances/brokerName/dbstore`

Recommended directory in which to create an embedded database.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWiqu

imqdbmgr(1M)

SEE ALSO imqadmin(1M), imqbrokerd(1M), imqcmd(1M), imqusermgr(1M),
imqkeytool(1M), imqobjmgr(1M), attributes(5)

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imqkeytool(1M)

NAME	imqkeytool – generate a self-signed certificate for secure communication					
SYNOPSIS	<pre>/usr/bin/imqkeytool [-broker] [-servlet <i>keystore_location</i>] /usr/bin/imqkeytool -h</pre>					
DESCRIPTION	The imqkeytool utility generates a self-signed certificate for secure communication. The certificate can be used by a broker instance to establish a secure connection with a client, or by an MQ-supplied HTTPS servlet to establish a secure connection with a broker instance. An HTTPS is an SSL-enabled variant of the HyperText Transfer Protocol that establishes a secure connection with a broker instance. Without an option, imqkeytool operates a self-signed certificate for a broker instance. imqkeytool uses command line options to specify whether the certificate is used by a broker instance or by a servlet.					
OPTIONS	The following options are supported: -broker Generate a self-signed certificate for the broker and places it in the MQ keystore. All broker instances running on a system must use the same certificate. -h Display usage help. Do not execute anything else on the command line. -servlet <i>keystore_location</i> Generate a self-signed certificate for an HTTPS servlet and places it in <i>keystore_location</i>. <i>keystore_location</i> refers to the location of the keystore. You should move this keystore to a location where it is accessible and readable by the MQ HTTPS servlet to establish a secure connection with a broker.					
ENVIRONMENT VARIABLES	The following environment variables affect the execution of this command: <table><tr><td>IMQ_JAVAHOME</td><td>Specify the Java 2 compatible runtime. When this environment variable is not set it defaults to /usr/j2se.</td></tr></table>		IMQ_JAVAHOME	Specify the Java 2 compatible runtime. When this environment variable is not set it defaults to /usr/j2se.		
IMQ_JAVAHOME	Specify the Java 2 compatible runtime. When this environment variable is not set it defaults to /usr/j2se.					
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>>0</td><td>An error occurred.</td></tr></table>		0	Successful completion.	>0	An error occurred.
0	Successful completion.					
>0	An error occurred.					
FILES	/etc/imq/keystore	Contains MQ keystore in which imqkeytool stores a self-signed certificate for brokers.				

imqkeytool(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWiQu

SEE ALSO imqadmin(1M), imqbrokerd(1M), imqcmd(1M), imqdbmgr(1M), imqobjmgr(1M), imqusermgr(1M), attributes(5)

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imqobjmgr(1M)

NAME	imqobjmgr – manage Message Queue administered objects
SYNOPSIS	<pre>/usr/bin/imqobjmgr subcommand [[option]...] /usr/bin/imqobjmgr -i fileName /usr/bin/imqobjmgr -h [-H] -help -Help /usr/bin/imqobjmgr -v</pre>
DESCRIPTION	imqobjmgr manages Message Queue administered objects in an object store accessible using JNDI. Administered objects allow JMS clients to be provider-independent by insulating them from provider-specific naming and configuration formats. imqobjmgr supports five management subcommands. These <i>subcommands</i>, and their corresponding <i>options</i> follow the imqobjmgr command on the command line. See USAGE and OPTIONS. The following subcommands are supported: - add Add a new administered object - delete Delete an administered object - list Display a list of administered objects - query Display information about administered objects - update Update administered objects You can use the -i option to specify the name of an input file that uses java property file syntax to represent all or part of any imqobjmgr subcommand clause. The -f, -s, and -pre options can be used with any imqobjmgr subcommand.
OPTIONS	The following options are supported: -f Perform action without user confirmation. -h -help Display usage help. Execute nothing else on the command line. -H -Help Display usage help, attribute list, and examples. Execute nothing else on the command line. -i <i>fileName</i> Specify the name of an input file containing all or part of the subcommand clause, specifying object type, lookup name, object attributes, object store attributes, or other options. Use this option for repetitive information, such as object store attributes.

<code>-j attribute=value</code>	Specify attributes necessary to identify and access a JNDI object store.
<code>-javahome</code>	Specify an alternate Java 2 compatible runtime to use. <code>imqobjmgr</code> uses the runtime bundled with the operating system by default.
<code>-l lookupName</code>	Specify the JNDI lookup name of an administered object. This name must be unique in the object store's context.
<code>-o attribute=value</code>	Specify the attributes of an administered object.
<code>-pre</code>	Run command in preview mode. Preview mode indicates what will be done without performing the command.
<code>-r read-only_state</code>	Specify if an administered object is a read-only object. A value of true indicates the administered object is a read-only object. JMS clients cannot modify the attributes of read-only administered objects. The read-only state is set to false by default.
<code>-s</code>	Silent mode. No output is displayed.
<code>-t type</code>	Specify the type of an administered object: <code>q</code> = queue <code>t</code> = topic <code>cf</code> = ConnectionFactory <code>qf</code> = queueConnectionFactory <code>tf</code> = topicConnectionFactory <code>xcf</code> = XA ConnectionFactory (distributed transactions) <code>xqf</code> = XA queueConnectionFactory (distributed transactions) <code>xtf</code> = XA topicConnectionFactory (distributed transactions) <code>e</code> = SOAP endpoint (used to support SOAP messaging)
<code>-v</code>	Display version information. Execute nothing else on the command line.

USAGE This section provides information on subcommands, options, and attribute value pairs.

Subcommands and Options

The following subcommands and corresponding options are supported:

`add -t type -l lookupName [-o attribute=value]... -j attribute=value...`

Add a new administered object of the specified type, lookup name, and object attributes to an object store.

`delete -t type -l lookupName -j attribute=value...`

Delete an administered object, of the specified type and lookup name from an object store.

`list [-t type] -j attribute=value...`

Display a list of administered objects of a specified type, or all administered objects, in an object store.

imqobjmgr(1M)

**Attribute Value
Pairs**

`query -l lookupName -j attribute=value...`

Display information about an administered object of a specified lookup name in an object store.

`update -l lookupName [-o attribute=value]... -j attribute=value...`

Update the specified attribute values of an administered object of the specified lookup name in an object store.

The following attribute value pairs are supported for the specified administered object types:

Type = ConnectionFactories: ConnectionFactory, TopicConnectionFactory, QueueConnectionFactory, XAConnectionFactory, XATopicConnectionFactory, and XAQueueConnectionFactory

`imqAckOnAcknowledge`

Value: String (`true`, `false`, not specified)

Default: not specified

`imqAckOnProduce`

Value: String (`true`, `false`, not specified)

Default: not specified

`imqAckTimeout`

Value: String (time in milliseconds)

Default: 0 (no timeout)

`imqBrokerHostName`

Used if `imqConnectionType` is TCP or TLS.

Value: String

Default: `localhost`

`imqBrokerHostPort`

Used if `imqConnectionType` is TCP or TLS.

Value: Integer

Default: 7676

`imqBrokerServicePort ()`

Used if `imqConnectionType` is TCP or TLS.

Value: Integer

Default: 7676

`imqConfiguredClientID`

Value: String (ID number)

Default: no ID specified

imqConnectionType
Value: String (TCP, TLS, HTTP)

Default: TCP

imqConnectionURL
Used if imqConnectionType is HTTP.

Value: String

Default: `http://localhost/imq/tunnel`

imqDefaultPassword
Value: String

Default: guest

imqDefaultUsername
Value: String

Default: guest

imqDisableSetClientID
Value: Boolean

Default: false

imqFlowControlCount
Value: Integer

Default: 100

imqFlowControlIsLimited
Value: Boolean

Default: false

imqFlowControlLimit
Value: Integer

Default: 1000

imqMSDeliveryMode
Value: Integer (1=non-persistent, 2=persistent)

Default: 2

imqMSEExpiration
Value: Long (time in milliseconds)

Default: 0 (does not expire)

imqobjmgr(1M)

imqJMSPriority
Value: Integer (0 to 9)

Default: 4

imqLoadMaxToServerSession
Value: Boolean

Default: true

imqOverrideJMSDeliveryMode
Value: Boolean

Default: false

imqOverrideJMSExpiration
Value: Boolean

Default: false

imqOverrideJMSHeadersToTemporaryDestinations
Value: Boolean

Default: false

imqOverrideJMSPriority
Value: Boolean

Default: false

imqQueueBrowserMaxMessagesPerRetrieve
Value: Integer

Default: 1000

imqBrowserRetrieveTimeout
Value: Long (time in milliseconds)

Default: 60,000

imqReconnect
Value: Boolean

Default: false

imqReconnectDelay
Value: Integer (time in milliseconds)

Default: 30,000

imqReconnectRetries
Value: Integer

Default: 0

```

imqSetJMSXAppID
  Value: Boolean

  Default: false
imqSetJMSXConsumerTXID
  Value: Boolean

  Default: false
imqSetJMSXProducerTXID
  Value: Boolean

  Default: false
imqSetJMSXRcvTimestamp
  Value: Boolean

  Default: false
imqSetJMSXUserID
  Value: Boolean

  Default: false
imqSSLIsHostTrusted
  Used if imqConnectionType is TLS.

  Value: Boolean

  Default: true
Type = Destinations: Topic and Queue
imqDestinationDescription
  Value: String

  Default: no description
imqDestinationName
  Value: String

  Default: Untitled_Destination_Object
Type = Endpoint (SOAP Endpoint)
imqEndpointDescription
  Value: String

  Default: A description for the endpoint object
imqEndpointName
  Value: String

  Default: Untitled_Endpoint_Object

```

imqobjmgr(1M)

imqSOAPEndpointList
Value: String (one or more space-separated URLs)

Default: no url

EXAMPLES

EXAMPLE 1 Adding a Topic Administered Object to an Object Store

Where JNDI lookup name=myTopic and imqDestinationName=MyTestTopic, the following command adds to an LDAP server object store:

```
imqobjmgr add -t t -l "cn=myTopic"\
-o "imqDestinationName=MyTestTopic"\
-j "java.naming.factory.initial=com.sun.jndi.ldap.LdapCtxFactory"\
-j "java.naming.provider.url=ldap://mydomain.com:389/o=imq"
```

Where JNDI lookup name=myTopic and imqDestinationName=MyTestTopic, the following command adds to a file system object store:

```
imqobjmgr add -t -l "cn=myTopic"\
-o "imqDestinationName=MyTestTopic"\
-j \
  "java.naming.factory.initial=com.sun.jndi.fscontext.RefFSContextFactory"\
-j "java.naming.provider.url=file:/home/foo/imq_admin_objects"
```

Where JNDI lookup name=myTopic and imqDestinationName=MyTestTopic, the following command adds to a file system object store, using an input file:

```
imqobjmgr -i inputfile
```

The associated input file consists of the following:

```
cmdtype=add
obj.type=t
obj.lookupName=cn=myTopic
obj.attrs.imqDestinationName=MyTestTopic
objstore.attrs.java.naming.factory.initial=com.sun.jndi.fscontext.\
  RefFSContextFactory
objstore.attrs.java.naming.provider.url=file:/home/foo/imq_admin_objects
```

EXAMPLE 2 Adding a QueueConnectionFactory Administered Object to an Object Store

Where JNDI lookup name=myQCF, read-only state=true, imqBrokerHostName=foo and imqBrokerHost Port=777, the following command adds to an LDAP server object store:

```
imqobjmgr add -t qf -l "cn=myQCF" -r true\
-o "imqBrokerHostName=foo"\
-o "imqBrokerHostPort=777"\
-j "java.naming.factory.initial=com.sun.jndi.ldap.LdapCtxFactory"\
-j "java.naming.provider.url=ldap://mydomain.com:389/o=imq"
```

Where JNDI lookup name=myQCF, read-only state=true, imqBrokerHostName=foo and imqBrokerHost Port=777, the following command adds to an LDAP server object store using an input file:

```
imqobjmgr -i inputfile
```

EXAMPLE 2 Adding a QueueConnectionFactory Administered Object to an Object Store *(Continued)*

The associated input file consists of the following:

```
cmdtype=add
obj.type=qf
obj.lookupName=cn=myQCF
obj.readOnly=true
obj.attrs.imqBrokerHostName=foo
obj.attrs.imqBrokerHostPort=777
objstore.attrs.java.naming.factory.initial=com.sun.jndi.\
    ldap.LdapCtxFactory
objstore.attrs.java.naming.provider.url=ldap://mydomain.com:389/o=imq
```

Where JNDI lookup name=myQCF, read-only state=true, imqBrokerHostName=foo and imqBrokerHost Port=777, the following command adds to an LDAP server object store, using both an input file and command options :

```
imqobjmgr add -t qf -l "cn=myQCF"\
-o "imqBrokerHostName=foo"\
-o "imqBrokerHostPort=777"\
-i inputfile
```

The associated input file consists of the following:

```
objstore.attrs.java.naming.factory.initial=com.sun.jndi.ldap.LdapCtxFactory
objstore.attrs.java.naming.provider.url=ldap://mydomain.com:389/o=imq
```

EXAMPLE 3 Deleting a Topic Administered Object from an Object Store

Where JNDI lookup name=myTopic and no confirmation is requested, the following command deletes from an LDAP server object store:

```
imqobjmgr delete -f -l "cn=myTopic"\
-j "java.naming.factory.initial=com.sun.jndi.ldap.LdapCtxFactory"\
-j "java.naming.provider.url=ldap://mydomain.com:389/o=imq"
```

EXAMPLE 4 Querying Information About a Topic Administered Object

Where JNDI lookup name=myTopic, the following command queries from an LDAP server object store using simple authentication scheme:

```
imqobjmgr query -l "cn=myTopic"\
-j "java.naming.factory.initial=com.sun.jndi.ldap.LdapCtxFactory"\
-j "java.naming.provider.url=ldap://mydomain.com:389/o=imq"\
-j "java.naming.security.authentication=simple"\
-j "java.naming.security.principal=uid=foo,ou=imqobjmgr,o=imq"\
-j "java.naming.security.credentials=foo"
```

EXIT STATUS The following exit values are returned:

0	Successful completion.
>0	An error occurred.

imqobjmgr(1M)

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWiqu

SEE ALSO

imqadmin(1M), imqcmd(1M), imqbrokerd(1M), imqkeytool(1M),
imqusermgr(1M), attributes(5)

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NAME	imqusermgr – command utility for managing a Message Queue user repository
SYNOPSIS	<pre> /usr/bin/imqusermgr <i>subcommand</i> [<i>option</i>] ... /usr/bin/imqusermgr -h /usr/bin/imqusermgr -v </pre>
DESCRIPTION	The imqusermgr utility manages a file-based user repository to authenticate and authorize users of an Message Queue (MQ) message server. imqusermgr provides subcommands for adding, deleting, updating, and listing user entries in the repository. imqusermgr supports four management subcommands. These <i>subcommands</i>, and their corresponding <i>options</i> follow the imqusermgr command on the command line. See USAGE and OPTIONS. The following subcommands are supported: add Add a new user and associated password to the repository. delete Delete a user from the repository. list Display information users in the repository. update Update the password or state of a user in the repository.
OPTIONS	The following options are supported: -a <i>active_state</i> Specify if user's state is active or inactive. An inactive user cannot create connections to the Message Queue message server. Valid values for <i>active_state</i> are true or false. Specify true for active or false for inactive. the default is true. Use this option with the update subcommmand. -f Perform action without user confirmation. Use this option with the delete and update subcommmands. -g <i>group</i> Specify the group of the user. Valid values for <i>group</i> are admin, user, and anonymous. Use this option with the add subcommmand. -h Display usage help. Exceute nothing else on the command line. -p <i>password</i> Specify user password.

imqusermgr(1M)

	Use this option with the add and update subcommands.
-s	Silent mode. Display no output
	Use this option with the add, delete, and update subcommands.
-u <i>userName</i>	Specify user name.
	<i>userName</i> cannot contain the following characters: asterisk (*), colon (:), NEWLINE, or RETURN.
	Use this option with the add, delete, update and list subcommands.
-v	Display version information. Execute nothing else on the command line.

USAGE

The following subcommands and corresponding options are supported:

add -u *userName* -p *password* [-g *group*] [-s]
 Add a new user and associated password to the repository, and optionally specify the user's group.

delete -u *userName* [-s] [-f]
 Delete a user from the repository.

list [-u *user_name*]
 Display information about the specified user in the repository. If no user is specified, all users are displayed.

update -u *userName* -p *password* [-a *state*] [-s] [-f]
 update -u *userName* -a *state* [-p *password*] [-s] [-f]
 Update the password or state (or both) of a user.

ENVIRONMENT VARIABLES

The following environment variables affect the execution of this command:

IMQ_JAVAHOME Specify the Java 2 compatible runtime. When this environment variable is not set, it defaults to /usr/j2se.

EXIT STATUS

The following exit values are returned:

0 Successful completion.

>0 An error occurred.

FILES

/etc/imq/passwd Flat-file user repository.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWiqu

imqusermgr(1M)

SEE ALSO imqadmin(1M), imqbrokerd(1M), imqcmd(1M), imqdbmgr(1M), imqkeytool(1M),
imqobjmgr(1M), attributes(5)

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in.comsat(1M)

NAME	in.comsat, comsat – biff server				
SYNOPSIS	/usr/sbin/in.comsat				
DESCRIPTION	comsat is the server process which listens for reports of incoming mail and notifies users who have requested to be told when mail arrives. It is invoked as needed by inetd(1M), and times out if inactive for a few minutes. comsat listens on a datagram port associated with the biff service specification (see services(4)) for one line messages of the form <i>user@mailbox-offset</i> If the <i>user</i> specified is logged in to the system and the associated terminal has the owner execute bit turned on (by a biff y), the <i>offset</i> is used as a seek offset into the appropriate mailbox file, and the first 7 lines or 560 characters of the message are printed on the user's terminal. Lines which appear to be part of the message header other than the From, To, Date, or Subject lines are not printed when displaying the message.				
FILES	/var/adm/utmpx user access and administration information				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWrcmds</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWrcmds
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWrcmds				
SEE ALSO	inetd(1M), services(4), attributes(5)				
NOTES	The message header filtering is prone to error.				

NAME	in.dhcpd – Dynamic Host Configuration Protocol server
SYNOPSIS	<pre> /usr/lib/inet/in.dhcpd [-denv] [-h relay_hops] [-i interface, ...] [-l syslog_local_facility] [-b automatic manual] [-o DHCP_offer_time] [-t dhcptab_rescan_interval] /usr/lib/inet/in.dhcpd [-dv] [-h relay_hops] [-i interface,...] [-l syslog_local_facility] -r IP_address hostname, ... </pre>
DESCRIPTION	<code>in.dhcpd</code> is a daemon that responds to Dynamic Host Configuration Protocol (DHCP) requests and optionally to BOOTP protocol requests. The daemon forks a copy of itself that runs as a background process. It must be run as root. The daemon has two run modes, DHCP server (with optional BOOTP compatibility mode) and BOOTP relay agent mode. The first line in the SYNOPSIS section illustrates the options available in the DHCP/BOOTP server mode. The second line in the SYNOPSIS section illustrates the options available when the daemon is run in BOOTP relay agent mode. The DHCP and BOOTP protocols are used to provide configuration parameters to Internet hosts. Client machines are allocated their IP addresses as well as other host configuration parameters through this mechanism. The DHCP/BOOTP daemon manages two types of DHCP data tables: the <code>dhcptab</code> configuration table and the DHCP network tables. See <code>dhcptab(4)</code> regarding the <code>dhcptab</code> configuration table and <code>dhcp_network(4)</code> regarding the DHCP network tables. The <code>dhcptab</code> contains macro definitions defined using a <code>termcap</code>-like syntax which permits network administrators to define groups of DHCP configuration parameters to be returned to clients. However, a DHCP/BOOTP server always returns hostname, network broadcast address, network subnet mask, and IP maximum transfer unit (MTU) if requested by a client attached to the same network as the server machine. If those options have not been explicitly configured in the <code>dhcptab</code>, <code>in.dhcpd</code> returns reasonable default values. The <code>dhcptab</code> is read at startup, upon receipt of a <code>SIGHUP</code> signal, or periodically as specified by the <code>-t</code> option. A <code>SIGHUP</code> (sent using the command <code>kill -HUP in.dhcpd</code>) causes the DHCP/BOOTP daemon to reread the <code>dhcptab</code> within an interval from 0-60 seconds (depending on where the DHCP daemon is in its polling cycle). For busy servers, users should run <code>/etc/init.d/dhcp stop</code>, followed by <code>/etc/init.d/dhcp start</code> to force the <code>dhcptab</code> to be reread. The DHCP network tables contain mappings of client identifiers to IP addresses. These tables are named after the network they support and the datastore used to maintain them. The DHCP network tables are consulted during runtime. A client request received from a network for which no DHCP network table exists is ignored.

in.dhcpd(1M)

This command may change in future releases of Solaris software. Scripts, programs, or procedures that use this command might need modification when upgrading to future Solaris software releases. The command line options provided with the `in.dhcpd` daemon are used only for the current session, and include only some of the server options you can set. The `dhcpsvc.conf(4)` contains all the server default settings, and can be modified by using the `dhcpmgr` utility. See `dhcpsvc.conf(4)` for more details.

OPTIONS

The following options are supported:

`-b automatic | manual`

This option enables BOOTP compatibility mode, allowing the DHCP server to respond to BOOTP clients. The option argument specifies whether the DHCP server should automatically allocate permanent lease IP addresses to requesting BOOTP clients if the clients are not registered in the DHCP network tables (`automatic`) or respond only to BOOTP clients who have been manually registered in the DHCP network tables (`manual`). This option only affects DHCP server mode.

`-d`

Debugging mode. The daemon remains as a foreground process, and displays verbose messages as it processes DHCP and/or BOOTP datagrams. Messages are displayed on the current TTY. This option can be used in both DHCP/BOOTP server mode and BOOTP relay agent mode.

`-h relay_hops`

Specifies the maximum number of relay agent hops that can occur before the daemon drops the DHCP/BOOTP datagram. The default number of relay agent hops is 4. This option affects both DHCP/BOOTP server mode and BOOTP relay agent mode.

`-i interface, ...`

Selects the network interfaces that the daemon should monitor for DHCP/BOOTP datagrams. The daemon ignores DHCP/BOOTP datagrams on network interfaces not specified in this list. This option is only useful on machines that have multiple network interfaces. If this option is not specified, then the daemon listens for DHCP/BOOTP datagrams on all network interfaces. The option argument consists of a comma-separated list of interface names. It affects both DHCP/BOOTP server and BOOTP relay agent run modes.

`-l syslog_local_facility`

The presence of this option turns on transaction logging for the DHCP server or BOOTP relay agent. The value specifies the `syslog` local facility (an integer from 0 to 7 inclusive) the DHCP daemon should use for tagging the transactions. Using a facility separate from the `LOG_DAEMON` facility allows the network administrator to capture these transactions separately from other DHCP daemon events for such purposes as generating transaction reports. See `syslog(3C)`, for details about local facilities. Transactions are logged using a record with 9 space-separated fields as follows:

1. Protocol:

Relay mode: "BOOTP"
 Server mode: "BOOTP" or "DHCP" based upon client type.

2. Type:

Relay mode: "RELAY-CLNT", "RELAY-SRVR"
 Server mode: "ASSIGN", "EXTEND", "RELEASE",
 "DECLINE", "INFORM", "NAK" "ICMP-ECHO."

3. Transaction time: absolute time in seconds (unix time)

4. Lease time:

Relay mode: Always 0.
 Server mode: 0 for ICMP-ECHO events, absolute time in seconds (unix time) otherwise

5. Source IP address: Dotted Internet form

Relay mode: Relay interface IP on RELAY-CLNT,
 INADDR_ANY on RELAY-SRVR.
 Server mode: Client IP.

6. Destination IP address: Dotted Internet form

Relay mode: Client IP on RELAY-CLNT, Server IP on
 RELAY-SRVR.
 Server mode: Server IP.

7. Client Identifier: Hex representation (0-9, A-F)

Relay mode: MAC address
 Server mode: BOOTP - MAC address; DHCP - client id

8. Vendor Class identifier (white space converted to periods (.)).

Relay mode: Always "N/A"
 Server mode: Vendor class ID tokenized by
 converting white space characters
 to periods (.)

9. MAC address: Hex representation (0-9, A-F)

Relay mode: MAC address
 Server mode: MAC address

The format of this record is subject to change between releases.

Transactions are logged to the console if daemon is in debug mode (-d).

Logging transactions impact daemon performance.

It is suggested that you periodically rotate the DHCP transaction log file to keep it from growing until it fills the filesystem. This can be done in a fashion similar to that used for the general system message log `/var/adm/messages` and is best accomplished using the facilities provided by `logadm(1M)`.

`-n`

Disable automatic duplicate IP address detection. When this option is specified, the DHCP server does not attempt to verify that an IP address it is about to offer a client is not in use. By default, the DHCP server pings an IP address before offering it to a DHCP/BOOTP client, to verify that the address is not in use by another machine.

`-o DHCP_offer_time`

Specifies the number of seconds the DHCP server should cache the offers it has extended to discovering DHCP clients. The default setting is 10 seconds. On slow network media, this value can be increased to compensate for slow network performance. This option affects only DHCP server mode.

`-r IP_address | hostname, . . .`

This option enables BOOTP relay agent mode. The option argument specifies a comma-separated list of IP addresses or hostnames of DHCP or BOOTP servers to which the relay agent is to forward BOOTP requests. When the daemon is started in this mode, any DHCP tables are ignored, and the daemon simply acts as a BOOTP relay agent.

A BOOTP relay agent listens to UDP port 68, and forwards BOOTP request packets received on this port to the destinations specified on the command line. It supports the BROADCAST flag described in RFC 1542. A BOOTP relay agent can run on any machine that has knowledge of local routers, and thus does not have to be an Internet gateway machine.

Note that the proper entries must be made to the `netmasks` database so that the DHCP server being served by the BOOTP relay agents can identify the subnet mask of the foreign BOOTP/DHCP client's network. See `netmasks(4)` for the format and use of this database.

`-t dhcptab_rescan_interval`

Specifies the interval in minutes that the DHCP server should use to schedule the automatic rereading of the `dhcptab` information. Typically, you would use this option if the changes to the `dhcptab` are relatively frequent. Once the contents of the `dhcptab` have stabilized, you can turn off this option to avoid needless reinitialization of the server.

`-v`

Verbose mode. The daemon displays more messages than in the default mode. Note that verbose mode can reduce daemon efficiency due to the time taken to display messages. Messages are displayed to the current TTY if the debugging option is used; otherwise, messages are logged to the `syslogd` facility. This option can be used in both DHCP/BOOTP server mode and BOOTP relay agent mode.

EXAMPLES**EXAMPLE 1** Starting a DHCP Server in BOOTP Compatibility Mode

The following command starts a DHCP server in BOOTP compatibility mode, permitting the server to automatically allocate permanent IP addresses to BOOTP clients which are not registered in the server's table; limits the server's attention to incoming datagrams on network devices `le2` and `tr0`; drops BOOTP packets whose hop count exceeds 2; configures the DHCP server to cache extended DHCP offers for 15 seconds; and schedules `dhcptab` rescans to occur every 10 minutes:

```
# in.dhcpd -i le2,tr0 -h 2 -o 15 -t 10 -b automatic
```

EXAMPLE 2 Starting the Daemon in BOOTP Relay Agent Mode

The following command starts the daemon in BOOTP relay agent mode, registering the hosts `bladerunner` and `10.0.0.5` as relay destinations, with debugging and verbose modes enabled, and drops BOOTP packets whose hop count exceeds 5:

```
# in.dhcpd -d -v -h 5 -r bladerunner,10.0.0.5
```

FILES

```
/etc/inet/dhcpsvc.conf
/etc/init.d/dhcp
/etc/init/hosts
/usr/lib/inet/dhcp/nsu/rfc2136.so.1
```

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWdhcsu
Interface Stability	Evolving

SEE ALSO

`cron(1M)`, `dhcpgmgr(1M)`, `dhtadm(1M)`, `logadm(1M)`, `pntadm(1M)`, `syslogd(1M)`, `syslog(3C)`, `dhcpsvc.conf(4)`, `dhcp_network(4)`, `dhcptab(4)`, `ethers(4)`, `hosts(4)`, `netmasks(4)`, `nsswitch.conf(4)`, `attributes(5)`, `dhcp(5)`

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Alexander, S., and R. Droms, *DHCP Options and BOOTP Vendor Extensions*, RFC 2132, Silicon Graphics, Inc., Bucknell University, March 1997.

Droms, R., *Interoperation Between DHCP and BOOTP*, RFC 1534, Bucknell University, October 1993.

Droms, R., *Dynamic Host Configuration Protocol*, RFC 2131, Bucknell University, March 1997.

Wimer, W., *Clarifications and Extensions for the Bootstrap Protocol*, RFC 1542, Carnegie Mellon University, October 1993.

inetd(1M)

NAME	inetd – Internet services daemon		
SYNOPSIS	inetd [-d] [-s] [-t] [-r <i>count interval</i>] [<i>configuration-file</i>]		
DESCRIPTION	inetd is the server process for the Internet standard services. It usually starts up at system boot time. The <i>configuration-file</i> lists the services that inetd is to provide. If no <i>configuration-file</i> is given on the command line, inetd reads the configuration information from the /etc/inetd.conf file. If /etc/inetd.conf is not present, inetd reads the configuration information from /etc/inet/inetd.conf. See inetd.conf(4) for more information on the format of this file. inetd listens for service requests on the TCP or UDP ports associated with each of the services listed in the configuration file. When a request arrives, inetd executes the server program associated with the service. A service can be configured to have "wait" wait-status, in which case, inetd waits for the server process to exit before starting a second server process. RPC services can also be started by inetd. inetd provides a number of simple Internet services internally. These include echo, discard, chargen (character generator), daytime (human-readable time), and time (machine-readable time, in the form of the number of seconds since midnight, January 1, 1900). inetd reads the <i>configuration-file</i> and the default settings in /etc/default/inetd once when it starts up and rereads them again whenever it receives a hangup signal, SIGHUP. New services can be activated and existing services can be deleted or modified by editing the <i>configuration-file</i> and then sending inetd a SIGHUP signal. After it receives the SIGHUP signal, inetd reads the <i>configuration-file</i> and, for each service listed, attempts to bind() to that service's port. The attempt might fail if another standalone server or "wait" wait-status server started by inetd is already listening on the same port. Such a server has to be killed before inetd can bind to the service's port. inetd defers implementing a newly read configuration for a service whose port is busy and periodically attempts to start listening, after logging an error on console. The retry interval is currently 10 minutes. If you want a "wait" wait-status server that is started by inetd to be controlled by that daemon following a kill and restart of inetd, you must do one of the following: ■ Kill the server before restarting inetd. ■ Restart inetd, kill the server, and wait till the retry interval elapses. After this time, inetd attempts to restart the server upon the next request for service. The /etc/default/inetd file contains the following default parameter settings. See FILES. <table> <tr> <td>ENABLE_CONNECTION_LOGGING</td><td>Specifies whether incoming TCP connections are traced. The value ENABLE_CONNECTION_LOGGING=YES is equivalent to the -t command-line option.</td></tr> </table>	ENABLE_CONNECTION_LOGGING	Specifies whether incoming TCP connections are traced. The value ENABLE_CONNECTION_LOGGING=YES is equivalent to the -t command-line option.
ENABLE_CONNECTION_LOGGING	Specifies whether incoming TCP connections are traced. The value ENABLE_CONNECTION_LOGGING=YES is equivalent to the -t command-line option.		

ENABLE_TCPWRAPPERS

The default value for
ENABLE_CONNECTION_LOGGING is NO.

Specifies the TCP wrappers facility will be used to control access to TCP services. The value YES enables checking. The default value for ENABLE_TCPWRAPPERS is NO. If the ENABLE_TCPWRAPPERS parameter is turned on, then all “streams, nowait” services will be automatically wrapped by the TCP wrappers facility. The syslog facility code daemon is used to log allowed connections (using the notice severity level) and denied traffic (using the warning severity level). See `syslog.conf(4)` for a description of syslog codes and severity levels. The stability level of the TCP wrappers facility and its configuration files is External. As the TCP wrappers facility is not controlled by Sun, intrarelease incompatibilities are not uncommon. See `attributes(5)`.

For more information about configuring TCP wrappers, you can refer to the following man pages, which are delivered as part of Solaris at `/usr/sfw/man: tcpd(1M)`, `hosts_access(4)`.

OPTIONS

- d Runs `inetd` in the foreground and enables debugging output.
- s Allows you to run `inetd` “stand-alone” outside the Service Access Facility (SAF). If the `-s` option is omitted, `inetd` will attempt to contact the service access controller (SAC) and will exit if SAC is not already running. See `sac(1M)`.
- t Instructs `inetd` to trace the incoming connections for all of its TCP services. It does this by logging the client’s IP address and TCP port number, along with the name of the service, using the `syslog(3C)` facility. “Wait” wait-status services cannot be traced. When tracing is enabled, `inetd` uses the syslog facility code daemon and notice priority level. This logging is separate from the logging done by the TCP wrappers facility. See `FILES`.
- r Allows `inetd` to detect and then suspend “broken” wait services servers and connectionless datagram services servers, for example, UDP and RPC/CLTS. Without this detection, a buggy server that fails before consuming the service request is continuously restarted and taxes system resources too much. The `-r` flag has the form:

`-r count interval`

inetd(1M)

count and *interval* are decimal numbers that represent the maximum *count* of invocations per *interval* of seconds a service can be started before the service is considered “broken.”

After being considered “broken,” a server is suspended for ten minutes. After ten minutes, *inetd* again enables service, trusting the server to operate correctly.

If the *-r* flag is not specified, *inetd* considers *-r40 60* to be specified.

OPERANDS	<i>configuration-file</i>	Lists the services <i>inetd</i> is to provide.			
EXIT STATUS	<i>inetd</i> does not return an exit status.				
FILES	<i>/etc/default/inetd</i>	Contains default settings. <i>inetd</i> reads the <i>configuration-file</i> and the default settings in <i>/etc/default/inetd</i> once when it starts up and rereads them again whenever it receives a hangup signal, <i>SIGHUP</i> . You can override some of the settings by command-line options.			
ATTRIBUTES	See <i>attributes(5)</i> for descriptions of the following attributes:				
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<i>in.ftpd(1M)</i>, <i>in.rexecd(1M)</i>, <i>in.rshd(1M)</i>, <i>in.tftpd(1M)</i>, <i>sac(1M)</i>, <i>syslog(3C)</i>, <i>inetd.conf(4)</i>, <i>syslog.conf(4)</i>, <i>attributes(5)</i> Postel, Jon. <i>RFC 862: Echo Protocol</i>. Network Information Center, SRI International, Menlo Park, CA, May 1983. Postel, Jon. <i>RFC 863: Discard Protocol</i>. Network Information Center, SRI International, Menlo Park, CA, May 1983. Postel, Jon. <i>RFC 864: Character Generator Protocol</i>. Network Information Center, SRI International, Menlo Park, CA, May 1983. Postel, Jon. <i>RFC 867: Daytime Protocol</i>. Network Information Center, SRI International, Menlo Park, CA, May 1983. Postel, Jon, and Ken Harrenstien. <i>RFC 868: Time Protocol</i>. Network Information Center, SRI International, Menlo Park, CA, May 1983. The following man pages are delivered as part of the <i>SUNWtcpd</i> package: <i>tcpd(1M)</i>, <i>hosts_access(4)</i>				

WARNINGS	Do not configure <code>udp</code> services as <code>nowait</code>. This can cause a race condition where the <code>inetd</code> program selects on the socket and the server program reads from the socket. Many server programs will fork and performance will be severely compromised. If you kill and restart <code>inetd</code>, be aware that any environment variables in your shell are inherited by a shell for an incoming <code>telnet</code> session. For example, if you have <code>USER=root</code> in your environment, a user who connects to your machine with <code>telnet</code> inherits <code>USER=root</code>.
NOTES	For RPC services, <code>inetd</code> listens on all the transports, not only <code>tcp</code> and <code>udp</code>, as specified for each service in the <code>inetd.conf(4)</code> file.

in.fingerd(1M)

NAME	in.fingerd, fingerd – remote user information server										
SYNOPSIS	/usr/sbin/in.fingerd										
DESCRIPTION	fingerd implements the server side of the Name/Finger protocol, specified in <i>RFC 742</i>. The Name/Finger protocol provides a remote interface to programs which display information on system status and individual users. The protocol imposes little structure on the format of the exchange between client and server. The client provides a single command line to the finger server which returns a printable reply. fingerd waits for connections on TCP port 79. Once connected, it reads a single command line terminated by RETURN-LINEFEED and passes the arguments to <code>finger(1)</code>, prepended with <code>-s</code>. <code>fingerd</code> closes its connections as soon as the output is finished. You must invoke <code>fingerd</code> from <code>inetd</code>. See <code>inetd(1M)</code> for more information.										
FILES	<table><tr><td><code>/var/adm/utmpx</code></td><td>User and accounting information.</td></tr><tr><td><code>/etc/passwd</code></td><td>System password file.</td></tr><tr><td><code>/var/adm/lastlog</code></td><td>Last login times.</td></tr><tr><td><code>\$HOME/.plan</code></td><td>User's plans.</td></tr><tr><td><code>\$HOME/.project</code></td><td>User's projects.</td></tr></table>	<code>/var/adm/utmpx</code>	User and accounting information.	<code>/etc/passwd</code>	System password file.	<code>/var/adm/lastlog</code>	Last login times.	<code>\$HOME/.plan</code>	User's plans.	<code>\$HOME/.project</code>	User's projects.
<code>/var/adm/utmpx</code>	User and accounting information.										
<code>/etc/passwd</code>	System password file.										
<code>/var/adm/lastlog</code>	Last login times.										
<code>\$HOME/.plan</code>	User's plans.										
<code>\$HOME/.project</code>	User's projects.										
USAGE	<code>fingerd</code> and <code>in.fingerd</code> are IPv6-enabled. See <code>ip6(7P)</code> .										
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWrcmds</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWrcmds						
ATTRIBUTE TYPE	ATTRIBUTE VALUE										
Availability	SUNWrcmds										
SEE ALSO	<code>finger(1)</code>, <code>inetd(1M)</code>, <code>inetd.conf(4)</code>, <code>attributes(5)</code>, <code>ip6(7P)</code> Harrenstien, Ken, <i>RFC 742, NAME/FINGER</i>, Network Information Center, SRI International, Menlo Park, Calif., December 1977.										
NOTES	Connecting directly to the server from a TIP or an equally narrow-minded TELNET-protocol user program can result in meaningless attempts at option negotiation being sent to the server, which will foul up the command line interpretation. <code>fingerd</code> should be taught to filter out IAC's and perhaps even respond negatively (IAC will not) to all option commands received.										

NAME	infocmp – compare or print out terminfo descriptions
SYNOPSIS	<pre> /usr/bin/infocmp [-d] [-c] [-n] [-I] [-L] [-C] [-r] [-u] [-s d i l c] [-v] [-V] [-1] [-w width] [-A directory] [-B directory] [termname...] </pre>
DESCRIPTION	infocmp compares a binary terminfo entry with other terminfo entries, rewrites a terminfo description to take advantage of the use= terminfo field, or prints out a terminfo description from the binary file (<i>term</i>) in a variety of formats. It displays boolean fields first, then numeric fields, followed by the string fields. If no options are specified and zero, or one <i>termname</i> is specified, the -I option is assumed. If more than one <i>termname</i> is specified, the -d option is assumed.
OPTIONS	The -d , -c , and -n options can be used for comparisons. infocmp compares the terminfo description of the first terminal <i>termname</i> with each of the descriptions given by the entries for the other terminal's <i>termname</i>. If a capability is defined for only one of the terminals, the value returned will depend on the type of the capability: F for boolean variables, -1 for integer variables, and NULL for string variables. -d Produce a list of each capability that is different between two entries. This option is useful to show the difference between two entries, created by different people, for the same or similar terminals. -c Produce a list of each capability that is common between two entries. Capabilities that are not set are ignored. This option can be used as a quick check to see if the -u option is worth using. -n Produce a list of each capability that is in neither entry. If no <i>termname</i> is given, the environment variable TERM will be used for both of the <i>termnames</i>. This can be used as a quick check to see if anything was left out of a description. The -I , -L , and -C options will produce a source listing for each terminal named. -I Use the terminfo names. -L Use the long C variable name listed in < term.h >. -C Use the termcap names. The source produced by the -C option may be used directly as a termcap entry, but not all of the parameterized strings may be changed to the termcap format. infocmp will attempt to convert most of the parameterized information, but anything not converted will be plainly marked in the output and commented out. These should be edited by hand. -r When using -C , put out all capabilities in termcap form. If no <i>termname</i> is given, the environment variable TERM will be used for the terminal name.

infocmp(1M)

All padding information for strings will be collected together and placed at the beginning of the string where `termcap` expects it. Mandatory padding (padding information with a trailing `'/'`) will become optional.

All `termcap` variables no longer supported by `terminfo`, but are derivable from other `terminfo` variables, will be displayed. Not all `terminfo` capabilities will be translated; only those variables which were part of `termcap` will normally be displayed. Specifying the `-r` option will take off this restriction, allowing all capabilities to be displayed in `termcap` form.

Note that because padding is collected to the beginning of the capability, not all capabilities are displayed. Mandatory padding is not supported. Because `termcap` strings are not as flexible, it is not always possible to convert a `terminfo` string capability into an equivalent `termcap` format. A subsequent conversion of the `termcap` file back into `terminfo` format will not necessarily reproduce the original `terminfo` source.

Some common `terminfo` parameter sequences, their `termcap` equivalents, and some terminal types which commonly have such sequences, are:

<code>terminfo</code>	<code>termcap</code>	Representative Terminals
<code>%p1%c</code>	<code>%. adm</code>	
<code>%p1%d</code>	<code>%d hp, ANSI standard, vt100</code>	
<code>%p1%'x'%'%+c</code>	<code>%+x concept</code>	
<code>%i %i</code>	<code>ANSI standard, vt100</code>	
<code>%p1%?'x'%'>%t%p1%'y'%'%+%;</code>	<code>%>xy concept</code>	
<code>%p2 is printed before %p1</code>	<code>%r hp</code>	

`-u` Produce a `terminfo` source description of the first terminal *termname* which is relative to the sum of the descriptions given by the entries for the other terminals' *termnames*. It does this by analyzing the differences between the first *termname* and the other *termnames* and producing a description with `use=` fields for the other terminals. In this manner, it is possible to retrofit generic `terminfo` entries into a terminal's description. Or, if two similar terminals exist, but were coded at different times, or by different people so that each description is a full description, using `infocmp` will show what can be done to change one description to be relative to the other.

A capability is displayed with an at-sign (`@`) if it no longer exists in the first *termname*, but one of the other *termname* entries contains a value for it. A capability's value is displayed if the value in the first *termname* is not found in any of the other *termname* entries, or if the first of the other *termname* entries that has this capability gives a different value for that capability.

The order of the other *termname* entries is significant. Since the *terminfo* compiler *tic* does a left-to-right scan of the capabilities, specifying two *use=* entries that contain differing entries for the same capabilities will produce different results, depending on the order in which the entries are given. *infocmp* will flag any such inconsistencies between the other *termname* entries as they are found.

Alternatively, specifying a capability *after* a *use=* entry that contains, it will cause the second specification to be ignored. Using *infocmp* to recreate a description can be a useful check to make sure that everything was specified correctly in the original source description.

Another error that does not cause incorrect compiled files, but will slow down the compilation time, is specifying superfluous *use=* fields. *infocmp* will flag any superfluous *use=* fields.

- s Sorts the fields within each type according to the argument below:
 - d Leave fields in the order that they are stored in the *terminfo* database.
 - i Sort by *terminfo* name.
 - l Sort by the long C variable name.
 - c Sort by the *termcap* name.

If the -s option is not given, the fields are sorted alphabetically by the *terminfo* name within each type, except in the case of the -C or the -L options, which cause the sorting to be done by the *termcap* name or the long C variable name, respectively.
- v Print out tracing information on standard error as the program runs.
- V Print out the version of the program in use on standard error and exit.
- l Print the fields one to a line. Otherwise, the fields are printed several to a line to a maximum width of 60 characters.
- width Changes the output to *width* characters.

The location of the compiled *terminfo* database is taken from the environment variable *TERMINFO*. If the variable is not defined, or the terminal is not found in that location, the system *terminfo* database, usually in */usr/share/lib/terminfo*, is used. The options -A and -B may be used to override this location.

- A *directory* Set *TERMINFO* for the first *termname*.
- B *directory* Set *TERMINFO* for the other *termnames*. With this, it is possible to compare descriptions for a terminal with the same name located in two different databases. This is useful for comparing descriptions for the same terminal created by different people.

infocmp(1M)

FILES /usr/share/lib/terminfo/?/* Compiled terminal description database.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO captainfo(1M), tic(1M), curses(3CURSES), terminfo(4), attributes(5)

NAME	in.ftpd, ftpd – File Transfer Protocol Server																				
SYNOPSIS	in.ftpd [-A] [-a] [-d] [-I] [-i] [-L] [-l] [-o] [-P <i>dataport</i>] [-p <i>ctrlport</i>] [-Q] [-q] [-r <i>rootdir</i>] [-S] [-s] [-T <i>maxtimeout</i>] [-t <i>timeout</i>] [-u <i>umask</i>] [-V] [-v] [-W] [-w] [-X]																				
DESCRIPTION	in.ftpd is the Internet File Transfer Protocol (FTP) server process. The server may be invoked by the Internet daemon inetd(1M) each time a connection to the FTP service is made or run as a standalone server. See <i>services(4)</i> .																				
OPTIONS	in.ftpd supports the following options: <table> <tr> <td>-A</td><td>Disable use of the <i>ftppaccess(4)</i> file. Use of <i>ftppaccess</i> is disabled by default.</td></tr> <tr> <td>-a</td><td>Enable use of the <i>ftppaccess(4)</i> file.</td></tr> <tr> <td>-d</td><td>Write debugging information to <i>syslogd(1M)</i>.</td></tr> <tr> <td>-I</td><td>Disable the use of <i>AUTH</i> and <i>ident</i> to determine the username on the client. See <i>RFC 931</i>. The FTP Server is built not to use <i>AUTH</i> and <i>ident</i>.</td></tr> <tr> <td>-i</td><td>Log the names of all files received by the FTP Server to <i>xferlog(4)</i>. You can override the <i>-i</i> option through use of the <i>ftppaccess(4)</i> file.</td></tr> <tr> <td>-L</td><td>Log all commands sent to in.ftpd to <i>syslogd(1M)</i>. When the <i>-L</i> option is used, command logging will be on by default, once the FTP Server is invoked. Because the FTP Server includes <i>USER</i> commands in those logged, if a user accidentally enters a password instead of the username, the password will be logged. You can override the <i>-L</i> option through use of the <i>ftppaccess(4)</i> file.</td></tr> <tr> <td>-l</td><td>Log each FTP session to <i>syslogd(1M)</i>.</td></tr> <tr> <td>-o</td><td>Log the names of all files transmitted by the FTP Server to <i>xferlog(4)</i>. You can override the <i>-o</i> option through use of the <i>ftppaccess(4)</i> file.</td></tr> <tr> <td>-P <i>dataport</i></td><td>The FTP Server determines the port number by looking in the <i>services(4)</i> file for an entry for the <i>ftp-data</i> service. If there is no entry, the daemon uses the port just prior to the control connection port. Use the <i>-P</i> option to specify the data port number.</td></tr> <tr> <td>-p <i>ctrlport</i></td><td>When run in standalone mode, the FTP Server determines the control port number by looking in the <i>services(4)</i> file for an entry for the <i>ftp</i> service. Use the <i>-p</i> option to specify the control port number.</td></tr> </table>	-A	Disable use of the <i>ftppaccess(4)</i> file. Use of <i>ftppaccess</i> is disabled by default.	-a	Enable use of the <i>ftppaccess(4)</i> file.	-d	Write debugging information to <i>syslogd(1M)</i> .	-I	Disable the use of <i>AUTH</i> and <i>ident</i> to determine the username on the client. See <i>RFC 931</i> . The FTP Server is built not to use <i>AUTH</i> and <i>ident</i> .	-i	Log the names of all files received by the FTP Server to <i>xferlog(4)</i> . You can override the <i>-i</i> option through use of the <i>ftppaccess(4)</i> file.	-L	Log all commands sent to in.ftpd to <i>syslogd(1M)</i> . When the <i>-L</i> option is used, command logging will be on by default, once the FTP Server is invoked. Because the FTP Server includes <i>USER</i> commands in those logged, if a user accidentally enters a password instead of the username, the password will be logged. You can override the <i>-L</i> option through use of the <i>ftppaccess(4)</i> file.	-l	Log each FTP session to <i>syslogd(1M)</i> .	-o	Log the names of all files transmitted by the FTP Server to <i>xferlog(4)</i> . You can override the <i>-o</i> option through use of the <i>ftppaccess(4)</i> file.	-P <i>dataport</i>	The FTP Server determines the port number by looking in the <i>services(4)</i> file for an entry for the <i>ftp-data</i> service. If there is no entry, the daemon uses the port just prior to the control connection port. Use the <i>-P</i> option to specify the data port number.	-p <i>ctrlport</i>	When run in standalone mode, the FTP Server determines the control port number by looking in the <i>services(4)</i> file for an entry for the <i>ftp</i> service. Use the <i>-p</i> option to specify the control port number.
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-Q	Disable PID files. This disables user limits. Large, busy sites that do not want to impose limits on the number of concurrent users can use this option to disable PID files.
-q	Use PID files. The <code>limit</code> directive uses PID files to determine the number of current users in each access class. By default, PID files are used.
-r <i>rootdir</i>	<code>chroot(2)</code> to <i>rootdir</i> upon loading. Use this option to improve system security. It limits the files that can be damaged should a break in occur through the daemon. This option is similar to anonymous FTP. Additional files are needed, which vary from system to system.
-S	Place the daemon in standalone operation mode. The daemon runs in the background. This is useful for startup scripts that run during system initialization. See <code>init.d(4)</code> .
-s	Place the daemon in standalone operation mode. The daemon runs in the foreground. This is useful when run from <code>/etc/inittab</code> by <code>init(1M)</code> .
-T <i>maxtimeout</i>	Set the maximum allowable timeout period to <i>maxtimeout</i> seconds. The default maximum timeout limit is 7200 second (two hours). You can override the <code>-T</code> option through use of the <code>ftpaccess(4)</code> file.
-t <i>timeout</i>	Set the inactivity timeout period to <i>timeout</i> seconds. The default timeout period is 900 seconds (15 minutes). You can override the <code>-t</code> option through use of the <code>ftpaccess(4)</code> file.
-u <i>umask</i>	Set the default umask to <i>umask</i> .
-V	Display copyright and version information, then terminate.
-v	Write debugging information to <code>syslogd(1M)</code> .
-W	Do not record user login and logout in the <code>wtmpx(4)</code> file.
-w	Record each user login and logout in the <code>wtmpx(4)</code> file. By default, logins and logouts are recorded.
-X	Write the output from the <code>-i</code> and <code>-o</code> options to the <code>syslogd(1M)</code> file instead of <code>xferlog(4)</code> . This allows the collection of output from several hosts on one central loghost. You can override the <code>-X</code> option through use of the <code>ftpaccess(4)</code> file.
Requests	The FTP Server currently supports the following FTP requests; case is not distinguished. ABOR Abort previous command. ALLO Allocate storage (vacuously).

APPE	Append to a file.
CDUP	Change to parent of current working directory.
CWD	Change working directory.
DELE	Delete a file.
EPRT	Specify extended address for the transport connection.
EPSV	Extended passive command request.
HELP	Give help information.
LIST	Give list files in a directory (ls -lA).
LPRT	Specify long address for the transport connection.
LPSV	Long passive command request.
MKD	Make a directory.
MDTM	Show last time file modified.
MODE	Specify data transfer <i>mode</i> .
NLST	Give name list of files in directory (ls).
NOOP	Do nothing.
PASS	Specify password.
PASV	Prepare for server-to-server transfer.
PORT	Specify data connection port.
PWD	Print the current working directory.
QUIT	Terminate session.
REST	Restart incomplete transfer.
RETR	Retrieve a file.
RMD	Remove a directory.
RNFR	Specify rename-from file name.
RNTO	Specify rename-to file name.
SITE	Use nonstandard commands.
SIZE	Return size of file.
STAT	Return status of server.
STOR	Store a file.
STOU	Store a file with a unique name.
STRU	Specify data transfer <i>structure</i> .

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SYST	Show operating system type of server system.
TYPE	Specify data transfer type.
USER	Specify user name.
XCUP	Change to parent of current working directory. This request is deprecated.
XCWD	Change working directory. This request is deprecated.
XMKD	Make a directory. This request is deprecated.
XPWD	Print the current working directory. This request is deprecated.
XRMD	Remove a directory. This request is deprecated.

The following nonstandard or UNIX specific commands are supported by the SITE request:

ALIAS	List aliases.
CDPATH	List the search path used when changing directories.
CHECKMETHOD	Get or set the checksum method.
CHECKSUM	Give the checksum of a file.
CHMOD	Change mode of a file. For example, SITE CHMOD 755 <i>filename</i> .
EXEC	Execute a program. For example, SITE EXEC program params
GPASS	Give special group access password. For example, SITE GPASS bar.
GROUP	Request special group access. For example, SITE GROUP foo.
GROUPS	List supplementary group membership.
HELP	Give help information. For example, SITE HELP.
IDLE	Set idle-timer. For example, SITE IDLE 60.
UMASK	Change umask. For example, SITE UMASK 002.

The remaining FTP requests specified in *RFC 959* are recognized, but not implemented.

The FTP server will abort an active file transfer only when the ABOR command is preceded by a Telnet "Interrupt Process" (IP) signal and a Telnet "Synch" signal in the command Telnet stream, as described in *RFC 959*. If a STAT command is received during a data transfer that has been preceded by a Telnet IP and Synch, transfer status will be returned.

in.ftpd interprets file names according to the "globbing" conventions used by csh(1). This allows users to utilize the metacharacters: * ? [] { } ~

in.ftpd authenticates users according to four rules.

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First, the user name must be in the password data base, `/etc/passwd`. The password must not be null. A password must always be provided by the client before any file operations may be performed. The PAM framework is used to verify that the correct password was entered. See `SECURITY` below.

Second, the user name must not appear in either the `/etc/ftpusers` or the `/etc/ftpd/ftpusers` file. Use of the `/etc/ftpusers` files is deprecated, although it is still supported.

Third, the user must have a standard shell returned by `getusershell(3C)`.

Fourth, if the user name is `anonymous` or `ftp`, an anonymous ftp account must be present in the password file for user `ftp`. Use `ftpconfig(1M)` to create the anonymous ftp account and home directory tree.

The FTP Server supports virtual hosting, which can be configured by using `ftppaddhost(1M)`.

The FTP Server does not support sublogins.

General FTP Extensions

The FTP Server has certain extensions. If the user specifies a filename that does not exist with a `RETR` (retrieve) command, the FTP Server looks for a conversion to change a file or directory that does into the one requested. See `ftpconversions(4)`.

By convention, anonymous users supply their email address when prompted for a password. The FTP Server attempts to validate these email addresses. A user whose FTP client hangs on a long reply, for example, a multiline response, should use a dash (-) as the first character of the user's password, as this disables the Server's `lreply()` function.

The FTP Server can also log all file transmission and reception. See `xferlog(4)` for details of the log file format.

The `SITE EXEC` command may be used to execute commands in the `/bin/ftp-exec` directory. Take care that you understand the security implications before copying any command into the `/bin/ftp-exec` directory. For example, do not copy in `/bin/sh`. This would enable the user to execute other commands through the use of `sh -c`. If you have doubts about this feature, do not create the `/bin/ftp-exec` directory.

SECURITY

`in.ftpd` uses `pam(3PAM)` for authentication, account management, and session management. The PAM configuration policy, listed through `/etc/pam.conf`, specifies the module to be used for `in.ftpd`. Here is a partial `pam.conf` file with entries for the `in.ftpd` command using the UNIX authentication, account management, and session management module.

```
ftp  auth      requisite    pam_authtok_get.so.1
ftp  auth      required    pam_dhkeys.so.1
ftp  auth      required    pam_unix_auth.so.1
```

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```
ftp account      required pam_unix_roles.so.1
ftp account      required pam_unix_projects.so.1
ftp account      required pam_unix_account.so.1

ftp session      required pam_unix_session.so.1
```

If there are no entries for the `ftp` service, then the entries for the "other" service will be used. Unlike `login`, `passwd`, and other commands, the `ftp` protocol will only support a single password. Using multiple modules will prevent `in.ftpd` from working properly.

USAGE The `in.ftpd` command is IPv6-enabled. See `ip6(7P)`.

FILES

<code>/etc/ftpd/ftpaccess</code>	FTP Server configuration file
<code>/etc/ftpd/ftpconversions</code>	FTP Server conversions database
<code>/etc/ftpd/ftpgroups</code>	FTP Server enhanced group access file
<code>/etc/ftpd/ftphosts</code>	FTP Server individual user host access file
<code>/etc/ftpd/ftpservers</code>	FTP Server virtual hosting configuration file.
<code>/etc/ftpd/ftpusers</code>	File listing users for whom FTP login privileges are disallowed.
<code>/etc/ftpusers</code>	File listing users for whom FTP login privileges are disallowed. This use of this file is deprecated.
<code>/var/log/xferlog</code>	FTP Server transfer log file
<code>/var/run/ftp.pids-<i>classname</i></code>	
<code>/var/adm/wtmpx</code>	Extended database files that contain the history of user access and accounting information for the <code>wtmpx</code> database.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWftpu

SEE ALSO `csh(1)`, `ftp(1)`, `ftpcount(1)`, `ftpwho(1)`, `ls(1)`, `ftpaddhost(1M)`, `ftpconfig(1M)`, `ftprestart(1M)`, `ftpshut(1M)`, `inetd(1M)`, `syslogd(1M)`, `chroot(2)`, `umask(2)`, `getpwent(3C)`, `getusershell(3C)`, `syslog(3C)`, `ftpaccess(4)`, `ftpconversions(4)`, `ftpgroups(4)`, `ftphosts(4)`, `ftpservers(4)`, `ftpusers(4)`, `group(4)`, `passwd(4)`, `services(4)`, `xferlog(4)`, `wtmpx(4)`, `attributes(5)`,

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pam_authtok_check(5), pam_authtok_get(5), pam_authtok_store(5),
pam_dhkeys(5), pam_passwd_auth(5), pam_unix_account(5),
pam_unix_auth(5), pam_unix_session(5)ip6(7P)

Allman, M., Ostermann, S., and Metz, C. *RFC 2428, FTP Extensions for IPv6 and NATs*. The Internet Society. September 1998.

Piscitello, D. *RFC 1639, FTP Operation Over Big Address Records (FOOBAR)*. Network Working Group. June 1994.

Postel, Jon, and Joyce Reynolds. *RFC 959, File Transfer Protocol (FTP)*. Network Information Center. October 1985.

St. Johns, Mike. *RFC 931, Authentication Server*. Network Working Group. January 1985.

DIAGNOSTICS

in.ftpd logs various errors to syslogd(1M), with a facility code of daemon.

NOTES

The anonymous FTP account is inherently dangerous and should be avoided when possible.

The FTP Server must perform certain tasks as the superuser, for example, the creation of sockets with privileged port numbers. It maintains an effective user ID of the logged in user, reverting to the superuser only when necessary.

The FTP Server no longer supports the `/etc/default/ftpd` file. Instead of using `UMASK=nnn` to set the umask, use the `defumask` capability in the `ftppaccess` file. The banner greeting text capability is also now set through the `ftppaccess` file by using the greeting text capability instead of by using `BANNER=" . . "`. However, unlike the `BANNER` string, the greeting text string is not passed to the shell for evaluation. See `ftppaccess(4)`.

The `pam_unix(5)` module is no longer supported. Similar functionality is provided by `pam_authtok_check(5)`, `pam_authtok_get(5)`, `pam_authtok_store(5)`, `pam_dhkeys(5)`, `pam_passwd_auth(5)`, `pam_unix_account(5)`, `pam_unix_auth(5)`, and `pam_unix_session(5)`.

in.iked(1M)

NAME	in.iked – daemon for the Internet Key Exchange (IKE)										
SYNOPSIS	<pre>/usr/lib/inet/in.iked [-d] [-f <i>filename</i>] [-p <i>level</i>] /usr/lib/inet/in.iked -c [-f <i>filename</i>]</pre>										
DESCRIPTION	in.iked performs automated key management for IPsec using the Internet Key Exchange (IKE) protocol. in.iked implements the following: ■ IKE authentication with either pre-shared keys, DSS signatures, RSA signatures, or RSA encryption. ■ Diffie-Hellman key derivation using either 768, 1024, or 1536-bit public key moduli. ■ Authentication protection with cipher choices of DES, Blowfish, or 3DES, and hash choices of either HMAC-MD5 or HMAC-SHA-1. Encryption in in.iked is limited to the IKE authentication and key exchange. See ipsecesp(7P) for information regarding IPsec protection choices. in.iked starts at boot time if the /etc/inet/ike/config file exists. See ike.config(4) for the format of this file. in.iked listens for incoming IKE requests from the network and for requests for outbound traffic using the PF_KEY socket. See pf_key(7P). in.iked has two support programs that are used for IKE administration and diagnosis: ikeadm(1M) and ikecert(1M). The SIGHUP signal causes the IKE daemon to read /etc/inet/ike/config and reload the certificate database. SIGHUP is equivalent to using ikeadm(1M) to read the /etc/inet/ike/config file as a rule, for example: <pre>example# ikeadm read rule /etc/inet/ike/config</pre>										
OPTIONS	The following options are supported: <table><tr><td>-c</td><td>Check the syntax of a configuration file.</td></tr><tr><td>-d</td><td>Use debug mode. The process stays attached to the controlling terminal and produces large amounts of debugging output.</td></tr><tr><td>-f <i>filename</i></td><td>Use <i>filename</i> instead of /etc/inet/ike/config. See ike.config(4) for the format of this file.</td></tr><tr><td>-p <i>level</i></td><td>Specify privilege level (<i>level</i>). This option sets how much ikeadm(1M) invocations can change or observe about the running in.iked.</td></tr></table> Valid <i>levels</i> are: <table><tr><td>0</td><td>Base level</td></tr></table>	-c	Check the syntax of a configuration file.	-d	Use debug mode. The process stays attached to the controlling terminal and produces large amounts of debugging output.	-f <i>filename</i>	Use <i>filename</i> instead of /etc/inet/ike/config. See ike.config(4) for the format of this file.	-p <i>level</i>	Specify privilege level (<i>level</i>). This option sets how much ikeadm(1M) invocations can change or observe about the running in.iked.	0	Base level
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0	Base level										

1 Access to preshared key info

2 Access to keying material

If `-p` is not specified, *level* defaults to 0.

SECURITY This program has sensitive private keying information in its image. Care should be taken with any core dumps or system dumps of a running `in.iked` daemon, as these files contain sensitive keying information. Use the `coreadm(1M)` command to limit any corefiles produced by `in.iked`.

FILES `/etc/inet/ike/config`
`/etc/inet/secret/ike.privatekeys/*`
 Private keys. A private key *must* have a matching public-key certificate with the same filename in `/etc/inet/ike/publickeys/`.
`/etc/inet/ike/publickeys/*`
 Public-key certificates. The names are only important with regard to matching private key names.
`/etc/inet/ike/crls/*`
 Public key certificate revocation lists.
`/etc/inet/secret/ike.preshared`
 IKE pre-shared secrets for Phase I authentication.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `coreadm(1M)`, `ikeadm(1M)`, `ikecert(1M)`, `ike.config(4)`, `attributes(5)`, `ipsecesp(7P)`

Harkins, Dan and Carrel, Dave. *RFC 2409, Internet Key Exchange (IKE)*. Network Working Group. November 1998.

Maughan, Douglas, Schertler, M., Schneider, M., Turner, J. *RFC 2408, Internet Security Association and Key Management Protocol (ISAKMP)*. Network Working Group. November 1998.

Piper, Derrell, *RFC 2407, The Internet IP Security Domain of Interpretation for ISAKMP*. Network Working Group. November 1998.

init(1M)

NAME	init, telinit – process control initialization								
SYNOPSIS	/sbin/init [0123456abcQqSs] /etc/telinit [0123456abcQqSs]								
DESCRIPTION	init is a general process spawner. Its primary role is to create processes from information stored in the file <code>/etc/inittab</code> .								
Run Level Defined	At any given time, the system is in one of eight possible run levels. A run level is a software configuration under which only a selected group of processes exists. Processes spawned by <code>init</code> for each of these run levels are defined in <code>/etc/inittab</code> . <code>init</code> can be in one of eight run levels, 0–6 and S or s (S and s are identical). The run level changes when a privileged user runs <code>/sbin/init</code> . This sends appropriate signals to the original <code>init</code> spawned by the operating system at boot time, saying which run level to invoke.								
init and System Booting	When the system is booted, <code>init</code> is invoked and the following occurs. First, it reads <code>/etc/default/init</code> to set environment variables. This is typically where TZ (time zone) and locale-related environments such as LANG or LC_CTYPE get set. (See the FILES section at the end of this page.) <code>init</code> then looks in <code>/etc/inittab</code> for the <code>initdefault</code> entry (see <code>inittab(4)</code>). If the <code>initdefault</code> entry: <table><tr><td>exists</td><td><code>init</code> usually uses the run level specified in that entry as the initial run level to enter.</td></tr><tr><td>does not exist</td><td><code>/etc/inittab</code>, <code>init</code> asks the user to enter a run level from the system console.</td></tr><tr><td>S or s</td><td><code>init</code> goes to the single-user state. In this state, the system console device (<code>/dev/console</code>) is opened for reading and writing and the command <code>/sbin/su</code>, (see <code>su(1M)</code>), is invoked. Use either <code>init</code> or <code>telinit</code> to change the run level of the system. Note that if the shell is terminated (using an end-of-file), <code>init</code> only re-initializes to the single-user state if <code>/etc/inittab</code> does not exist.</td></tr><tr><td>0–6</td><td><code>init</code> enters the corresponding run level. Run levels 0, 5, and 6 are reserved states for shutting the system down. Run levels 2, 3, and 4 are available as multi-user operating states.</td></tr></table> If this is the first time since power up that <code>init</code> has entered a run level other than single-user state, <code>init</code> first scans <code>/etc/inittab</code> for <code>boot</code> and <code>bootwait</code> entries (see <code>inittab(4)</code>). These entries are performed before any other processing of <code>/etc/inittab</code> takes place, providing that the run level entered matches that of the	exists	<code>init</code> usually uses the run level specified in that entry as the initial run level to enter.	does not exist	<code>/etc/inittab</code> , <code>init</code> asks the user to enter a run level from the system console.	S or s	<code>init</code> goes to the single-user state. In this state, the system console device (<code>/dev/console</code>) is opened for reading and writing and the command <code>/sbin/su</code> , (see <code>su(1M)</code>), is invoked. Use either <code>init</code> or <code>telinit</code> to change the run level of the system. Note that if the shell is terminated (using an end-of-file), <code>init</code> only re-initializes to the single-user state if <code>/etc/inittab</code> does not exist.	0–6	<code>init</code> enters the corresponding run level. Run levels 0, 5, and 6 are reserved states for shutting the system down. Run levels 2, 3, and 4 are available as multi-user operating states.
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does not exist	<code>/etc/inittab</code> , <code>init</code> asks the user to enter a run level from the system console.								
S or s	<code>init</code> goes to the single-user state. In this state, the system console device (<code>/dev/console</code>) is opened for reading and writing and the command <code>/sbin/su</code> , (see <code>su(1M)</code>), is invoked. Use either <code>init</code> or <code>telinit</code> to change the run level of the system. Note that if the shell is terminated (using an end-of-file), <code>init</code> only re-initializes to the single-user state if <code>/etc/inittab</code> does not exist.								
0–6	<code>init</code> enters the corresponding run level. Run levels 0, 5, and 6 are reserved states for shutting the system down. Run levels 2, 3, and 4 are available as multi-user operating states.								

	entry. In this way any special initialization of the operating system, such as mounting file systems, can take place before users are allowed onto the system. <code>init</code> then scans <code>/etc/inittab</code> and executes all other entries that are to be processed for that run level. To spawn each process in <code>/etc/inittab</code>, <code>init</code> reads each entry and for each entry that should be respawned, it forks a child process. After it has spawned all of the processes specified by <code>/etc/inittab</code>, <code>init</code> waits for one of its descendant processes to die, a powerfail signal, or a signal from another <code>init</code> or <code>telinit</code> process to change the system's run level. When one of these conditions occurs, <code>init</code> re-examines <code>/etc/inittab</code>.
inittab Additions	New entries can be added to <code>/etc/inittab</code> at any time; however, <code>init</code> still waits for one of the above three conditions to occur before re-examining <code>/etc/inittab</code>. To get around this, <code>init Q</code> or <code>init q</code> command wakes <code>init</code> to re-examine <code>/etc/inittab</code> immediately. When <code>init</code> comes up at boot time and whenever the system changes from the single-user state to another run state, <code>init</code> sets the <code>ioctl(2)</code> states of the console to those modes saved in the file <code>/etc/iotcl.syscon</code>. <code>init</code> writes this file whenever the single-user state is entered.
Run Level Changes	When a run level change request is made, <code>init</code> sends the warning signal (<code>SIGTERM</code>) to all processes that are undefined in the target run level. <code>init</code> waits five seconds before forcibly terminating these processes by sending a kill signal (<code>SIGKILL</code>). When <code>init</code> receives a signal telling it that a process it spawned has died, it records the fact and the reason it died in <code>/var/adm/utmpx</code> and <code>/var/adm/wtmpx</code> if it exists (see <code>who(1)</code>). A history of the processes spawned is kept in <code>/var/adm/wtmpx</code>. If <code>init</code> receives a powerfail signal (<code>SIGPWR</code>) it scans <code>/etc/inittab</code> for special entries of the type <code>powerfail</code> and <code>powerwait</code>. These entries are invoked (if the run levels permit) before any further processing takes place. In this way <code>init</code> can perform various cleanup and recording functions during the powerdown of the operating system.
Environment Variables in /etc/defaults/init	You can set default values for environment variables, for such items as timezone and character formatting, in <code>/etc/default/init</code>. See the FILES section, below, for a list of these variables.
telinit	<code>telinit</code>, which is linked to <code>/sbin/init</code>, is used to direct the actions of <code>init</code>. It takes a one-character argument and signals <code>init</code> to take the appropriate action.
SECURITY	<code>init</code> uses <code>pam(3PAM)</code> for session management. The PAM configuration policy, listed through <code>/etc/pam.conf</code>, specifies the session management module to be used for <code>init</code>. Here is a partial <code>pam.conf</code> file with entries for <code>init</code> using the UNIX session management module. <pre>init session required pam_unix_session.so.1</pre>

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	If there are no entries for the <code>init</code> service, then the entries for the "other" service will be used.	
OPTIONS	0	Go into firmware.
	1	Put the system in system administrator mode. All local file systems are mounted. Only a small set of essential kernel processes are left running. This mode is for administrative tasks such as installing optional utility packages. All files are accessible and no users are logged in on the system.
	2	Put the system in multi-user mode. All multi-user environment terminal processes and daemons are spawned. This state is commonly referred to as the multi-user state.
	3	Extend multi-user mode by making local resources available over the network.
	4	Is available to be defined as an alternative multi-user environment configuration. It is not necessary for system operation and is usually not used.
	5	Shut the machine down so that it is safe to remove the power. Have the machine remove power, if possible.
	6	Stop the operating system and reboot to the state defined by the <code>initdefault</code> entry in <code>/etc/inittab</code> .
	a, b, c	process only those <code>/etc/inittab</code> entries having the a, b, or c run level set. These are pseudo-states, which may be defined to run certain commands, but which do not cause the current run level to change.
	Q, q	Re-examine <code>/etc/inittab</code> .
	S, s	Enter single-user mode. This is the only run level that doesn't require the existence of a properly formatted <code>/etc/inittab</code> file. If this file does not exist, then by default, the only legal run level that <code>init</code> can enter is the single-user mode. When in single-user mode, the filesystems required for basic system operation will be mounted. When the system comes down to single-user mode, these file systems will remain mounted (even if provided by a remote file server), and any other local filesystems will also be left mounted. During the transition down to single-user mode, all processes started by <code>init</code> or <code>init.d</code> scripts that should only be running in multi-user mode are killed. In addition, any process that has a <code>utmpx</code> entry will be killed. This last condition insures that all port monitors started by the SAC are killed and all services started by these port monitors, including <code>ttymon</code> login services, are killed.
FILES	<code>/dev/console</code>	System console device.

/etc/default/init	Contains environment variables and their default values. For example, for the timezone variable, TZ, you might specify TZ=US/Pacific. The variables are:
TZ	Either specifies the timezone information (see ctime(3C)) or the name of a timezone information file /usr/share/lib/zoneinfo.
	Refer to the TIMEZONE(4) man page before changing this setting.
CMASK	The mask (see umask(1)) that init uses and that every process inherits from the init process. If not set, init uses the mask it inherits from the kernel. Note that init always attempts to apply a umask of 022 before creating a file, regardless of the setting of CMASK.
LC_CTYPE	Character characterization information.
LC_MESSAGES	Message translation.
LC_MONETARY	Monetary formatting information.
LC_NUMERIC	Numeric formatting information.
LC_TIME	Time formatting information.
LC_ALL	If set, all other LC_* environmental variables take-on this value.
LANG	If LC_ALL is not set, and any particular LC_* is also not set, the value of LANG is used for that particular environmental variable.
/etc/initpipe	A named pipe used for internal communication.
/etc/inittab	Controls process dispatching by init.
/etc/ioctl.syscon	ioctl states of the console, as saved by init when single-user state is entered.
/var/adm/utmpx	User access and administration information.
/var/adm/wtmpx	History of user access and administration information.

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ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

login(1), sh(1), stty(1), who(1), shutdown(1M), su(1M), ttymon(1M), ioctl(2), kill(2), ctime(3C), pam(3PAM), inittab(4), pam.conf(4), TIMEZONE(4), utmpx(4), attributes(5), pam_authtok_check(5), pam_authtok_get(5), pam_authtok_store(5), pam_dhkeys(5), pam_passwd_auth(5), pam_unix(5), pam_unix_account(5), pam_unix_auth(5), pam_unix_session(5), termio(7I)

DIAGNOSTICS

If init finds that it is respawning an entry from /etc/inittab more than ten times in two minutes, assumes that there is an error in the command string in the entry, and generates an error message on the system console. It will then refuse to respawn this entry until either five minutes has elapsed or it receives a signal from a user-spawned init or telinit. This prevents init from eating up system resources when someone makes a typographical error in the inittab file, or a program is removed that is referenced in /etc/inittab.

NOTES

init and telinit can be run only by a privileged user.

The S or s state must not be used indiscriminately in /etc/inittab. When modifying this file, it is best to avoid adding this state to any line other than initdefault.

If a default state is not specified in the initdefault entry in /etc/inittab, state 6 is entered. Consequently, the system will loop by going to firmware and rebooting continuously.

If the utmpx file cannot be created when booting the system, the system will boot to state "s" regardless of the state specified in the initdefault entry in /etc/inittab. This can occur if the /var file system is not accessible.

When a system transitions down to the S or s state, the /etc/nologin file (see nologin(4)) is created. Upon subsequent transition to run level 2, this file is removed by a script in the /etc/rc2.d directory.

init uses /etc/initpipe, a named pipe, for internal communication.

The pam_unix(5) module might not be supported in a future release. Similar functionality is provided by pam_authtok_check(5), pam_authtok_get(5), pam_authtok_store(5), pam_dhkeys(5), pam_passwd_auth(5), pam_unix_account(5), pam_unix_auth(5), and pam_unix_session(5).

NAME	init.wbem – start and stop the CIM Boot Manager
SYNOPSIS	<code>/etc/init.d/init.wbem start stop status</code>
DESCRIPTION	The <code>init.wbem</code> utility is run automatically during installation and each time the system is rebooted. This utility manipulates the CIM Object Manager (CIMOM) and the Solaris Management Console server, both of which run combined in a single process. <code>init.wbem</code> can be used to start, stop, or retrieve status from the server.
CIM Object Manager	The CIM Object Manager manages CIM objects on a WBEM-enabled system. A CIM object is a computer representation, or model, of a managed resource, such as a printer, disk drive, or CPU. CIM objects are stored internally as Java classes. When a WBEM client application accesses information about a CIM object, the CIM Object Manager contacts either the appropriate provider for that object or the CIM Object Manager Repository. Providers are classes that communicate with managed objects to access data. When a WBEM client application requests data from a managed resource that is not available from the CIM Object Manager Repository, the CIM Object Manager forwards the request to the provider for that managed resource. The provider dynamically retrieves the information. At startup, the CIM Object Manager performs the following functions: ■ Listens for RMI connections on RMI port 5987 and for XML/HTTP connections on HTTP port 5988. ■ Sets up a connection to the CIM Object Manager Repository. ■ Waits for incoming requests. During normal operations, the CIM Object Manager performs the following functions: ■ Performs security checks to authenticate user login and authorization to access namespaces. ■ Performs syntactical and semantic checking of CIM data operations to ensure that they comply with the latest CIM Specification. ■ Routes requests to the appropriate provider or to the CIM Object Manager Repository. ■ Delivers data from providers and from the CIM Object Manager Repository to WBEM client applications. A WBEM client application contacts the CIM Object Manager to establish a connection when it needs to perform WBEM operations, such as creating a CIM class or updating a CIM instance. When a WBEM client application connects to a CIM Object Manager, it gets a reference to the CIM Object Manager, which it then uses to request services and operations.

init.wbem(1M)

**Solaris
Management
Console Server**

The Solaris Management Console server is the back end to the front end console, `smc(1M)`. It provides tools for the console to download and performs common services for the console and its tools to use, such as authentication, authorization, logging, messaging, and persistence.

System Booting

The `init.wbem` script is installed in the `/etc/init.d` directory.

OPTIONS

The following options are supported:

<code>start</code>	Starts the CIMOM and Solaris Management Console server on the local host.
<code>stop</code>	Stops the CIMOM and Solaris Management Console server on the local host.
<code>status</code>	Gets the status of the CIMOM and Solaris Management Console server on the local host.

NOTES

When the `init.wbem` script is run, it does not run the CIMOM and Solaris Management Console server directly. The server process is in Java and is too heavyweight to be run immediately at system boot time. Instead, three lightweight processes listen on three different ports that the CIMOM and the Solaris Management Console server normally use. This acts similarly to `inetd(1M)`.

Because Java programs cannot inherit file descriptors as other programs can, there is a small time period from when the first connection is made until the server is fully operational where client connections may be dropped. WBEM clients are immune to this, as they will retry until the server comes online. Solaris Management Console clients are not immune, and it may be necessary to manually reconnect, though this should not happen in the common case.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwbcor

SEE ALSO

`inetd(1M)`, `mofcomp(1M)`, `smc(1M)`, `smcconf(1M)`, `wbemadmin(1M)`, `wbemlogviewer(1M)`, `attributes(5)`

NAME	inityp2l – create NIS (YP) to LDAP configuration files	
SYNOPSIS	/usr/lib/netsvc/yp/inityp2l [-m <i>mapping_file_name</i>] [-c <i>config_file_name</i>]	
DESCRIPTION	The inityp2l utility assists with creation of the NISLDAPmapping and ypserv files. See NISLDAPmapping(4) and ypserv(4). inityp2l examines the NIS maps on a system, and through a dialogue with the user, determines which NIS to (and from) LDAP mappings are required. A NISLDAPmapping file is then created based on this information. The utility asks users about their LDAP server configuration and a ypserv file is created based on this information. The inityp2l utility handles mappings for standard NIS maps and the auto.* series of maps. If requested, it creates default mappings for custom maps, with each map entry represented as a single DIT string. inityp2l does not handle full custom mapping, but if requested, inityp2l will insert comments into the NISLDAPmapping file that indicate where these should be added. To write to the NISLDAPmapping or ypserv files is potentially dangerous. inityp2l warns the user and asks for confirmation before: 1. it overwrites either file 2. it writes to the default NISLDAPmapping file location, if this file did not previously exist. This is important because the existence of a file in this location causes NIS components to work NIS to LDAP (N2L) mode when next restarted, rather than to traditional NIS mode. inityp2l assists with rapid creation of a simple N2L configuration files. It is not a general purpose tool for the management of these files. An advanced user who would like to maintain the files or use custom mappings should examine the output of inityp2l and customize it by using a standard text editor.	
OPTIONS	inityp2l supports the following options: -c Specify the name of the generated ypserv file. The default location is described in FILES. -m Specify the name of the generated NISLDAPmapping file. The default is described in FILES.	
FILES	/var/yp /var/yp/NISLDAPmapping /etc/default/ypserv	The directory to be searched for candidate domains (/var/yp/*) and NIS maps (/var/yp/*/*) The default location for the generated NISLDAPmapping file The default location for the generated ypserv file

inityp2l(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWypu
Interface Stability	Obsolete

SEE ALSO NISLDAPmapping(4), ypserv(4), attributes(5)

NAME	in.lpd – BSD print protocol adaptor				
SYNOPSIS	<code>/usr/lib/print/in.lpd</code>				
DESCRIPTION	in.lpd implements the network listening service for the BSD print protocol specified in RFC 1179. The BSD print protocol provides a remote interface for systems to interact with a local spooling system. The protocol defines five standard requests from the client to the server: starting queue processing, transferring print jobs, retrieving terse status, retrieving verbose status, and canceling print jobs. in.lpd is started from inetd (see inetd(1M)). inetd waits for connections on TCP port 515. Upon receipt of a connect request, in.lpd is started to service the connection. Once the request has been filled, in.lpd closes the connection and exits.				
EXIT STATUS	The following exit values are returned: <table> <tr> <td>0</td><td>Successful completion.</td></tr> <tr> <td>non-zero</td><td>An error occurred.</td></tr> </table>	0	Successful completion.	non-zero	An error occurred.
0	Successful completion.				
non-zero	An error occurred.				
FILES	<code>/etc/printers.conf</code> System printer configuration database. <code>printers.conf.byname</code> NIS version of <code>/etc/printers.conf</code>. <code>fns.ctx_dir.domain</code> NIS+ version of <code>/etc/printers.conf</code>. <code>/usr/lib/print/bsd-adaptor/bsd_*.so*</code> Spooler translation modules.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWpcu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWpcu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWpcu				
SEE ALSO	inetd(1M), printers.conf(4), attributes(5)				

in.mpathd(1M)

NAME	in.mpathd – daemon for network adapter (NIC) failure detection, recovery, automatic failover and failback
SYNOPSIS	<code>/usr/lib/inet/in.mpathd</code>
DESCRIPTION	The <code>in.mpathd</code> daemon performs Network Interface Card (NIC) failure and repair detection. In the event of a NIC failure, it causes IP network access from the failed NIC to failover to a standby NIC, if available, or to any another operational NIC that has been configured as part of the same network multipathing group. Once the failed NIC is repaired, all network access will be restored to the repaired NIC. <code>in.mpathd</code> needs a special test address on each NIC for the purpose of sending and receiving probes on each NIC. Use the <code>ifconfig</code> command <code>-failover</code> option to configure these test addresses. See <code>ifconfig(1M)</code>. The test address must belong to a subnet that is known to the hosts and routers on the link. The <code>in.mpathd</code> daemon can detect NIC failure and repair by two methods, by sending and receiving ICMP echo requests and replies on each NIC, and by monitoring the <code>IFF_RUNNING</code> flag for each NIC. The link state on some models of NIC is indicated by the <code>IFF_RUNNING</code> flag, allowing for faster failure detection when the link goes down. The <code>in.mpathd</code> daemon considers a NIC to have failed if either of the above two methods indicates failure. A NIC is considered to be repaired only if both methods indicate the NIC is repaired. The <code>in.mpathd</code> daemon sends the ICMP echo request probes to on-link routers. If no routers are available, it sends the probes to neighboring hosts. Thus, for network failure detection and repair, there must be at least one neighbor on each link that responds to ICMP echo request probes. <code>in.mpathd</code> works on both IPv4 and IPv6. If IPv4 is plumbed on a NIC, an IPv4 test address is configured on the NIC, and the NIC is configured as part of a network multipathing group, then <code>in.mpathd</code> will start sending ICMP probes on the NIC using IPv4. In the case of IPv6, the link-local address must be configured as the test address. The <code>in.mpathd</code> daemon will not accept a non-link-local address as a test address. If the NIC is part of a multipathing group, and the test address has been configured, then <code>in.mpathd</code> will probe the NIC for failures using IPv6. Even if both the IPv4 and IPv6 protocol streams are plumbed, it is sufficient to configure only one of the two, that is, either an IPv4 test address or an IPv6 test address on a NIC. If only an IPv4 test address is configured, it probes using only ICMPv4. If only an IPv6 test address is configured, it probes using only ICMPv6. If both type test addresses are configured, it probes using both ICMPv4 and ICMPv6. The <code>in.mpathd</code> daemon accesses three variable values in <code>/etc/default/mpathd</code>: <code>FAILURE_DETECTION_TIME</code>, <code>FAILBACK</code> and <code>TRACK_INTERFACES_ONLY_WITH_GROUPS</code>.

in.mpathd(1M)

The `FAILURE_DETECTION_TIME` variable specifies the NIC failure detection time for the ICMP echo request probe method of detecting NIC failure. The shorter the failure detection time, the greater the volume of probe traffic. The default value of `FAILURE_DETECTION_TIME` is 10 seconds. This means that NIC failure will be detected by `in.mpathd` within 10 seconds. NIC failures detected by the `IFF_RUNNING` flag being cleared are acted on as soon as the `in.mpathd` daemon notices the change in the flag. The NIC repair detection time cannot be configured; however, it is defined as double the value of `FAILURE_DETECTION_TIME`.

By default, `in.mpathd` does failure detection only on NICs that are configured as part of a multipathing group. You can set `TRACK_INTERFACES_ONLY_WITH_GROUPS` to `no` to enable failure detection by `in.mpathd` on all NICs, even if they are not part of a multipathing group. However, `in.mpathd` cannot do failover from a failed NIC if it is not part of a multipathing group.

The `in.mpathd` daemon will restore network traffic back to the previously failed NIC, after it has detected a NIC repair. To disable this, set the value of `FAILBACK` to `no` in `/etc/default/mpathd`.

FILES `/etc/default/mpathd` Contains default values used by the `in.mpathd` daemon.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsr

SEE ALSO `ifconfig(1M)`, `attributes(5)`, `icmp(7P)`, `icmp6(7P)`,

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DIAGNOSTICS `IFF_NOFAILOVER` address *address* is not unique and failure detection is not possible

Every test address that is configured must be unique on the system. Otherwise `in.mpathd` cannot do failure detection. Since the IPv6 test address is a link-local address, which in turn is derived from the ethernet address, each NIC must have a unique MAC address.

NIC *interface_name* of group *group_name* is not plumbed for IPv[4|6] and may affect failover capability

All NICs in a multipathing group must be homogeneously plumbed. For example, if a NIC is plumbed for IPv4, then all NICs in the group must be plumbed for IPv4. The streams modules pushed on all NICs must be identical.

in.mpathd(1M)

Failures cannot be detected on *interface_name* as no IFF_NOFAILOVER address is available

Every NIC that is configured as part of a multipathing group must have a test address, which can be either IPv4 or IPv6, or both. Otherwise in.mpathd cannot probe the NIC, and this message is displayed.

Invalid failure detection *time* assuming default 10000

An invalid value was encountered for *FAILURE_DETECTION_TIME* in the /etc/default/mpathd file.

Too small failure detection time of *time* assuming minimum 100

The minimum value that can be specified for *FAILURE_DETECTION_TIME* is currently 100 milliseconds.

Invalid value for *FAILBACK value*

Valid values for the boolean variable *FAILBACK* are yes or no.

Invalid value for *TRACK_INTERFACES_ONLY_WITH_GROUPS value*

Valid values for the boolean variable

TRACK_INTERFACES_ONLY_WITH_GROUPS are yes or no.

Cannot meet requested failure detection time of *time* ms on (inet[6] *interface_name*) new failure detection is *time* ms

The round trip time for ICMP probes is higher than the specified failure detection time. The network is probably congested or the probe targets are loaded.

in.mpathd automatically increases the failure detection time to whatever it can achieve under these conditions.

Improved failure detection time *time* ms on (inet[6] *interface_name*)

The round trip time for ICMP probes has now decreased and in.mpathd has lowered the failure detection time correspondingly.

NIC failure detected on *interface_name*

in.mpathd has detected NIC failure on *interface_name*, and has set the IFF_FAILED flag on NIC *interface_name*.

Successfully failed over from NIC *interface_name1* to NIC *interface_name2*

in.mpathd has caused the network traffic to failover from NIC *interface_name1* to NIC *interface_name2*, which is part of the multipathing group.

NIC repair detected on *interface_name*

in.mpathd has detected that NIC *interface_name* is repaired and operational. If the IFF_FAILED flag on the NIC was previously set, it will be reset.

Successfully failed back to NIC *interface_name*

in.mpathd has restored network traffic back to NIC *interface_name*, which is now repaired and operational.

in.mpathd(1M)

The link has gone down on *interface_name*

in.mpathd has detected that the IFF_RUNNING flag for NIC *interface_name* has been cleared, indicating the link has gone down.

The link has come up on *interface_name*

in.mpathd has detected that the IFF_RUNNING flag for NIC *interface_name* has been set, indicating the link has come up.

in.named(1M)

NAME	in.named, named – Internet domain name server (DNS)												
SYNOPSIS	in.named [-d <i>debuglevel</i>] [-p <i>port#</i>] [[-b -c] <i>config_file</i>] [-fqrsv] [-u <i>user_name</i>] [-g <i>group_name</i>] [-t <i>directory</i>] [-w <i>directory</i>] [<i>config_file</i>]												
DESCRIPTION	in.named is the Internet domain name server. For more information on the Internet name-domain system, see <i>RFC 1033</i>, <i>RFC 1034</i> and <i>RFC 1035</i>. When run without any arguments, in.named reads the default configuration file /etc/named.conf, reads any initial data, and listens for queries. If you give a <i>config_file</i> argument at the end of the command line, it will override any <i>config_file</i> that you specified by using the -b or -c options. The named.conf(4) configuration file controls some of the options and behavior for in.named.												
OPTIONS	in.named supports the following options: <table><tr><td>-b c <i>configfile</i></td><td>Use an alternative configuration file. The default value for <i>configfile</i> is /etc/named.conf. The <i>configfile</i>, if any, specified at the end of the command line, overrides any value specified by this argument.</td></tr><tr><td>-d <i>debuglevel</i></td><td>Print debugging information. The value of <i>debuglevel</i> determines the level of messages to print. If negative, <i>debuglevel</i> is set to 1.</td></tr><tr><td></td><td>The new debugging framework is considerably more sophisticated than in previous versions of in.named. The logging statement in the configuration file allows for multiple, distinct levels of debugging for each of a large set of categories of events, for example, for queries and transfers in and out. See named.conf(4).</td></tr><tr><td>-f</td><td>Run this process in the foreground. The process will not fork(2). By default, in.named runs as a daemon in the background.</td></tr><tr><td>-g <i>group_name</i></td><td>Specify the group the server should run as after it initializes. The value specified may be either a group name or a numeric group id.</td></tr><tr><td>-p <i>port#</i></td><td>Use the specified remote port number. in.named will send queries to this port number. By default, the value is the standard port number, that is, the port number returned by getservbyname(3SOCKET) for the service domain.</td></tr></table> The in.named command previously supported the syntax: -p <i>port#[/localport#]</i> where <i>port#</i> was the first port used	-b c <i>configfile</i>	Use an alternative configuration file. The default value for <i>configfile</i> is /etc/named.conf. The <i>configfile</i> , if any, specified at the end of the command line, overrides any value specified by this argument.	-d <i>debuglevel</i>	Print debugging information. The value of <i>debuglevel</i> determines the level of messages to print. If negative, <i>debuglevel</i> is set to 1.		The new debugging framework is considerably more sophisticated than in previous versions of in.named. The logging statement in the configuration file allows for multiple, distinct levels of debugging for each of a large set of categories of events, for example, for queries and transfers in and out. See named.conf(4).	-f	Run this process in the foreground. The process will not fork(2). By default, in.named runs as a daemon in the background.	-g <i>group_name</i>	Specify the group the server should run as after it initializes. The value specified may be either a group name or a numeric group id.	-p <i>port#</i>	Use the specified remote port number. in.named will send queries to this port number. By default, the value is the standard port number, that is, the port number returned by getservbyname(3SOCKET) for the service domain.
-b c <i>configfile</i>	Use an alternative configuration file. The default value for <i>configfile</i> is /etc/named.conf. The <i>configfile</i> , if any, specified at the end of the command line, overrides any value specified by this argument.												
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when contacting remote servers and *localport#* was the service port bound by the local instance of *in.named*.

The current usage is equivalent to the old usage without *localport#* specified. This functionality can be specified with the *listen-on* clause options statement in the configuration file.

-q Trace all incoming queries. This option is deprecated in favor of the *queries* logging category of the logging statement in *named.conf*. See *named.conf*(4).

-r Turn recursion off in the server. Responses come only from local (primary or secondary) zones. You can use this option on root servers. By default, the server uses recursion. This option is deprecated and is overridden by the *recursion* clause of the *options* statement in the configuration file.

-t directory Specify the directory that the server is to *chroot*(2) into when it finishes processing command line arguments.

-u user_name Specify the user that the server should run as after it initializes. The value of *user_name* may be either a user name or a numeric user id. If the *-g* option is not invoked, then the group id will be the primary group of the user specified. Since *initgroups*(3C) is called, all of the user's group will be available to the server.

-v Report the version and exit.

-w directory Set the working directory of the server. The *directory* clause of the *options* statement overrides any value specified on the command line. The default working directory is the current directory ("").

For compatibility with older implementations any additional argument will be interpreted as the name of the configuration file. This argument overrides any *config_file* specified by means of the *-b* or *-c* options. If no further argument is given, then the default configuration file, */etc/named.conf* is used.

USAGE

Master File Format

The master file consists of control information and a list of resources for objects in the zone. The file has the following form:

```
$INCLUDE <filename><opt_domain>
$ORIGIN <domain>
$TTL <ttd>
<domain><opt_ttd><opt_class><type><resource_record_data>
```

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The fields are defined as follows:

<i>domain</i>	The value of <i>domain</i> can be "." for root, "@" for the current origin, or a standard domain name. If domain is a standard domain name that does not end with ".", the current origin is appended to the domain. Domain names ending with "." are not modified.														
<i>opt_domain</i>	This field is used to define an origin for the data in an included file. It is equivalent to placing an \$ORIGIN statement before the first line of the included file. This field is optional. Neither the <i>opt_domain</i> field nor \$ORIGIN statements in the included file modify the current origin for this file.														
<i>ttd</i>	An integer number that sets the default time-to-live for future records that do not have an explicit <i>ttd</i> .														
<i>opt_ttd</i>	An optional integer number for the time-to-live field. If not set the <i>ttd</i> is taken from the last \$TTL statement. If no \$TTL statement has occurred then the SOA minimum value is used, and a warning is generated.														
<i>opt_class</i>	The object address type. Currently only one type is supported, IN, for objects connected to the DARPA Internet.														
<i>type</i>	This field contains one of the following tokens. The data expected in the <i>resource_record_data</i> field is in parentheses: <table><tr><td>A</td><td>A host address (dotted-quad IP address).</td></tr><tr><td>NS</td><td>An authoritative name server (domain).</td></tr><tr><td>MX</td><td>A mail exchanger (domain), preceded by a preference value (0..32767), with lower numeric values representing higher logical preferences.</td></tr><tr><td>CNAME</td><td>The canonical name for an alias (domain).</td></tr><tr><td>SOA</td><td>Marks the start of a zone of authority (domain of originating host, domain address of maintainer, a serial number and the following parameters in seconds: refresh, retry, expire and minimum <i>ttd</i>). See RFC 883 and RFC 2308.</td></tr><tr><td>NULL</td><td>A NULL resource record (no format or data).</td></tr><tr><td>RP</td><td>A Responsible Person for some domain name (mailbox, TXT-referral).</td></tr></table>	A	A host address (dotted-quad IP address).	NS	An authoritative name server (domain).	MX	A mail exchanger (domain), preceded by a preference value (0..32767), with lower numeric values representing higher logical preferences.	CNAME	The canonical name for an alias (domain).	SOA	Marks the start of a zone of authority (domain of originating host, domain address of maintainer, a serial number and the following parameters in seconds: refresh, retry, expire and minimum <i>ttd</i>). See RFC 883 and RFC 2308.	NULL	A NULL resource record (no format or data).	RP	A Responsible Person for some domain name (mailbox, TXT-referral).
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RP	A Responsible Person for some domain name (mailbox, TXT-referral).														

		in.named(1M)
	PTR	A domain name pointer (domain).
	HINFO	Host information (cpu_type, OS_type).
<i>resource_record_data</i>		Resource records normally end at the end of a line, but may be continued across lines between opening and closing parentheses. Comments are introduced by semicolons and continue to the end of the line.
		There are other resource record types not shown here. Some resource record types may have been standardized in more recent RFCs, but they have not yet been implemented in this version of BIND
SOA Record Format	Each master zone file should begin with an SOA record for the zone. An example SOA record is as follows:	
	<pre>@ IN SOA ucbvax.Berkeley.EDU. rwh.ucbvax.Berkeley.EDU. (1989020501 ; serial 10800 ; refresh 3600 ; retry 3600000 ; expire 86400) ; minimum</pre>	
	The SOA specifies a serial number that should be incremented each time the master file is changed. Note that the serial number can be given as a dotted number, but this is a very unwise thing to do since the translation to normal integers is by means of concatenation rather than multiplication and addition. You can spell out the year, month, day of month, and 0.99 version number and still fit inside the unsigned 32-bit size of this field. (It's true that we will have to rethink this strategy in the year 4294, but we're not worried about it.) Secondary servers check the serial number at intervals specified by the refresh time in seconds; if the serial number changes, a zone transfer will be done to load the new data. If a master server cannot be contacted when a refresh is due, the retry time specifies the interval at which refreshes should be attempted. If a master server cannot be contacted within the interval given by the expire time, all data from the zone is discarded by secondary servers. The minimum value is the cache time-to-live for negative answers. See <i>RFC 2308</i>.	
FILES	/etc/named.conf	default name server configuration file.
	/var/run/named.pid	the process ID.
	<i>srvcwd</i>	in.named's current working directory, usually set by the "directory" options statement in named.conf.
	<i>srvcwd/named_dump.db</i>	dump of the name server database.
	<i>srvcwd/named.run</i>	debug output.
	<i>srvcwd/named.stats</i>	name server statistics data.

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ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWinamd
Interface Stability	Standard BIND 8.2.4

SEE ALSO

`kill(1)`, `named-xfer(1M)`, `chroot(2)`, `fork(2)`, `getservbyname(3SOCKET)`, `resolver(3RESOLV)`, `signal(3C)`, `syslog(3C)`, `resolv.conf(4)`, `attributes(5)`

Andrews, M. *RFC 2308, Negative Caching of DNS Queries (DNS NCACHE)*. Network Working Group. March 1998.

Braden, R., editor. *RFC 1123, Requirements for Internet Hosts - Applications and Support*. Network Working Group. October 1989.

Lotter, M. *RFC 1033, Domain Administrators Operations Guide*. Network Working Group. November 1987.

Mockapetris, Paul. *RFC 882, Domain Names - Concepts and Facilities*. Network Working Group. November 1983.

Mockapetris, Paul. *RFC 883, Domain Names - Implementation and Specification*. Network Working Group. November 1983.

Mockapetris, Paul. *RFC 973, Domain System Changes and Observations*. Network Working Group. January 1986.

Mockapetris, Paul. *RFC 1034, Domain Names - Concepts and Facilities*. Network Working Group. November 1987.

Mockapetris, Paul. *RFC 1035, Domain Names - Implementation and Specification*. Network Working Group. November 1987.

Partridge, Craig. *RFC 974, Mail Routing and the Domain System*. Network Working Group. January 1986.

Vixie, Paul, Dunlap, Kevin J., Karels, Michael J., *Name Server Operations Guide for BIND* Internet Software Consortium. 1996.

NOTES

The boot file directives `domain` and `suffixes` are now obsolete. They have been replaced by a resolver-based implementation of suffixing for partially-qualified domain names. The earlier mechanisms failed under a number of situations, for example, when the local name server did not have complete information.

The following signals have the specified effect when sent to the server process using the `kill(1)` command:

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SIGHUP	Causes the server to read <code>named.conf</code> and reload the database. SIGHUP will also cause the server to check the serial number on all secondary zones.
SIGINT	Dumps the current database and cache to <code>named_dump.db</code> .
SIGILL	Dumps statistics data into <code>named.stats</code> . Statistics data is appended to the file.
SIGTERM	Saves any modified dynamic zones to the file system and shuts down the server.
SIGUSR1	Turns on debugging. Each additional SIGUSR1 signal increments the debug level.
SIGUSR2	Turns off debugging completely.
SIGWINCH	Toggles logging of all incoming queries by means of <code>syslog(3C)</code> .

in.ndpd(1M)

NAME	in.ndpd – daemon for IPv6 autoconfiguration	
SYNOPSIS	/usr/lib/inet/in.ndpd [-adt] [-f <i>config_file</i>]	
DESCRIPTION	in.ndpd provides both the host and router autoconfiguration components of Neighbor Discovery for IPv6 and Stateless Address Autoconfiguration for IPv6. In particular, in.ndpd implements ■ router discovery; ■ prefix discovery; ■ parameter discovery; and ■ address autoconfiguration. Other aspects of Neighbor Discovery are implemented by ip6(7P), including: ■ address resolution; ■ neighbor unreachability detection; and ■ redirect. The duplicate address detection function is implemented by ifconfig(1M). If the <code>/etc/inet/ndpd.conf</code> file does not exist or does not set the variable <code>AdvSendAdvertisements</code> to true for a network interface, then in.ndpd will make the node a host for that interface, that is, sending router solicitation messages and then using router advertisement messages it receives to autoconfigure the node. Note that in.ndpd only autoconfigures the addresses of global or site-local scope from the prefix advertisement. If <code>AdvSendAdvertisements</code> is set to true for an interface, then in.ndpd will perform router functions on that interface, that is, sending router advertisement messages to autoconfigure the attached hosts, but not use any advertisements it receives for autoconfiguration. However, when sending advertisements, in.ndpd will use the advertisements it sends itself to autoconfigure its prefixes.	
OPTIONS	-a	Turn off stateless address auto configuration. When set, the daemon does not autoconfigure any addresses and does not renumber any addresses.
	-d	Turn on large amounts of debugging output on stdout. When set, the program runs in the foreground and stays attached to the controlling terminal.
	-f <i>config_file</i>	Use <i>config_file</i> for configuration information instead of the default <code>/etc/inet/ndpd.conf</code> .
	-t	Turn on tracing (printing) of all sent and received packets to stdout. When set, the program runs in the foreground and stays attached to the controlling terminal.
FILES	<code>/etc/inet/ndpd.conf</code>	Configuration file. This file is not necessary on a host, but it is required on a router to enable in.ndpd to advertise autoconfiguration information to the hosts.

in.ndpd(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO ifconfig(1M), ndpd.conf(4), attributes(5), icmp6(7P), ip6(7P) attributes(5)

Narten, T., Nordmark, E., Simpson, W. *RFC 2461, Neighbor Discovery for IP Version 6 (IPv6)*. The Internet Society. December 1998.

Thomson, S., Narten, T. *RFC 2462, IPv6 Stateless Address Autoconfiguration*. The Internet Society. December 1998.

DIAGNOSTICS Receipt of a SIGHUP signal will make in.ndpd restart and reread /etc/inet/ndpd.conf.

in.rarpd(1M)

NAME	in.rarpd, rarpd – DARPA Reverse Address Resolution Protocol server										
SYNOPSIS	<pre>/usr/sbin/in.rarpd [-d] -a /usr/sbin/in.rarpd [-d] device unit</pre>										
DESCRIPTION	in.rarpd starts a daemon that responds to Reverse Address Resolution Protocol (RARP) requests. The daemon forks a copy of itself that runs in background. It must be run as root. RARP is used by machines at boot time to discover their Internet Protocol (IP) address. The booting machine provides its Ethernet address in a RARP request message. Using the <code>ethers</code> and <code>hosts</code> databases, in.rarpd maps this Ethernet address into the corresponding IP address which it returns to the booting machine in an RARP reply message. The booting machine must be listed in both databases for in.rarpd to locate its IP address. in.rarpd issues no reply when it fails to locate an IP address. in.rarpd uses the STREAMS-based Data Link Provider Interface (DLPI) message set to communicate directly with the datalink device driver.										
OPTIONS	The following options are supported: -a Get the list of available network interfaces from IP using the SIOCGIFADDR ioctl and start a RARP daemon process on each interface returned. -d Print assorted debugging messages while executing.										
EXAMPLES	EXAMPLE 1 Starting An in.rarpd Daemon For Each Network Interface Name Returned From /dev/ip: The following command starts an in.rarpd for each network interface name returned from /dev/ip: <pre>example# /usr/sbin/in.rarpd -a</pre> EXAMPLE 2 Starting An in.rarpd Daemon On The Device /dev/le With The Device Instance Number 0 The following command starts one in.rarpd on the device /dev/le with the device instance number 0. <pre>example# /usr/sbin/in.rarpd le 0</pre>										
FILES	<table><tr><td>/etc/ethers</td><td>File or other source, as specified by <code>nsswitch.conf(4)</code>.</td></tr><tr><td>/etc/hosts</td><td>File or other source, as specified by <code>nsswitch.conf(4)</code>.</td></tr><tr><td>/tftpboot</td><td></td></tr><tr><td>/dev/ip</td><td></td></tr><tr><td>/dev/arp</td><td></td></tr></table>	/etc/ethers	File or other source, as specified by <code>nsswitch.conf(4)</code> .	/etc/hosts	File or other source, as specified by <code>nsswitch.conf(4)</code> .	/tftpboot		/dev/ip		/dev/arp	
/etc/ethers	File or other source, as specified by <code>nsswitch.conf(4)</code> .										
/etc/hosts	File or other source, as specified by <code>nsswitch.conf(4)</code> .										
/tftpboot											
/dev/ip											
/dev/arp											

in.rarpd(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWbsu

SEE ALSO boot(1M), ifconfig(1M), ethers(4), hosts(4), netconfig(4),
nsswitch.conf(4), attributes (5), dlpi(7P)

Finlayson, R., Mann, T., Mogul, J., and Theimer, M., *RFC 903, A Reverse Address Resolution Protocol*, Network Information Center, SRI International, June 1984.

Unix International, *Data Link Provider Interface*, Version 2, May 7, 1991, Sun Microsystems, 800-6915-01.

in.rdisc(1M)

NAME	in.rdisc, rdisc – network router discovery daemon
SYNOPSIS	<pre>/usr/sbin/in.rdisc [-a] [-f] [-s] [send-address] [receive-address] /usr/sbin/in.rdisc -r [-p preference] [-T interval] [send-address] [receive-address]</pre>
DESCRIPTION	The functionality provided by the <code>in.rdisc</code> daemon is now included in <code>in.routed(1M)</code>. <code>in.rdisc</code> remains part of the software distribution of the Solaris Operating Environment. However, the system startup scripts in <code>/etc/init.d</code> start <code>in.routed</code> and do not start <code>in.rdisc</code>. If you want to customize router discovery behavior, consult <code>gateways(4)</code>. See <code>in.routed(1M)</code> for information on that daemon. <code>in.rdisc</code> implements the ICMP router discovery protocol. The first form of the command is used on hosts and the second form is used on routers. <code>in.rdisc</code> can be invoked in either the first form (host mode) or second form (router mode). On a host, <code>in.rdisc</code> populates the network routing tables with default routes. On a router, advertises the router to all the hosts.
Host (First Form)	On a host, <code>in.rdisc</code> listens on the <code>ALL_HOSTS</code> (224.0.0.1) multicast address for <code>ROUTER_ADVERTISE</code> messages from routers. The received messages are handled by first ignoring those listed router addresses with which the host does not share a network. Among the remaining addresses, the ones with the highest preference are selected as default routers and a default route is entered in the kernel routing table for each one of them. Optionally, <code>in.rdisc</code> can avoid waiting for routers to announce themselves by sending out a few <code>ROUTER_SOLICITATION</code> messages to the <code>ALL_ROUTERS</code> (224.0.0.2) multicast address when it is started. A timer is associated with each router address. The address will no longer be considered for inclusion in the routing tables if the timer expires before a new <i>advertise</i> message is received from the router. The address will also be excluded from consideration if the host receives an <i>advertise</i> message with the preference being maximally negative or with a lifetime of zero.
Router (Second Form)	When <code>in.rdisc</code> is started on a router, it uses the <code>SIOCGIFCONF</code> <code>ioctl(2)</code> to find the interfaces configured into the system and it starts listening on the <code>ALL_ROUTERS</code> multicast address on all the interfaces that support multicast. It sends out <i>advertise</i> messages to the <code>ALL_HOSTS</code> multicast address advertising all its IP addresses. A few initial <i>advertise</i> messages are sent out during the first 30 seconds and after that it will transmit <i>advertise</i> messages approximately every 600 seconds. When <code>in.rdisc</code> receives a <i>solicitation</i> message, it sends an <i>advertise</i> message to the host that sent the <i>solicitation</i> message. When <code>in.rdisc</code> is terminated by a signal, it sends out an <i>advertise</i> message with the preference being maximally negative.

in.rdisc(1M)

- OPTIONS**
- a Accept all routers independent of the preference they have in their *advertise* messages. Normally, *in.rdisc* only accepts (and enters in the kernel routing tables) the router or routers with the highest preference.
 - f Run *in.rdisc* forever even if no routers are found. Normally, *in.rdisc* gives up if it has not received any *advertise* message after soliciting three times, in which case it exits with a non-zero exit code. If -f is not specified in the first form then -s must be specified.
 - r Act as a router, rather than a host.
 - s Send three *solicitation* messages initially to quickly discover the routers when the system is booted. When -s is specified, *in.rdisc* exits with a non-zero exit code if it can not find any routers. This can be overridden with the -f option.
 - p *preference* Set the preference transmitted in the *solicitation* messages. The default is zero.
 - T *interval* Set the interval between transmitting the *advertise* messages. The default time is 600 seconds.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWroute

SEE ALSO *in.routed*(1M), *ioctl*(2), *gateways*(4), *attributes*(5), *icmp*(7P), *inet*(7P)

Deering, S.E., editor, *ICMP Router Discovery Messages*, RFC 1256, Network Information Center, SRI International, Menlo Park, California, September 1991.

in.rexecd(1M)

NAME	in.rexecd, rexecd – remote execution server				
SYNOPSIS	in.rexecd				
DESCRIPTION	in.rexecd is the server for the rexec(3SOCKET) routine. The server provides remote execution facilities with authentication based on user names and passwords. It is invoked automatically as needed by inetd(1M), and then executes the following protocol: 1. The server reads characters from the socket up to a null (\0) byte. The resultant string is interpreted as an ASCII number, base 10. 2. If the number received in step 1 is non-zero, it is interpreted as the port number of a secondary stream to be used for the stderr. A second connection is then created to the specified port on the client's machine. 3. A null terminated user name of at most 16 characters is retrieved on the initial socket. 4. A null terminated password of at most 16 characters is retrieved on the initial socket. 5. A null terminated command to be passed to a shell is retrieved on the initial socket. The length of the command is limited by the upper bound on the size of the system's argument list. 6. rexecd then validates the user as is done at login time and, if the authentication was successful, changes to the user's home directory, and establishes the user and group protections of the user. If any of these steps fail the connection is aborted and a diagnostic message is returned. 7. A null byte is returned on the connection associated with the stderr and the command line is passed to the normal login shell of the user. The shell inherits the network connections established by rexecd.				
USAGE	in.rexecd and rexecd are IPv6-enabled. See ip6(7P).				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWrcmds</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWrcmds
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWrcmds				
SEE ALSO	inetd(1M), rexec(3SOCKET), inetd.conf(4), attributes(5), ip6(7P)				
DIAGNOSTICS	All diagnostic messages are returned on the connection associated with the stderr, after which any network connections are closed. An error is indicated by a leading byte with a value of 1 (0 is returned in step 7 above upon successful completion of all the steps prior to the command execution). <table><tr><td>username too long</td><td>The name is longer than 16 characters.</td></tr><tr><td>password too long</td><td>The password is longer than 16 characters.</td></tr></table>	username too long	The name is longer than 16 characters.	password too long	The password is longer than 16 characters.
username too long	The name is longer than 16 characters.				
password too long	The password is longer than 16 characters.				

in.rexecd(1M)

command too long	The command line passed exceeds the size of the argument list (as configured into the system).
Login incorrect.	No password file entry for the user name existed.
Password incorrect.	The wrong password was supplied.
No remote directory.	The chdir command to the home directory failed.
Try again.	A fork by the server failed.
/usr/bin/sh: ...	The user's login shell could not be started.

in.ripngd(1M)

NAME	in.ripngd – network routing daemon for IPv6
SYNOPSIS	/usr/sbin/in.ripngd [-s] [-q] [-t] [-p <i>n</i>] [-P] [-v] [<i>logfile</i>]
DESCRIPTION	in.ripngd is the IPv6 equivalent of in.routed(1M). It is invoked at boot time to manage the network routing tables. The routing daemon uses the Routing Information Protocol for IPv6. In normal operation, in.ripngd listens on the udp(7P) socket port 521 for routing information packets. If the host is an internetwork router, it periodically supplies copies of its routing tables to any directly connected hosts and networks. When in.ripngd is started, it uses the SIOCGLIFCONF ioctl(2) to find those directly connected IPv6 interfaces configured into the system and marked "up"; the software loopback interface is ignored. If multiple interfaces are present, it is assumed the host will forward packets between networks. in.ripngd then multicasts a request packet on each IPv6 interface and enters a loop, listening for request and response packets from other hosts. When a request packet is received, in.ripngd formulates a reply based on the information maintained in its internal tables. The response packet contains a list of known routes. With each route is a number specifying the number of bits in the prefix. The prefix is the number of bits in the high order part of an address that indicate the subnet or network that the route describes. Each route reported also has a "<i>hop count</i>" metric. A count of 16 or greater is considered "infinity." The metric associated with each route returned provides a metric relative to the sender. The request packets received by in.ripngd are used to update the routing tables if one of the following conditions is satisfied: ■ No routing table entry exists for the destination network or host, and the metric indicates the destination is "reachable, that is, the <i>hop count</i> is not infinite. ■ The source host of the packet is the same as the router in the existing routing table entry. That is, updated information is being received from the very internetwork router through which packets for the destination are being routed. ■ The existing entry in the routing table has not been updated for a period of time, defined to be 90 seconds, and the route is at least as cost-effective as the current route. ■ The new route describes a shorter route to the destination than the one currently stored in the routing tables; this is determined by comparing the metric of the new route against the one stored in the table. When an update is applied, in.ripngd records the change in its internal tables and generates a response packet to all directly connected hosts and networks. To allow possible unstable situations to settle, in.ripngd waits a short period of time (no more than 30 seconds) before modifying the kernel's routing tables.

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In addition to processing incoming packets, `in.ripngd` also periodically checks the routing table entries. If an entry has not been updated for 3 minutes, the entry's metric is set to infinity and marked for deletion. Deletions are delayed an additional 60 seconds to insure the invalidation is propagated throughout the internet.

Hosts acting as internetwork routers gratuitously supply their routing tables every 30 seconds to all directly connected hosts and networks.

OPTIONS `in.ripngd` supports the following options:

- q Do not supply routing information.
- s Force `in.ripngd` to supply routing information whether it is acting as an internetwork router or not.
- p *n* Send and receive the routing packets from other routers using the UDP port number *n*.
- P Do not use poison reverse.
- t Print all packets sent or received to standard output. `in.ripngd` will not divorce itself from the controlling terminal. Accordingly, interrupts from the keyboard will kill the process.
- v Print all changes made to the routing tables to standard output with a timestamp.

Any other argument supplied is interpreted as the name of the file in which the actions of `in.ripngd`, as specified by this option or by `-t`, should be logged versus being sent to standard output.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWroute

SEE ALSO `in.routed(1M)`, `ioctl(2)`, `attributes(5)`, `udp(7P)`

Malkin, G., Minnear, R., *RFC 2080, RIPng for IPv6*, January 1997.

NOTES The kernel's routing tables may not correspond to those of `in.ripngd` for short periods of time while processes that utilize existing routes exit; the only remedy for this is to place the routing process in the kernel.

`in.ripngd` currently does not support all of the functionality of `in.routed(1M)`. Future releases may support more if appropriate.

`in.ripngd` initially obtains a routing table by examining the interfaces configured on a machine. It then sends a request on all directly connected networks for more routing information. `in.ripngd` does not recognize or use any routing information already

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established on the machine prior to startup. With the exception of interface changes, `in.ripngd` does not see any routing table changes that have been done by other programs on the machine, for example, routes added, deleted or flushed by way of the `route(1M)` command. Therefore, these types of changes should not be done while `in.ripngd` is running. Rather, shut down `in.ripngd`, make the changes required, and then restart `in.ripngd`.

NAME	in.rlogind, rlogind – remote login server									
SYNOPSIS	<code>/usr/sbin/in.rlogind</code>									
DESCRIPTION	<code>in.rlogind</code> is the server for the <code>rlogin(1)</code> program. The server provides a remote login facility with authentication based on privileged port numbers. <code>in.rlogind</code> is invoked by <code>inetd(1M)</code> when a remote login connection is established, and executes the following protocol: ■ The server checks the client’s source port. If the port is not in the range 512-1023, the server aborts the connection. ■ The server checks the client’s source address. If an entry for the client exists in both <code>/etc/hosts</code> and <code>/etc/hosts.equiv</code>, a user logging in from the client is not prompted for a password. If the address is associated with a host for which no corresponding entry exists in <code>/etc/hosts</code>, the user is prompted for a password, regardless of whether or not an entry for the client is present in <code>/etc/hosts.equiv</code>. See <code>hosts(4)</code> and <code>hosts.equiv(4)</code>. Once the source port and address have been checked, <code>in.rlogind</code> allocates a pseudo-terminal and manipulates file descriptors so that the slave half of the pseudo-terminal becomes the <code>stdin</code>, <code>stdout</code>, and <code>stderr</code> for a login process. The login process is an instance of the <code>login(1)</code> program, invoked with the <code>-r</code>. The login process then proceeds with the <code>pam(3PAM)</code> authentication process. See SECURITY below. If automatic authentication fails, it reprompts the user to login. The parent of the login process manipulates the master side of the pseudo-terminal, operating as an intermediary between the login process and the client instance of the <code>rlogin</code> program. In normal operation, a packet protocol is invoked to provide Ctrl-S and Ctrl-Q type facilities and propagate interrupt signals to the remote programs. The login process propagates the client terminal’s baud rate and terminal type, as found in the environment variable, <code>TERM</code>; see <code>environ(4)</code>.									
USAGE	<code>rlogind</code> and <code>in.rlogind</code> are IPv6-enabled. See <code>ip6(7P)</code> .									
SECURITY	<code>in.rlogind</code> uses <code>pam(3PAM)</code> for authentication, account management, and session management. The PAM configuration policy, listed through <code>/etc/pam.conf</code>, specifies the modules to be used for <code>in.rlogind</code>. Here is a partial <code>pam.conf</code> file with entries for the <code>rlogin</code> command using the "rhosts" and UNIX authentication modules, and the UNIX account, session management, and password management modules. <table><tr><td><code>rlogin</code></td><td><code>auth sufficient</code></td><td><code>pam_rhosts_auth.so.1</code></td></tr><tr><td><code>rlogin</code></td><td><code>auth requisite</code></td><td><code>pam_authtok_get.so.1</code></td></tr><tr><td><code>rlogin</code></td><td><code>auth required</code></td><td><code>pam_dhkeys.so.1</code></td></tr></table>	<code>rlogin</code>	<code>auth sufficient</code>	<code>pam_rhosts_auth.so.1</code>	<code>rlogin</code>	<code>auth requisite</code>	<code>pam_authtok_get.so.1</code>	<code>rlogin</code>	<code>auth required</code>	<code>pam_dhkeys.so.1</code>
<code>rlogin</code>	<code>auth sufficient</code>	<code>pam_rhosts_auth.so.1</code>								
<code>rlogin</code>	<code>auth requisite</code>	<code>pam_authtok_get.so.1</code>								
<code>rlogin</code>	<code>auth required</code>	<code>pam_dhkeys.so.1</code>								

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rlogin	auth required	pam_unix_auth.so.1
rlogin	account required	pam_unix_roles.so.1
rlogin	account required	pam_unix_projects.so.1
rlogin	account required	pam_unix_account.so.1
rlogin	session required	pam_unix_session.so.1

With this configuration, the server checks the client's source address. If an entry for the client exists in both `/etc/hosts` and `/etc/hosts.equiv`, a user logging in from the client is not prompted for a password. If the address is associated with a host for which no corresponding entry exists in `/etc/hosts`, the user is prompted for a password, regardless of whether or not an entry for the client is present in `/etc/hosts.equiv`. See `hosts(4)` and `hosts.equiv(4)`.

If there are no entries for the `rlogin` service, then the entries for the "other" service will be used. If multiple authentication modules are listed, then the user may be prompted for multiple passwords. Removing the `"pam_rhosts_auth.so.1"` entry will disable the `/etc/hosts.equiv` and `~/.rhosts` authentication protocol and the user would always be forced to type the password. The *sufficient* flag indicates that authentication through the `pam_rhosts_auth.so.1` module is "sufficient" to authenticate the user. Only if this authentication fails is the next authentication module used.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWrcmds

SEE ALSO

`login(1)`, `rlogin(1)`, `in.rshd(1M)`, `inetd(1M)`, `pam(3PAM)`, `environ(4)`, `hosts(4)`, `hosts.equiv(4)`, `inetd.conf(4)`, `pam.conf(4)`, `attributes(5)`, `pam_authtok_check(5)`, `pam_authtok_get(5)`, `pam_authtok_store(5)`, `pam_dhkeys(5)`, `pam_passwd_auth(5)`, `pam_unix(5)`, `pam_unix_account(5)`, `pam_unix_auth(5)`, `pam_unix_session(5)`

DIAGNOSTICS

All diagnostic messages are returned on the connection associated with the `stderr`, after which any network connections are closed. An error is indicated by a leading byte with a value of 1.

Hostname for your address unknown.

No entry in the host name database existed for the client's machine.

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Try again.

A *fork* by the server failed.

/usr/bin/sh: ...

The user's login shell could not be started.

NOTES The authentication procedure used here assumes the integrity of each client machine and the connecting medium. This is insecure, but it is useful in an "open" environment.

A facility to allow all data exchanges to be encrypted should be present.

The `pam_unix(5)` module might not be supported in a future release. Similar functionality is provided by `pam_authtok_check(5)`, `pam_authtok_get(5)`, `pam_authtok_store(5)`, `pam_dhkeys(5)`, `pam_passwd_auth(5)`, `pam_unix_account(5)`, `pam_unix_auth(5)`, and `pam_unix_session(5)`.

in.routed(1M)

NAME	in.routed, routed – network routing daemon
SYNOPSIS	<pre>/usr/sbin/in.routed [-AdghmnqsStvVz] [-T <i>tracefile</i>] [-F <i>net</i> [/mask [,metric]]] [-P <i>params</i>]</pre>
DESCRIPTION	The daemon <code>in.routed</code>, often referred to as <code>routed</code>, is invoked at boot time to manage the network routing tables. It uses Routing Information Protocol, RIPv1 (RFC 1058), RIPv2 (RFC 2453), and Internet Router Discovery Protocol (RFC 1256) to maintain the kernel routing table. The RIPv1 protocol is based on the reference 4.3BSD daemon. The daemon listens on a udp socket for the <code>route</code> service (see <code>services(4)</code>) for Routing Information Protocol packets. It also sends and receives multicast Router Discovery ICMP messages. If the host is a router, <code>in.routed</code> periodically supplies copies of its routing tables to any directly connected hosts and networks. It also advertises or solicits default routes using Router Discovery ICMP messages. When started (or when a network interface is later turned on), <code>in.routed</code> uses an <code>AF_ROUTE</code> address family facility to find those directly connected interfaces configured into the system and marked "up". It adds necessary routes for the interfaces to the kernel routing table. Soon after being first started, and provided there is at least one interface on which RIP has not been disabled, <code>in.routed</code> deletes all pre-existing non-static routes in the kernel table. Static routes in the kernel table are preserved and included in RIP responses if they have a valid RIP metric (see <code>route(1M)</code>). If more than one interface is present (not counting the loopback interface), it is assumed that the host should forward packets among the connected networks. After transmitting a RIP request and Router Discovery Advertisements or Solicitations on a new interface, the daemon enters a loop, listening for RIP request and response and Router Discovery packets from other hosts. When a request packet is received, <code>in.routed</code> formulates a reply based on the information maintained in its internal tables. The response packet generated contains a list of known routes, each marked with a "hop count" metric (a count of 16 or greater is considered "infinite"). Advertised metrics reflect the metric associated with an interface (see <code>ifconfig(1M)</code>), so setting the metric on an interface is an effective way to steer traffic. Responses do not include routes with a first hop on the requesting network, to implement in part split-horizon. Requests from query programs such as <code>rtquery(1M)</code> are answered with the complete table. The routing table maintained by the daemon includes space for several gateways for each destination to speed recovery from a failing router. RIP response packets received are used to update the routing tables, provided they are from one of the several currently recognized gateways or advertise a better metric than at least one of the existing gateways.

When an update is applied, `in.routed` records the change in its own tables and updates the kernel routing table if the best route to the destination changes. The change in the kernel routing table is reflected in the next batch of response packets sent. If the next response is not scheduled for a while, a flash update response containing only recently changed routes is sent.

In addition to processing incoming packets, `in.routed` also periodically checks the routing table entries. If an entry has not been updated for 3 minutes, the entry's metric is set to infinity and marked for deletion. Deletions are delayed until the route has been advertised with an infinite metric to insure the invalidation is propagated throughout the local internet. This is a form of poison reverse.

Routes in the kernel table that are added or changed as a result of ICMP Redirect messages are deleted after a while to minimize black-holes. When a TCP connection suffers a timeout, the kernel tells `in.routed`, which deletes all redirected routes through the gateway involved, advances the age of all RIP routes through the gateway to allow an alternate to be chosen, and advances the age of any relevant Router Discovery Protocol default routes.

Hosts acting as internetwork routers gratuitously supply their routing tables every 30 seconds to all directly connected hosts and networks. These RIP responses are sent to the broadcast address on nets that support broadcasting, to the destination address on point-to-point links, and to the router's own address on other networks. If RIPv2 is enabled, multicast packets are sent on interfaces that support multicasting.

If no response is received on a remote interface, if there are errors while sending responses, or if there are more errors than input or output (see `netstat(1M)`), then the cable or some other part of the interface is assumed to be disconnected or broken, and routes are adjusted appropriately.

The Internet Router Discovery Protocol is handled similarly. When the daemon is supplying RIP routes, it also listens for Router Discovery Solicitations and sends Advertisements. When it is quiet and listening to other RIP routers, it sends Solicitations and listens for Advertisements. If it receives a good Advertisement and it is not multi-homed, it stops listening for broadcast or multicast RIP responses. It tracks several advertising routers to speed recovery when the currently chosen router dies. If all discovered routers disappear, the daemon resumes listening to RIP responses. It continues listening to RIP while using Router Discovery if multi-homed to ensure all interfaces are used.

The Router Discovery standard requires that advertisements have a default "lifetime" of 30 minutes. That means should something happen, a client can be without a good route for 30 minutes. It is a good idea to reduce the default to 45 seconds using `-P rdisc_interval=45` on the command line or `rdisc_interval=45` in the `/etc/gateways` file. See `gateways(4)`.

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While using Router Discovery (which happens by default when the system has a single network interface and a Router Discover Advertisement is received), there is a single default route and a variable number of redirected host routes in the kernel table. On a host with more than one network interface, this default route will be via only one of the interfaces. Thus, multi-homed hosts running with `-q` might need the `no_rdisc` argument described below.

To support "legacy" systems that can handle neither RIPv2 nor Router Discovery, you can use the `pm_rdisc` parameter in the `/etc/gateways`. See `gateways(4)`.

By default, neither Router Discovery advertisements nor solicitations are sent over point-to-point links (for example, PPP). The Solaris OE uses a netmask of all ones (255.255.255.255) on point-to-point links.

`in.routed` supports the notion of "distant" passive or active gateways. When the daemon is started, it reads the file `/etc/gateways` to find such distant gateways that cannot be located using only information from a routing socket, to discover if some of the local gateways are passive, and to obtain other parameters. Gateways specified in this manner should be marked passive if they are not expected to exchange routing information, while gateways marked active should be willing to exchange RIP packets. Routes through passive gateways are installed in the kernel's routing tables once upon startup and are not included in transmitted RIP responses.

Distant active gateways are treated like network interfaces. RIP responses are sent to the distant active gateway. If no responses are received, the associated route is deleted from the kernel table and RIP responses are advertised via other interfaces. If the distant gateway resumes sending RIP responses, the associated route is restored.

Distant active gateways can be useful on media that do not support broadcasts or multicasts but otherwise act like classic shared media, such as some ATM networks. One can list all RIP routers reachable on the HIPPI or ATM network in `/etc/gateways` with a series of "host" lines. Note that it is usually desirable to use RIPv2 in such situations to avoid generating lists of inferred host routes.

Gateways marked external are also passive, but are not placed in the kernel routing table, nor are they included in routing updates. The function of external entries is to indicate that another routing process will install such a route if necessary, and that other routes to that destination should not be installed by `in.routed`. Such entries are required only when both routers might learn of routes to the same destination.

OPTIONS

Listed below are available options. Any other argument supplied is interpreted as the name of a file in which the actions of `in.routed` should be logged. It is better to use `-T` (described below) instead of appending the name of the trace file to the command.

`-A`

Do not ignore RIPv2 authentication if we do not care about RIPv2 authentication. This option is required for conformance with RFC 2453. However, it makes no sense and breaks using RIP as a discovery protocol to ignore all RIPv2 packets that carry authentication when this machine does not care about authentication.

- d
Do not run in the background. This option is meant for interactive use.
- F net [/mask] [, metric]
Minimize routes in transmissions via interfaces with addresses that match *net* (network number)/*mask* (netmask), and synthesizes a default route to this machine with the *metric*. The intent is to reduce RIP traffic on slow, point-to-point links, such as PPP links, by replacing many large UDP packets of RIP information with a single, small packet containing a "fake" default route. If *metric* is absent, a value of 14 is assumed to limit the spread of the "fake" default route. This is a dangerous feature that, when used carelessly, can cause routing loops. Notice also that more than one interface can match the specified network number and mask. See also -g.
- g
Used on internetwork routers to offer a route to the "default" destination. It is equivalent to -F 0/0, 1 and is present mostly for historical reasons. A better choice is -P pm_rdisc on the command line or pm_rdisc in the /etc/gateways file. A larger metric will be used with the latter alternatives, reducing the spread of the potentially dangerous default route. The -g (or -P) option is typically used on a gateway to the Internet, or on a gateway that uses another routing protocol whose routes are not reported to other local routers. Note that because a metric of 1 is used, this feature is dangerous. Its use more often creates chaos with a routing loop than solves problems.
- h
Causes host or point-to-point routes not to be advertised, provided there is a network route going the same direction. That is a limited kind of aggregation. This option is useful on gateways to LANs that have other gateway machines connected with point-to-point links such as SLIP.
- m
Cause the machine to advertise a host or point-to-point route to its primary interface. It is useful on multi-homed machines such as NFS servers. This option should not be used except when the cost of the host routes it generates is justified by the popularity of the server. It is effective only when the machine is supplying routing information, because there is more than one interface. The -m option overrides the -q option to the limited extent of advertising the host route.
- n
Do not install routes in kernel. By default, routes are installed in the kernel.
- P params
Equivalent to adding the parameter line *params* to the /etc/gateways file.
- q
Opposite of the -s option. This is the default when only one interface is present. With this explicit option, the daemon is always in "quiet mode" for RIP and does not supply routing information to other computers.

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	-s Force <code>in.routed</code> to supply routing information. This is the default if multiple network interfaces are present on which RIP or Router Discovery have not been disabled, and if the <code>/dev/ip ndd</code> variable <code>ip_forwarding</code> is set to 1. -S If <code>in.routed</code> is not acting as an internetwork router, instead of entering the whole routing table in the kernel, it enters only a default route for each internetwork router. This reduces the memory requirements without losing any routing reliability. This option is provided for compatibility with the previous, RIPv1-only <code>in.routed</code>. Use of this option is generally discouraged. -t Runs in the foreground (as with <code>-d</code>) and logs the contents of the packets received (as with <code>-zz</code>). This is for compatibility with prior versions of Solaris. -T <i>tracefile</i> Increases the debugging level to at least 1 and causes debugging information to be appended to the trace file. Because of security concerns, do not to run <code>in.routed</code> routinely with tracing directed to a file. -v Enables debug. Same as <code>-z</code>. -V Displays the version of the daemon. -z Increase the debugging level, which causes more information to be logged on the tracefile specified with <code>-T</code> or <code>stdout</code>. The debugging level can be increased or decreased with the <code>SIGUSR1</code> or <code>SIGUSR2</code> signals or with the <code>rtquery(1M)</code> command.						
FILES	<table><tr><td><code>/etc/defaultrouter</code></td><td>If this file is present and contains the address of a default router, the system startup script does not run <code>in.routed</code>. See <code>defaultrouter(4)</code>.</td></tr><tr><td><code>/etc/gateways</code></td><td>List of distant gateways and general configuration options for <code>in.routed</code>. See <code>gateways(4)</code>.</td></tr><tr><td><code>/etc/notrouter</code></td><td>Presence of this file sets the <code>/dev/ip_forwarding</code> flag to zero, preventing machine from forwarding IP packets received on one interface to any other. <code>in.routed</code> does not advertise reachable routes if IP forwarding is disabled.</td></tr></table>	<code>/etc/defaultrouter</code>	If this file is present and contains the address of a default router, the system startup script does not run <code>in.routed</code> . See <code>defaultrouter(4)</code> .	<code>/etc/gateways</code>	List of distant gateways and general configuration options for <code>in.routed</code> . See <code>gateways(4)</code> .	<code>/etc/notrouter</code>	Presence of this file sets the <code>/dev/ip_forwarding</code> flag to zero, preventing machine from forwarding IP packets received on one interface to any other. <code>in.routed</code> does not advertise reachable routes if IP forwarding is disabled.
<code>/etc/defaultrouter</code>	If this file is present and contains the address of a default router, the system startup script does not run <code>in.routed</code> . See <code>defaultrouter(4)</code> .						
<code>/etc/gateways</code>	List of distant gateways and general configuration options for <code>in.routed</code> . See <code>gateways(4)</code> .						
<code>/etc/notrouter</code>	Presence of this file sets the <code>/dev/ip_forwarding</code> flag to zero, preventing machine from forwarding IP packets received on one interface to any other. <code>in.routed</code> does not advertise reachable routes if IP forwarding is disabled.						
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:						

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ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWroute

SEE ALSO route(1M), rtquery(1M), ioctl(2), inet(3SOCKET), defaultrouter(4), gateways(4), attributes(5), icmp(7P), inet(7P), udp(7P)

Internet Transport Protocols, XSI 028112, Xerox System Integration Standard

Routing Information Protocol, v2 (RFC 2453, STD 0056, November 1998)

RIP-v2 MD5 Authentication (RFC 2082, January 1997)

Routing Information Protocol, v1 (RFC 1058, June 1988)

ICMP Router Discovery Messages (RFC 1256, September 1991)

NOTES This daemon purposefully deviates from RFC 2453 in two notable ways:

- By default, `in.routed` does not discard authenticated RIPv2 messages when RIP authentication is not configured. There is little to gain from dropping authenticated packets when RIPv1 listeners will gladly process them. Using the `-A` option causes `in.routed` to conform to the RFC in this case.
- Unauthenticated RIP requests are never discarded, even when RIP authentication is configured. Forwarding tables are not secret and can be inferred through other means such as test traffic. RIP is also the most common router-discovery protocol, and hosts need to send queries that will be answered.

`in.routed` does not always detect unidirectional failures in network interfaces, for example, when the output side fails.

in.rshd(1M)

NAME	in.rshd, rshd – remote shell server
SYNOPSIS	in.rshd <i>host.port</i>
DESCRIPTION	in.rshd is the server for the rsh(1) program. The server provides remote execution facilities with authentication based on privileged port numbers. in.rshd is invoked by inetd(1M) each time a shell service is requested, and executes the following protocol: 1. The server checks the client's source port. If the port is not in the range 512-1023, the server aborts the connection. The client's host address (in hex) and port number (in decimal) are the arguments passed to in.rshd. 2. The server reads characters from the socket up to a null (<code>\0</code>) byte. The resultant string is interpreted as an ASCII number, base 10. 3. If the number received in step 2 is non-zero, it is interpreted as the port number of a secondary stream to be used for the stderr. A second connection is then created to the specified port on the client's machine. The source port of this second connection is also in the range 512-1023. 4. A null-terminated user name of at most 16 characters is retrieved on the initial socket. This user name is interpreted as the user identity on the <i>client's</i> machine. 5. A null terminated user name of at most 16 characters is retrieved on the initial socket. This user name is interpreted as a user identity to use on the <i>server's</i> machine. 6. A null terminated command to be passed to a shell is retrieved on the initial socket. The length of the command is limited by the upper bound on the size of the system's argument list. 7. in.rshd then validates the user according to the following steps. The remote user name is looked up in the password file and a chdir is performed to the user's home directory. If the lookup fails, the connection is terminated. If the chdir fails, it does a chdir to / (root). If the user is not the superuser, (user ID 0), and if the pam_rhosts_auth PAM module is configured for authentication, the file <code>/etc/hosts.equiv</code> is consulted for a list of hosts considered "equivalent". If the client's host name is present in this file, the authentication is considered successful. See the SECURITY section below for a discussion of PAM authentication. If the lookup fails, or the user is the superuser, then the file <code>.rhosts</code> in the home directory of the remote user is checked for the machine name and identity of the user on the client's machine. If this lookup fails, the connection is terminated 8. A null byte is returned on the connection associated with the stderr and the command line is passed to the normal login shell of the user. (The PATH variable is set to <code>/usr/bin</code>.) The shell inherits the network connections established by in.rshd.
USAGE	rshd and in.rshd are IPv6-enabled. See ip6(7P) .

SECURITY | `in.rshd` uses `pam(3PAM)` for authentication, account management, and session management. The PAM configuration policy, listed through `/etc/pam.conf`, specifies the modules to be used for `in.rshd`. Here is a partial `pam.conf` file with entries for the `rsh` command using `rhosts` authentication, UNIX account management, and session management module.

rsh	auth	required	pam_rhosts_auth.so.1
rsh	account	required	pam_unix_roles.so.1
rsh	session	required	pam_unix_projects.so.1
rsh	session	required	pam_unix_account.so.1
rsh	session	required	pam_unix_session.so.1

If there are no entries for the `rsh` service, then the entries for the "other" service are used. To maintain the authentication requirement for `in.rshd`, the `rsh` entry must always be configured with the `pam_rhosts_auth.so.1` module.

FILES | `/etc/hosts.equiv`

ATTRIBUTES | See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWrcmds

SEE ALSO | `rsh(1)`, `inetd(1M)`, `pam(3PAM)`, `hosts(4)`, `inetd.conf(4)`, `pam.conf(4)`, `attributes(5)`, `environ(5)`, `pam_authtok_check(5)`, `pam_authtok_get(5)`, `pam_authtok_store(5)`, `pam_dhkeys(5)`, `pam_passwd_auth(5)`, `pam_rhosts_auth(5)`, `pam_unix(5)`, `pam_unix_account(5)`, `pam_unix_auth(5)`, `pam_unix_session(5)`, `ip6(7P)`

DIAGNOSTICS | The following diagnostic messages are returned on the connection associated with `stderr`, after which any network connections are closed. An error is indicated by a leading byte with a value of 1 in step 8 above (0 is returned above upon successful completion of all the steps prior to the command execution).

`locuser too long`

The name of the user on the client's machine is longer than 16 characters.

`remuser too long`

The name of the user on the remote machine is longer than 16 characters.

in.rshd(1M)

command too long

The command line passed exceeds the size of the argument list (as configured into the system).

Hostname for your address unknown.

No entry in the host name database existed for the client's machine.

Login incorrect.

No password file entry for the user name existed.

Permission denied.

The authentication procedure described above failed.

Can't make pipe.

The pipe needed for the stderr was not created.

Try again.

A *fork* by the server failed.

NOTES

The authentication procedure used here assumes the integrity of each client machine and the connecting medium. This is insecure, but it is useful in an "open" environment.

A facility to allow all data exchanges to be encrypted should be present.

The `pam_unix(5)` module might not be supported in a future release. Similar functionality is provided by `pam_authok_check(5)`, `pam_authok_get(5)`, `pam_authok_store(5)`, `pam_dhkeys(5)`, `pam_passwd_auth(5)`, `pam_unix_account(5)`, `pam_unix_auth(5)`, and `pam_unix_session(5)`.

NAME	in.rwhod, rwhod – system status server
SYNOPSIS	/usr/sbin/in.rwhod [-m <i>[ttl]</i>]
DESCRIPTION	in.rwhod is the server which maintains the database used by the rwho(1) and ruptime(1) programs. Its operation is predicated on the ability to broadcast or multicast messages on a network. in.rwhod operates as both a producer and consumer of status information. As a producer of information it periodically queries the state of the system and constructs status messages which are broadcast or multicast on a network. As a consumer of information, it listens for other in.rwhod servers' status messages, validating them, then recording them in a collection of files located in the directory /var/spool/rwho. The rwho server transmits and receives messages at the port indicated in the rwho service specification, see services(4). The messages sent and received are defined in /usr/include/protocols/rwhod.h and are of the form: <pre> struct outmp { char out_line[8]; /* tty name */ char out_name[8]; /* user id */ long out_time; /* time on */ }; struct whod { char wd_vers; char wd_type; char wd_fill[2]; int wd_sendtime; int wd_recvtime; char wd_hostname[32]; int wd_loadav[3]; int wd_boottime; struct whoent { struct outmp we_utmp; int we_idle; } wd_we[1024 / sizeof (struct whoent)]; }; </pre> All fields are converted to network byte order prior to transmission. The load averages are as calculated by the w(1) program, and represent load averages over the 1, 5, and 15 minute intervals prior to a server's transmission. The host name included is that returned by the uname(2) system call. The array at the end of the message contains information about the users who are logged in to the sending machine. This information includes the contents of the utmpx(4) entry for each non-idle terminal line and a value indicating the time since a character was last received on the terminal line. Messages received by the rwho server are discarded unless they originated at a rwho server's port. In addition, if the host's name, as specified in the message, contains any unprintable ASCII characters, the message is discarded. Valid messages received by in.rwhod are placed in files named whod.hostname in the directory /var/spool/rwho. These files contain only the most recent message, in the format described above.

in.rwhod(1M)

Status messages are generated approximately once every 3 minutes.

OPTIONS The following options are supported:

`-m [ ttl ]` Use the rwho IP multicast address (224.0.1.3) when transmitting. Receive announcements both on this multicast address and on the IP broadcast address. If *ttl* is not specified `in.rwhod` multicasts on all interfaces but with the IP TimeToLive set to 1 (that is, packets are not forwarded by multicast routers.) If *ttl* is specified `in.rwhod` only transmits packets on one interface and setting the IP TimeToLive to the specified *ttl*.

FILES `/var/spool/rwho/whod.*` information about other machines

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWrcmds

SEE ALSO `ruptime(1)`, `rwho(1)`, `w(1)`, `uname(2)`, `services(4)`, `utmpx(4)`, `attributes(5)`

WARNINGS This service can cause network performance problems when used by several hosts on the network. It is not run at most sites by default. If used, include the `-m` multicast option.

NOTES This service takes up progressively more network bandwidth as the number of hosts on the local net increases. For large networks, the cost becomes prohibitive.

`in.rwhod` should relay status information between networks. People often interpret the server dying as a machine going down.

NAME	install – install commands
SYNOPSIS	<pre> /usr/sbin/install -c <i>dira</i> [-m <i>mode</i>] [-u <i>user</i>] [-g <i>group</i>] [-o] [-s] <i>file</i> /usr/sbin/install -f <i>dirb</i> [-m <i>mode</i>] [-u <i>user</i>] [-g <i>group</i>] [-o] [-s] <i>file</i> /usr/sbin/install -n <i>dirc</i> [-m <i>mode</i>] [-u <i>user</i>] [-g <i>group</i>] [-o] [-s] <i>file</i> /usr/sbin/install -d -i [-m <i>mode</i>] [-u <i>user</i>] [-g <i>group</i>] [-o] [-s] <i>dirx...</i> /usr/sbin/install [-m <i>mode</i>] [-u <i>user</i>] [-g <i>group</i>] [-o] [-s] <i>file</i> [<i>dirx...</i>] </pre>
DESCRIPTION	install is most commonly used in “makefiles” (see make(1S)) to install a file in specific locations, or to create directories within a file system. Each file is installed by copying it into the appropriate directory. install uses no special privileges to copy files from one place to another. The implications of this are: ■ You must have permission to read the files to be installed. ■ You must have permission to copy into the destination directory. ■ You must have permission to change the modes on the final copy of the file if you want to use the -m option. ■ You must be super-user if you want to specify the ownership of the installed file with the -u or -g options. If you are not the super-user, the installed file will be owned by you, regardless of who owns the original. install prints messages telling the user exactly what files it is replacing or creating and where they are going. If no options or directories (<i>dirx...</i>) are given, install searches a set of default directories (/bin, /usr/bin, /etc, /lib, and /usr/lib, in that order) for a file with the same name as <i>file</i>. When the first occurrence is found, install issues a message saying that it is overwriting that file with <i>file</i>, and proceeds to do so. If the file is not found, the program states this and exits. If one or more directories (<i>dirx...</i>) are specified after <i>file</i>, those directories are searched before the default directories.
OPTIONS	-c <i>dira</i> Install <i>file</i> in the directory specified by <i>dira</i>, if <i>file</i> does not yet exist. If it is found, install issues a message saying that the file already exists, and exits without overwriting it. -f <i>dirb</i> Force <i>file</i> to be installed in given directory, even if the file already exists. If the file being installed does not already exist, the mode and owner of the new file will be set to 755 and bin , respectively. If the file already exists, the mode and owner will be that of the already existing file.

install(1M)

-n <i>dir</i>	If <i>file</i> is not found in any of the searched directories, it is put in the directory specified in <i>dir</i> . The mode and owner of the new file will be set to 755 and <i>bin</i> , respectively.
-d	Create a directory. Missing parent directories are created as required as in <code>mkdir -p</code> . If the directory already exists, the owner, group and mode will be set to the values given on the command line.
-i	Ignore default directory list, searching only through the given directories (<i>dirx . .</i>).
-m <i>mode</i>	The mode of the new file is set to <i>mode</i> . Set to 0755 by default.
-u <i>user</i>	The owner of the new file is set to <i>user</i> . Only available to the super-user. Set to <i>bin</i> by default.
-g <i>group</i>	The group id of the new file is set to <i>group</i> . Only available to the super-user. Set to <i>bin</i> by default.
-o	If <i>file</i> is found, save the “found” file by copying it to <i>OLDfile</i> in the directory in which it was found. This option is useful when installing a frequently used file such as <i>/bin/sh</i> or <i>/lib/saf/ttymon</i> , where the existing file cannot be removed.
-s	Suppress printing of messages other than error messages.

USAGE See `largefile(5)` for the description of the behavior of `install` when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `chgrp(1)`, `chmod(1)`, `chown(1)`, `cp(1)`, `make(1S)`, `mkdir(1)`, `chown(1M)`, `attributes(5)`, `largefile(5)`

NAME	installboot – install bootblocks in a disk partition				
SYNOPSIS					
SPARC	installboot <i>bootblk raw-disk-device</i>				
x86	installboot <i>pboot bootblk raw-disk-device</i>				
DESCRIPTION	The boot(1M) program, ufsboot, is loaded from disk by the bootblock program which resides in the boot area of a disk partition. The ufs boot objects are platform-dependent, and reside in the <code>/usr/platform/<i>platform-name</i>/lib/fs/ufs</code> directory. The platform name can be found using the <code>-i</code> option of <code>uname(1)</code>.				
OPERANDS	<i>bootblk</i> The name of the bootblock code. <i>raw-disk-device</i> The name of the disk device onto which the bootblock code is to be installed; it must be a character device which is readable and writable. Naming conventions for a SCSI or IPI drive are <code>c?t?d?s?</code> and <code>c?d?s?</code> for an IDE drive. <i>pboot</i> The name of the partition boot file.				
EXAMPLES					
SPARC	To install a ufs bootblock on slice 0 of target 0 on controller 1 of the platform where the command is being run, use: <pre>example# installboot /usr/platform/`uname -i`/lib/fs/ufs/bootblk \ /dev/rdisk/c1t0d0s0</pre>				
x86	To use installboot to install the ufs bootblock and partition boot program on a disk in an IA machine, you must specify slice 2 and that slice must be the entire disk. For example, to install the UFS bootblock on target 0, controller 1 of the platform where the command is being run, use: <pre>example# installboot /usr/platform/`uname -i`/lib/fs/ufs/pboot \ /usr/platform/`uname -i`/lib/fs/ufs/bootblk /dev/rdisk/c1t0d0s2</pre>				
FILES	<code>/usr/platform/<i>platform-name</i>/lib/fs/ufs</code> directory where ufs boot objects reside. <code>/platform/<i>platform-name</i>/ufsboot</code> second level program to boot from a disk or CD				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				

installboot(1M)

SEE ALSO od(1), uname(1), boot(1M), init(1M), kadb(1M), kernel(1M), reboot(1M),
rpc.bootparamd(1M), init.d(4), attributes(5)

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SPARC monitor(1M)

x86 fdisk(1M), fmthard(1M)

WARNINGS The installboot utility fails if the *bootblk*, *pboot* or *openfirmware* files do not exist or
if the raw disk device is not a character device.

NAME	installer – Solaris Web Start installer utility									
SYNOPSIS	installer [-locales <i>list</i>] [-nodisplay] [-noconsole] [-debug]									
DESCRIPTION	The installer utility invokes a Web Start install wizard sequence which will lead the user through a sequence of installation panels. This installer utility is found on many CDs that are shipped with Solaris and it will be found among the top level files of these CDs. When the installer is on a CD being accessed from a desktop file manager, the installer can be double clicked to start the installation sequence. If the user is not currently the system’s root user, the root user password will be requested. The installer utility can also be run from other UNIX scripts. Usually, a script is used in conjunction with the utility’s -nodisplay option. Add the -noconsole option for non-interactive scripts.									
OPTIONS	The following options are supported: <table><tr><td>-locales <i>list</i></td><td>Selects product translations for install, corresponding to the specified list of locales if the specified locale translations are present on the installation media. Locales are supplied in a comma-separated list following the -locales option. An example <i>list</i> would appear as follows: installer -locales fr,de,itThis would install products with translations for the French, German, and Italian locales.</td></tr><tr><td>-nodisplay</td><td>Runs the install without a graphical user interface. Use the default product install unless it was modified by the -locales options.</td></tr><tr><td>-noconsole</td><td>Run the install without any interactive text console device. Useful when paired with -nodisplay for non-interactive UNIX script use.</td></tr><tr><td>-debug</td><td>Outputs extra information about what the install is doing. Mainly for install diagnostic purposes.</td></tr></table>		-locales <i>list</i>	Selects product translations for install, corresponding to the specified list of locales if the specified locale translations are present on the installation media. Locales are supplied in a comma-separated list following the -locales option. An example <i>list</i> would appear as follows: installer -locales fr,de,it This would install products with translations for the French, German, and Italian locales.	-nodisplay	Runs the install without a graphical user interface. Use the default product install unless it was modified by the -locales options.	-noconsole	Run the install without any interactive text console device. Useful when paired with -nodisplay for non-interactive UNIX script use.	-debug	Outputs extra information about what the install is doing. Mainly for install diagnostic purposes.
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-nodisplay	Runs the install without a graphical user interface. Use the default product install unless it was modified by the -locales options.									
-noconsole	Run the install without any interactive text console device. Useful when paired with -nodisplay for non-interactive UNIX script use.									
-debug	Outputs extra information about what the install is doing. Mainly for install diagnostic purposes.									
FILES	/var/sadm/install/logs	location of installation log files								
SEE ALSO	prodreg(1M)									

installf(1M)

NAME	installf – add a file to the software installation database										
SYNOPSIS	<pre>installf [-c class] [[-M] -R root_path] [-V fs_file] pkginst pathname [ftype [major minor] [mode owner group]] installf [-c class] [[-M] -R root_path] [-V fs_file] pkginst - installf -f [-c class] [[-M] -R root_path] [-V fs_file] pkginst</pre>										
DESCRIPTION	installf informs the system that a pathname not listed in the pkgmap(4) file is being created or modified. It should be invoked before any file modifications have occurred. When the second synopsis is used, the pathname descriptions will be read from standard input. These descriptions are the same as would be given in the first synopsis but the information is given in the form of a list. The descriptions should be in the form: <pre>pathname [ftype [major minor] [mode owner group]]</pre> After all files have been appropriately created and/or modified, installf should be invoked with the -f synopsis to indicate that installation is final. Links will be created at this time and, if attribute information for a pathname was not specified during the original invocation of installf, or was not already stored on the system, the current attribute values for the pathname will be stored. Otherwise, installf verifies that attribute values match those given on the command line, making corrections as necessary. In all cases, the current content information is calculated and stored appropriately.										
OPTIONS	<table> <tr> <td>-c class</td><td>Class to which installed objects should be associated. Default class is none.</td></tr> <tr> <td>-f</td><td>Indicates that installation is complete. This option is used with the final invocation of installf (for all files of a given class).</td></tr> <tr> <td>-M</td><td>Instruct installf not to use the \$root_path/etc/vfstab file for determining the client's mount points. This option assumes the mount points are correct on the server and it behaves consistently with Solaris 2.5 and earlier releases.</td></tr> <tr> <td>-R root_path</td><td>Define the full path name of a directory to use as the root_path. All files, including package system information files, are relocated to a directory tree starting in the specified root_path. The root_path may be specified when installing to a client from a server (for example, /export/root/client1).</td></tr> <tr> <td>-V fs_file</td><td>Specify an alternative fs_file to map the client's file systems. For example, used in situations where the \$root_path/etc/vfstab file is non-existent or unreliable.</td></tr> </table>	-c class	Class to which installed objects should be associated. Default class is none.	-f	Indicates that installation is complete. This option is used with the final invocation of installf (for all files of a given class).	-M	Instruct installf not to use the \$root_path/etc/vfstab file for determining the client's mount points. This option assumes the mount points are correct on the server and it behaves consistently with Solaris 2.5 and earlier releases.	-R root_path	Define the full path name of a directory to use as the root_path. All files, including package system information files, are relocated to a directory tree starting in the specified root_path. The root_path may be specified when installing to a client from a server (for example, /export/root/client1).	-V fs_file	Specify an alternative fs_file to map the client's file systems. For example, used in situations where the \$root_path/etc/vfstab file is non-existent or unreliable.
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-V fs_file	Specify an alternative fs_file to map the client's file systems. For example, used in situations where the \$root_path/etc/vfstab file is non-existent or unreliable.										

OPERANDS	<i>pkginst</i>	Name of package instance with which the pathname should be associated.
	<i>pathname</i>	Pathname that is being created or modified.
	<i>ftype</i>	A one-character field that indicates the file type. Possible file types include:
	b	block special device
	c	character special device
	d	directory
	e	a file to be edited upon installation or removal
	f	a standard executable or data file
	l	linked file
	p	named pipe
	s	symbolic link
	v	volatile file (one whose contents are expected to change)
	x	an exclusive directory
	<i>major</i>	The major device number. The field is only specified for block or character special devices.
	<i>minor</i>	The minor device number. The field is only specified for block or character special devices.
	<i>mode</i>	The octal mode of the file (for example, 0664). A question mark (?) indicates that the mode will be left unchanged, implying that the file already exists on the target machine. This field is not used for linked or symbolically linked files.
	<i>owner</i>	The owner of the file (for example, bin or root). The field is limited to 14 characters in length. A question mark (?) indicates that the owner will be left unchanged, implying that the file already exists on the target machine. This field is not used for linked or symbolically linked files.
	<i>group</i>	The group to which the file belongs (for example, bin or sys). The field is limited to 14 characters in length. A question mark (?) indicates that the group will be left unchanged, implying that the file already exists on the target machine. This field is not used for linked or symbolically linked files.

installf(1M)

EXAMPLES

EXAMPLE 1 The use of `installf`.

The following example shows the use of `installf`, invoked from an optional pre-install or post-install script:

```
#create /dev/xt directory
#(needs to be done before drvinstall)
installf $PKGINST /dev/xt d 755 root sys ||
    exit 2
majno='/usr/sbin/drvinstall -m /etc/master.d/xt
    -d $BASEDIR/data/xt.o -v1.0' ||
    exit 2
i=00
while [ $i -lt $limit ]
do
    for j in 0 1 2 3 4 5 6 7
    do
        echo /dev/xt$i$j c $majno `expr $i ? 8 + $j`
        644 root sys |
        echo /dev/xt$i$j=/dev/xt/$i$j
    done
    i=`expr $i + 1`
    [ $i -le 9 ] && i="0$i" #add leading zero
done | installf $PKGINST - || exit 2
# finalized installation, create links
installf -f $PKGINST || exit 2
```

EXIT STATUS

0 Successful operation.
>0 An error occurred.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

`pkginfo(1)`, `pkgmk(1)`, `pkgparam(1)`, `pkgproto(1)`, `pkgtrans(1)`, `pkgadd(1M)`, `pkgask(1M)`, `pkgchk(1M)`, `pkgrm(1M)`, `removef(1M)`, `pkgmap(4)`, `space(4)`, `attributes(5)`

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NOTES

When `ftype` is specified, all applicable fields, as shown below, must be defined:

<i>ftype</i>	Required Fields
p, x, d, f, v, or e	mode owner group
c or b	major minor mode owner group

installf(1M)

The `installf` command will create directories, named pipes and special devices on the original invocation. Links are created when `installf` is invoked with the `-f` option to indicate installation is complete.

Links should be specified as *path1=path2*. *path1* indicates the destination and *path2* indicates the source file.

Files installed with `installf` will be placed in the class `none`, unless a class is defined with the command. Subsequently, they will be removed when the associated package is deleted. If this file should not be deleted at the same time as the package, be certain to assign it to a class which is ignored at removal time. If special action is required for the file before removal, a class must be defined with the command and an appropriate class action script delivered with the package.

When classes are used, `installf` must be used in one of the following forms:

```
installf -c class1 . . .
installf -f -c class1 . . .
installf -c class2 . . .
installf -f -c class2 . . .
```

install_scripts(1M)

NAME	install_scripts, add_install_client, add_to_install_server, modify_install_server, rm_install_client, setup_install_server, check – scripts used to install the Solaris software
SYNOPSIS	<pre> cdrom-mnt-pt/Solaris_XX/Tools/add_install_client [-i IP_address] [-e Ethernet_address] [-s server_name : path] [-c server_name : path] [-n [server] : name_service [(netmask)] [-p server_name : path] [-f boot_file_name] host_name platform_group cdrom-mnt-pt/Solaris_XX/Tools/add_install_client -d [-s server_name:path] [-c server_name:path] [-p server_name:path] [-t install_boot_image_path] [-f boot_file_name] platform_name platform_group cdrom-mnt-pt/Solaris_XX/Tools/add_install_client -d [-s server_name:path] [-c server_name:path] [-p server_name:path] [-t install_boot_image_path] [-f boot_file_name] -e Ethernet_address platform_group cdrom-mnt-pt/Solaris_XX/Tools/add_to_install_server [-s] [-p product_image_path] install_server_path cdrom-mnt-pt/Solaris_XX/Tools/jumpstart_sample/check [-p install_dir_path] [-r rulesfile] cdrom-mnt-pt/modify_install_server [-p] install_dir_path installer_miniroot_path cdrom-mnt-pt/Solaris_XX/Tools/rm_install_client host_name cdrom-mnt-pt/Solaris_XX/Tools/setup_install_server [-b] [-t install_boot_image_path] [-w wanboot_image_path] install_dir_path </pre>
DESCRIPTION	These commands are located on slice 0 of the Solaris Software and Solaris Installer CDs. If the Solaris CD has been copied to a local disk, <code>cdrom_mnt_pt</code> is the path to the copied Solaris CD. They can be used for a variety of installation tasks. The <code>XX</code> in <code>Solaris_XX</code> is the version number of the Solaris release being used. There are three versions of the <code>add_install_client</code> command. See SYNOPSIS. Use the following version of the <code>add_install_client</code> command to add clients for network installation (these commands update the <code>bootparams(4)</code> file). The <code>add_install_client</code> command must be run from the install server's Solaris installation image (a mounted Solaris CD or a Solaris CD copied to disk) or the boot server's boot directory (if a boot server is required). The Solaris installation image or the boot directory must be the same Solaris release that you want installed on the client. <pre> cdrom-mnt-pt/Solaris_XX/Tools/add_install_client [-i IP_address] [-e Ethernet_address] [-s server_name : path] [-c server_name : path] [-n [server] : name_service [(netmask)] [-p server_name : path] host_name platform_group </pre>

Use the following version of the `add_install_client` command to add support for instances of a platform within a platform group to the install server. This group will be booted and configured using DHCP. The script will perform the necessary configuration steps on the server, and prints the data that the user needs to add to the DHCP server for the group.

```
cdrom-mnt-pt/Solaris_XX/Tools/add_install_client -d [-s server:path]
[-c server:path] [-p server:path] [-t install boot image path]
[-f boot file name] platform_name platform_group
```

Use the following version of the `add_install_client` command to add a single client to the install server. This client will be booted and configured using DHCP. The script will perform the necessary configuration steps on the server, and will print the data that the user needs to add to the DHCP server for the client. The `-f` flag used above needs to be added to the existing usage as well. `-f` allows the user to specify a boot file name to be used for a given client.

```
cdrom-mnt-pt/Solaris_XX/Tools/add_install_client -d
[-s server_name:path] [-c server_name:path] [-p server_name:path]
[-t install_boot_image_path] [-f boot_file_name] -e Ethernet_address
platform_group
```

Note – Always use the `-d` option when registering x86 Architecture Pre-boot eXecution Environment (PXE) clients. These clients use DHCP for their configuration.

Use `add_to_install_server` to merge other Solaris CDs with an existing image on a Net Install Server. Each CD that can be merged (currently OS CD 2, and the Language CD) has its own `add_to_install_server` script. Do not use `add_to_install_server` scripts with CDs other than the ones with which they were delivered.

Use `check` to validate the rules in a rules file (this is only necessary if a custom JumpStart installation is being set up).

Use `modify_install_server` to replace an existing net install server's miniroot with a Solaris Installation CD's miniroot. This will change the net install server's install time user interface over to the Solaris Installation CD's Web Start user interface.

An existing install image (created using `setup_install_server`) must exist prior to using the `modify_install_server` command.

Use `rm_install_client` to remove clients for network installation (these commands update the `bootparams(4)` file).

Use `setup_install_server` to copy the Solaris CD to a disk (to set up an install server), to build a WANboot miniroot image (to set up a WANboot install server), or to copy just the boot software of the Solaris CD to a disk (to set up a boot server). An install server is required to install clients over the network. A boot server is also required for network installations if the install server and clients to be installed are on different subnets (the boot server must be located on the client's subnet).

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OPTIONS

The `add_install_client` supports the following options:

`-c server_name:path`

This option is required only to specify a JumpStart directory for a custom JumpStart installation. *server_name* is the host name of the server with a JumpStart directory. *path* is the absolute path to the JumpStart directory.

`-d`

Specify as a DHCP client.

`-e Ethernet_address`

Specify the Ethernet address of the system to be installed.

`-f`

Specify the *boot_file_name* of the client to be installed.

`-i IP_address`

Specify the IP address of the client to be installed.

`-n [server]: name_service[(netmask)]`

This option specifies which name service should be used during system configuration. This sets the `ns` keyword in the `bootparams(4)` file.

name_service

Valid entries are `nis`, `nisplus`, and `none`.

netmask

A series of four numbers separated by periods, specifying which portion of an IP address is the network part, and which is the host part.

server

The name of the server or IP address of the specified name service. If the server specified is on a different subnet, then the *netmask* may be needed to enable the client to contact the server.

`-p server_name: path`

This option is the location of the user-defined `sysidcfg` file for pre-configuring system or network information. *server_name* is either a valid host name or IP address. *path* is the absolute path to the Jumpstart directory.

`-s server_name:path`

This option is required only when using `add_install_client` from a boot server. Specify the name of the server and the absolute path of the Solaris installation image that will be used for this installation. *path* is either the path to a mounted Solaris CD or a path to a directory with a copy of the Solaris CD.

The `add_to_install_server` command supports the following options:

`-p`

Specifies the location of the CD (containing the supplemental products) to be copied.

`-s`

Allows users to select from a list only the products needing installation.

The `check` command supports the following options:

`-p install_dir_path`

Validates the rules file by using the `check` script from a specified Solaris installation image, instead of the `check` script from the system you are using. `install_dir_path` is the path to a Solaris installation image on a local disk or a mounted Solaris CD.

Use this option to run the most recent version of `check` if your system is running a previous version of Solaris.

`-r rulesfile`

Specifies a rules file other than the one named `rules`. Using this option, the validity of a rule can be tested before integrating it into the rules file. `check` will report whether or not the rule is valid, but it will not create the `rules.ok` file necessary for a custom JumpStart installation.

The `modify_install_server` command supports the following options:

`-p`

This option preserves the existing images `miniroot` in `install_dir_path/Solaris_XX/Tools/Boot.orig`.

The `setup_install_server` command supports the following options:

`-b`

This option sets up the server only as a boot server.

`-t`

This option allows an alternate `miniroot` to be specified.

`-w`

This option builds a WANboot `miniroot` image.

OPERANDS

The `add_install_client` command supports the following options:

host_name

This is the name of the client to be installed.

platform_group

Vendor-defined grouping of hardware platforms for the purpose of distributing specific software. Examples of valid platform groups are:

System	Platform Group
x86	i86pc
Sun Fire 4800	sun4u

Use the `uname(1)` command (with the `-m` option) to determine a system's platform group.

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platform_name

Use the `uname(1)` command (with the `-i` option) to determine a system's platform name.

The following example shows the use of the `uname` command to determine the system platform name for an Ultra 1:

```
uname -i
```

The system responds with:

```
SUNW,Ultra-1
```

Therefore, the system's platform name is `SUNW,Ultra1`.

The following command calls `add_install_client` for Ultra 1s:

```
add_install_client -d SUNW,Ultra-1 sun4u
```

For IA32 platforms, the platform name is always `SUNW.i86pc`.

The following command calls `add_install_client` for IA32 platforms:

```
add_install_client -d SUNW.i86pc i86pc
```

The `rm_install_client` command supports the following operands:

host_name

This is the name of the client to be removed.

The `setup_install_server` command supports the following operands:

install_dir_path

The absolute path of the directory in which the Solaris software is to be copied. The directory must be empty.

wanboot_image_path

The absolute path of the directory in which the file containing the WANboot miniroot image is to be created.

EXAMPLES

EXAMPLE 1 Using `add_install_client`

The following `add_install_client` commands add clients for network installation from a mounted Solaris CD on an install server on Solaris 9:

```
example# cd /cdrom/cdrom0/s0/Solaris_9/Tools
example# ./add_install_client system_2/sun4u
```

EXAMPLE 2 Using `add_install_client`

The following `add_install_client` commands add clients for network installation from a mounted Solaris CD on an install server. The `-c` option specifies a server and path to a JumpStart directory that has a rules file and a profile file for performing a custom JumpStart installation. Also, the Solaris CD has been copied to the `/export/install` directory on Solaris 9:

```
example# cd /export/install/Solaris_9/Tools
example# ./add_install_client -c install_server:/jumpstart system_1 i86pc
```

EXAMPLE 2 Using `add_install_client` (Continued)

```
example# ./add_install_client -c install_server:/jumpstart system_2 i86pc
```

EXAMPLE 3 Using `add_install_client`

The following `add_install_client` command adds support for a specific sun4u platform machine (8:0:20:99:88:77) using the boot file: `sun4u.solaris8`.

```
example# add_install_client -d -f sun4u.solaris8 -e 8:0:20:99:88:77 sun4u
```

EXAMPLE 4 Using `add_install_client`

The following `add_install_client` command adds x86 clients that use the PXE standard for network booting:

```
example# add_install_client -d -s svrname:/mnt/export/root SUNW.i86pc i86p
```

EXAMPLE 5 Using `add_to_install_server`

The following `add_to_install_server` command copies the packages in all the CD's products directories to an existing install server on Solaris 9:

```
example# cd /cdrom/cdrom0/s0
example# ./add_to_install_server /export/Solaris_9
```

EXAMPLE 6 Using `check`

The following `check` command validates the syntax of the rules file used for a custom JumpStart installation:

```
example# cd jumpstart_dir_path
example# ./check -p /cdrom/cdrom0/s0
```

EXAMPLE 7 Using `modify_install_server`

The following `modify_install_server` command moves the miniroot created using the above `setup_install_server` to `Boot.orig` and replaces it with the miniroot on the Solaris Installer CD.

```
example# cd /cdrom/cdrom0/s0
example# ./modify_install_server -p /export/install /cdrom/cdrom0/s1
```

EXAMPLE 8 Using `modify_install_server`

The following `modify_install_server` command replaces the miniroot created using the above `setup_install_server` with the miniroot on the Solaris Installer CD.

```
example# cd /cdrom/cdrom0/s0
example# ./modify_install_server /export/install /cdrom/cdrom0/s1
```

EXAMPLE 9 Using `rm_install_client`

The following `rm_install_client` commands remove clients for network installation on Solaris 9:

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EXAMPLE 9 Using rm_install_client (Continued)

```
example# cd /export/install/Solaris_9/Tools
example# ./rm_install_client holmes
example# ./rm_install_client watson
```

EXAMPLE 10 Using setup_install_server

The following `setup_install_server` command copies the mounted Solaris CD to a directory named `/export/install` on the local disk on Solaris 9:

```
example# cd /cdrom/cdrom0/s0/Solaris_9/Tools
example# ./setup_install_server /export/install
```

EXAMPLE 11 Using setup_install_server

The following `setup_install_server` command copies the boot software of a mounted Solaris CD to a directory named `/boot_dir` on a system that is going to be a boot server for a subnet on Solaris 9:

```
example# cd /cdrom/cdrom0/s0/Solaris_9/Tools
example# ./setup_install_server -b /boot_dir
```

EXAMPLE 12 Using setup_install_server

By default, `setup_install_server` will look for an installation boot directory at the Solaris `../Tools/Boot` location of the mount Solaris distribution disc.

If an alternate boot directory is required, such as one saved on a > network boot server by way of an earlier `./setup_install_server -b /boot_dir` command, the `-t` option can be used.

```
example# cd /cdrom/cdrom0/s0/Solairs_9/Tools
example# ./setup_install_server -t /boot_dir /export/install
```

EXAMPLE 13 Using setup_install_server with WANboot Option

The following `setup_install_server` command creates an image of the WANboot miniroot file system and stores it in the file `/wanboot_dir/miniroot`.

```
example# cd /cdrom/cdrom0/s0/Solairs_9/Tools
example# ./setup_install_server -w /wanboot_dir /export/install
```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	An error has occurred.

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ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	Solaris CD

SEE ALSO uname(1), bootparams(4), attributes(5)

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in.talkd(1M)

NAME	in.talkd, talkd – server for talk program				
SYNOPSIS	in.talkd				
DESCRIPTION	talkd is a server used by the talk(1) program. It listens at the UDP port indicated in the “talk” service description; see services(4). The actual conversation takes place on a TCP connection that is established by negotiation between the two machines involved.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWrcmds</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWrcmds
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWrcmds				
SEE ALSO	talk(1), inetd(1M), services(4), attributes(5)				
NOTES	The protocol is architecture dependent.				

NAME	in.telnetd, telnetd – DARPA TELNET protocol server
SYNOPSIS	<code>/usr/sbin/in.telnetd</code>
DESCRIPTION	<code>in.telnetd</code> is a server that supports the DARPA standard TELNET virtual terminal protocol. <code>in.telnetd</code> is normally invoked in the internet server (see <code>inetd(1M)</code>), for requests to connect to the TELNET port as indicated by the <code>/etc/services</code> file (see <code>services(4)</code>). <code>in.telnetd</code> operates by allocating a pseudo-terminal device for a client, then creating a login process which has the slave side of the pseudo-terminal as its standard input, output, and error. <code>in.telnetd</code> manipulates the master side of the pseudo-terminal, implementing the TELNET protocol and passing characters between the remote client and the login process. When a TELNET session starts up, <code>in.telnetd</code> sends TELNET options to the client side indicating a willingness to do <i>remote echo</i> of characters, and to <i>suppress go ahead</i>. The pseudo-terminal allocated to the client is configured to operate in “cooked” mode, and with XTABS, ICRNL and ONLCR enabled. See <code>termio(7I)</code>. <code>in.telnetd</code> is willing to do: <i>echo</i>, <i>binary</i>, <i>suppress go ahead</i>, and <i>timing mark</i>. <code>in.telnetd</code> is willing to have the remote client do: <i>binary</i>, <i>terminal type</i>, <i>terminal size</i>, <i>logout option</i>, and <i>suppress go ahead</i>. <code>in.telnetd</code> also allows environment variables to be passed, provided that the client negotiates this during the initial option negotiation. The DISPLAY environment variable may be sent this way, either by the TELNET general environment passing methods, or by means of the XDISPLOC TELNET option. DISPLAY can be passed in the environment option during the same negotiation where XDISPLOC is used. Note that if you use both methods, use the same value for both. Otherwise, the results may be unpredictable. These options are specified in Internet standards RFC 1096, RFC 1408, RFC 1571, and RFC 1572. The banner printed by <code>in.telnetd</code> is configurable. The default is (more or less) equivalent to “<code>uname -sr</code>” and will be used if no banner is set in <code>/etc/default/telnetd</code>. To set the banner, add a line of the form <pre>BANNER="...to /etc/default/telnetd. Nonempty banner strings are fed to shells for evaluation. The default banner may be obtained by</pre> <pre>BANNER="\r\n\r\n'uname -s' 'uname -r'\r\n\r\n"and no banner will be printed if /etc/default/telnetd contains</pre> <pre>BANNER=" "</pre>
USAGE	<code>telnetd</code> and <code>in.telnetd</code> are IPv6-enabled. See <code>ip6(7P)</code> .

in.telnetd(1M)

SECURITY

in.telnetd uses pam(3PAM) for authentication, account management, session management, and password management. The PAM configuration policy, listed through /etc/pam.conf, specifies the modules to be used for in.telnetd. Here is a partial pam.conf file with entries for the telnet command using the UNIX authentication, account management, session management, and password management modules.

```
telnet  auth requisite      pam_authtok_get.so.1
telnet  auth required      pam_dhkeys.so.1
telnet  auth required      pam_unix_auth.so.1

telnet  account requisite  pam_roles.so.1
telnet  account required  pam_projects.so.1
telnet  account required  pam_unix_account.so.1

telnet  session required  pam_unix_session.so.1

telnet  password required  pam_dhkeys.so.1
telnet  password requisite pam_authtok_get.so.1
telnet  password requisite pam_authtok_check.so.1
telnet  password required  pam_authtok_store.so.1
```

If there are no entries for the telnet service, then the entries for the "other" service will be used. If multiple authentication modules are listed, then the user may be prompted for multiple passwords.

FILES

/etc/default/telnetd

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWtnetd

SEE ALSO

telnet(1), inetd(1M), pam(3PAM), inetd.conf(4), pam.conf(4), services(4), attributes(5), pam_authtok_check(5), pam_authtok_get(5), pam_authtok_store(5), pam_dhkeys(5), pam_passwd_auth(5), pam_unix(5), pam_unix_account(5), pam_unix_auth(5), pam_unix_session(5), ip6(7P), termio(7I)

Alexander, S., *TELNET Environment Option*, RFC 1572, Network Information Center, SRI International, Menlo Park, Calif., January 1994.

Borman, Dave, *TELNET Environment Option*, RFC 1408, Network Information Center, SRI International, Menlo Park, Calif., January 1993.

Borman, Dave, *TELNET Environment Option Interoperability Issues*, RFC 1571, Network Information Center, SRI International, Menlo Park, Calif., January 1994.

Crispin, Mark, *TELNET Logout Option*, RFC 727, Network Information Center, SRI International, Menlo Park, Calif., April 1977.

in.telnetd(1M)

Marcy, G., *TELNET X Display Location Option*. RFC 1096, Network Information Center, SRI International, Menlo Park, Calif., March 1989.

Postel, Jon, and Joyce Reynolds, *TELNET Protocol Specification*, RFC 854, Network Information Center, SRI International, Menlo Park, Calif., May 1983.

Waitzman, D., *TELNET Window Size Option*, RFC 1073, Network Information Center, SRI International, Menlo Park, Calif., October 1988.

NOTES

Some TELNET commands are only partially implemented.

Binary mode has no common interpretation except between similar operating systems.

The terminal type name received from the remote client is converted to lower case.

The *packet* interface to the pseudo-terminal should be used for more intelligent flushing of input and output queues.

in.telnetd never sends TELNET *go ahead* commands.

The pam_unix(5) module might not be supported in a future release. Similar functionality is provided by pam_authok_check(5), pam_authok_get(5), pam_authok_store(5), pam_dhkeys(5), pam_passwd_auth(5), pam_unix_account(5), pam_unix_auth(5), and pam_unix_session(5).

in.tftpd(1M)

NAME	in.tftpd, tftpd – Internet Trivial File Transfer Protocol server				
SYNOPSIS	in.tftpd [-s] [<i>homedir</i>]				
DESCRIPTION	tftpd is a server that supports the Internet Trivial File Transfer Protocol (TFTP). This server is normally started by inetd(1M) and operates at the port indicated in the tftp Internet service description in the /etc/inetd.conf file. By default, the entry for in.tftpd in etc/inetd.conf is commented out. To make in.tftpd operational, the comment character(s) must be deleted from the file. See inetd.conf(4). Before responding to a request, the server attempts to change its current directory to <i>homedir</i>; the default directory is /tftpboot. The use of tftp does not require an account or password on the remote system. Due to the lack of authentication information, in.tftpd will allow only publicly readable files to be accessed. Files may be written only if they already exist and are publicly writable. Note that this extends the concept of “public” to include all users on all hosts that can be reached through the network. This may not be appropriate on all systems, and its implications should be considered before enabling this service. in.tftpd runs with the user ID and group ID set to [GU] ID_NOBODY under the assumption that no files exist with that owner or group. However, nothing checks this assumption or enforces this restriction.				
OPTIONS	-d Debug. When specified it sets the SO_DEBUG socket option. -s Secure. When specified, the directory change to <i>homedir</i> must succeed. The daemon also changes its root directory to <i>homedir</i>.				
FILES	/etc/inetd.conf				
USAGE	The in.tftpd server is IPv6-enabled. See ip6(7P).				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWtftp</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWtftp
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWtftp				
SEE ALSO	tftp(1), inetd(1M), inetd.conf(4), netconfig(4), attributes(5), ip6(7P) Malkin, G. and Harkin, A. <i>RFC 2347, TFTP Option Extension</i>. The Internet Society. May 1998 Malkin, G. and Harkin, A. <i>RFC 2348, TFTP Blocksize Option</i>. The Internet Society. May 1998 Malkin, G. and Harkin, A. <i>RFC 2349, TFTP Timeout Interval and Transfer Size Options</i>. The Internet Society. May 1998				

in.tftpd(1M)

Sollins, K.R. *RFC 1350, The TFTP Protocol (Revision 2)*. Network Working Group. July 1992.

NOTES The `tftpd` server only acknowledges the transfer size option that is sent with a `read` request when the octet transfer mode is specified.

in.tnamed(1M)

NAME	in.tnamed, tnamed – DARPA trivial name server				
SYNOPSIS	/usr/sbin/in.tnamed [-v]				
DESCRIPTION	in.tnamed is a server that supports the DARPA Name Server Protocol. The name server operates at the port indicated in the “name” service description (see services(4)), and is invoked by inetd(1M) when a request is made to the name server.				
OPTIONS	-v Invoke the daemon in verbose mode.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWtnamd</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWtnamd
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWtnamd				
SEE ALSO	uucp(1C) , inetd(1M) , services(4) , attributes(5) Postel, Jon, <i>Internet Name Server</i> , IEN 116, SRI International, Menlo Park, California, August 1979.				
NOTES	The protocol implemented by this program is obsolete. Its use should be phased out in favor of the Internet Domain Name Service (DNS) protocol.				

NAME	in.uucpd, uucpd – UUCP server	
SYNOPSIS	/usr/sbin/in.uucpd [-n]	
DESCRIPTION	in.uucpd is the server for supporting UUCP connections over networks. in.uucpd is invoked by inetd(1M) when a UUCP connection is established (that is, a connection to the port indicated in the “uucp” service specification) and executes the following protocol. See services(4): 1. The server prompts with <code>login:.</code> The uucico(1M) process at the other end must supply a username. 2. Unless the username refers to an account without a password, the server then prompts with <code>Password:.</code> The uucico process at the other end must supply the password for that account. If the username is not valid, or is valid but refers to an account that does not have <code>/usr/lib/uucp/uucico</code> as its login shell, or if the password is not the correct password for that account, the connection is dropped. Otherwise, uucico is run, with the user ID, group ID, group set, and home directory for that account, with the environment variables <code>USER</code> and <code>LOGNAME</code> set to the specified username, and with a <code>-u</code> flag specifying the username. Unless the <code>-n</code> flag is specified, entries are made in <code>/var/adm/utmpx</code>, <code>/var/adm/wtmpx</code>, and <code>/var/adm/lastlog</code> for the username. in.uucpd must be invoked by a user with appropriate privilege (usually root) in order to be able to verify that the password is correct.	
SECURITY	in.uucpd uses pam(3PAM) for authentication, account management, and session management. The PAM configuration policy, listed through <code>/etc/pam.conf</code>, specifies the modules to be used for in.uucpd. Here is a partial <code>pam.conf</code> file with entries for uucp using the UNIX authentication, account management, and session management module. <pre> uucp auth requisite pam_authtok_get.so.1 uucp auth required pam_dhkeys.so.1 uucp auth required pam_unix_auth.so.1 uucp account requisite pam_roles.so.1 uucp account required pam_projects.so.1 uucp account required pam_unix_account.so.1 uucp session required pam_unix_session.so.1 </pre> If there are no entries for the uucp service, then the entries for the “other” service will be used. If multiple authentication modules are listed, then the peer may be prompted for multiple passwords.	
FILES	<code>/var/adm/utmpx</code>	accounting
	<code>/var/adm/wtmpx</code>	accounting
	<code>/var/adm/lastlog</code>	time of last login

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ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWbnuu

SEE ALSO

inetd(1M), uucico(1M), pam(3PAM), pam.conf(4), services(4), attributes(5), pam_authtok_check(5), pam_authtok_get(5), pam_authtok_store(5), pam_dhkeys(5), pam_passwd_auth(5), pam_unix(5), pam_unix_account(5), pam_unix_auth(5), pam_unix_session(5)

DIAGNOSTICS

All diagnostic messages are returned on the connection, after which the connection is closed.

user read	An error occurred while reading the username.
passwd read	An error occurred while reading the password.
Login incorrect.	The username is invalid or refers to an account with a login shell other than /usr/lib/uucp/uucico, or the password is not the correct password for the account.

NOTES

The pam_unix(5) module might not be supported in a future release. Similar functionality is provided by pam_authtok_check(5), pam_authtok_get(5), pam_authtok_store(5), pam_dhkeys(5), pam_passwd_auth(5), pam_unix_account(5), pam_unix_auth(5), and pam_unix_session(5).

NAME	iostat – report I/O statistics
SYNOPSIS	/usr/bin/iostat [-cCdDeEiImMnpPrstxXz] [-l <i>n</i>] [-T u d] [<i>disk...</i>] [<i>interval</i> [<i>count</i>]]
DESCRIPTION	The <i>iostat</i> utility iteratively reports terminal, disk, and tape I/O activity, as well as CPU utilization. The first line of output is for all time since boot; each subsequent line is for the prior interval only. To compute this information, the kernel maintains a number of counters. For each disk, the kernel counts reads, writes, bytes read, and bytes written. The kernel also takes hi-res time stamps at queue entry and exit points, which allows it to keep track of the residence time and cumulative residence-length product for each queue. Using these values, <i>iostat</i> produces highly accurate measures of throughput, utilization, queue lengths, transaction rates and service time. For terminals collectively, the kernel simply counts the number of input and output characters. During execution of this kernel status command, the "state" of the kernel can change. An example would be CPUs going online or offline. <i>iostat</i> reports this as one or more of the following messages: <i>device_name</i> added <i>device_name</i> removed <i>NFS_filesystem</i> mounted <i>NFS_filesystem</i> unmounted cpu[s] taken offline: <i>cpuid</i> cpu[s] brought online: <i>cpuid</i> where <i>device_name</i>, <i>NFS_filesystem</i> and <i>cpuid</i> are replaced with the actual name or names of the entities formatted according to other options. For more general system statistics, use <i>sar</i>(1), <i>sar</i>(1M), or <i>vmstat</i>(1M).
OPTIONS	The <i>iostat</i> utility's activity class options default to <i>tdc</i> (terminal, disk, and CPU). If any activity class options are specified, the default is completely overridden. Therefore, if only <i>-d</i> is specified, neither terminal nor CPU statistics will be reported. The last disk option specified (<i>-d</i>, <i>-D</i>, or <i>-x</i>) is the only one that is used. The following options are supported: <i>-c</i> Report the percentage of time the system has spent in user mode, in system mode, waiting for I/O, and idling. <i>-C</i> When the <i>-n</i> and <i>-x</i> options are also selected, report extended disk statistics aggregated by <i>controller id</i>. <i>-d</i> For each disk, report the number of kilobytes transferred per second, the number of transfers per second, and the average service time in milliseconds.

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-D	For each disk, report the reads per second, writes per second, and percentage disk utilization.
-e	Display device error summary statistics. The total errors, hard errors, soft errors, and transport errors are displayed.
-E	Display all device error statistics.
-i	In -E output, display the "Device Id" instead of the "Serial No". The "Device Id" is a unique identifier registered by a driver through <code>ddi_devid_register(9F)</code> .
-I	Report the counts in each interval, rather than rates (where applicable).
-l <i>n</i>	Limit the number of disks included in the report to <i>n</i> ; the disk limit defaults to 4 for -d and -D, and unlimited for -x. Note: disks explicitly requested (see <i>disk</i> below) are not subject to this disk limit.
-m	Report file system mount points. This option is most useful if the -P or -p option is also specified.
-M	Display data throughput in MB/sec instead of KB/sec.
-n	Display names in descriptive format (for example, <code>cXtYdZ</code> , <code>rmt/N</code> , <code>server:/export/path</code>).
-p	For each disk, report per-partition statistics in addition to per-device statistics.
-P	For each disk, report per-partition statistics only, no per-device statistics.
-r	Display data in a comma-separated format.
-s	Suppress messages related to "state changes."
-t	Report the number of characters read and written to terminals per second.
-T u d	Display a time stamp. Specify <i>u</i> for a printed representation of the internal representation of time. See <code>time(2)</code> . Specify <i>d</i> for standard date format. See <code>ctime(3C)</code> .
-x	For each disk, report extended disk statistics. The output is in tabular form.
-X	For disks under <code>scsi_vhci</code> control, also report statistics in the form of <i>target.controller</i> .
-z	Do not print lines whose underlying data values are all zeros.

OPERANDS The following operands are supported:

disk Explicitly specify the disks to be reported; in addition to any explicit disks, any active disks up to the disk limit (see -l above) will also be reported.

count Display only *count* reports.

interval Report once each *interval* seconds.

EXAMPLES **EXAMPLE 1** Using the `iostat` command

```
example% iostat -xtc 5 2
              extended device statistics              tty              cpu
device r/s  w/s kr/s  kw/s wait actv svc_t %w  %b tin tout  us sy wt id
sd0    0.4  0.3 10.4   8.0  0.0  0.0  36.9  0   1   0  10   0  0  1 99
sd1    0.0  0.0  0.3   0.4  0.0  0.0  35.0  0   0
sd6    0.0  0.0  0.0   0.0  0.0  0.0   0.0  0   0
nfs1   0.0  0.0  0.0   0.0  0.0  0.0   0.0  0   0
nfs2   0.0  0.0  0.0   0.1  0.0  0.0  35.6  0   0
              extended device statistics              tty              cpu
device r/s  w/s kr/s  kw/s wait actv svc_t %w  %b tin tout  us sy wt id
sd0    0.0  0.0  0.0   0.0  0.0  0.0   0.0  0   0   0  155   0  0  0 100
sd1    0.0  0.0  0.0   0.0  0.0  0.0   0.0  0   0
sd6    0.0  0.0  0.0   0.0  0.0  0.0   0.0  0   0
nfs1   0.0  0.0  0.0   0.0  0.0  0.0   0.0  0   0
nfs2   0.0  0.0  0.0   0.0  0.0  0.0   0.0  0   0
```

device name of the disk

r/s reads per second

w/s writes per second

Kr/s kilobytes read per second

Kw/s kilobytes written per second

wait average number of transactions waiting for service (queue length)

actv average number of transactions actively being serviced (removed from the queue but not yet completed)

svc_t average service time, in milliseconds

%w percent of time there are transactions waiting for service (queue non-empty)

%b percent of time the disk is busy (transactions in progress)

EXAMPLE 2 Using the `iostat` command

```
example% iostat -xnp              extended device statistics
r/s  w/s  kr/s kw/s wait actv wsvc_t asvc_t %w %b device
```

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EXAMPLE 2 Using the iostat command (Continued)

```
0.4  0.3  10.4  7.9  0.0  0.0  0.0  36.9  0  1  c0t0d0
0.3  0.3   9.0  7.3  0.0  0.0  0.0  37.2  0  1  c0t0d0s0
0.0  0.0   0.1  0.5  0.0  0.0  0.0  34.0  0  0  c0t0d0s1
0.0  0.0   0.0  0.1  0.0  0.0  0.6  35.0  0  0  expositor:/export/home3/user3
```

The fields have the same meanings as in the previous example, with the following additions:

wsvc_t average service time in wait queue, in milliseconds
 asvc_t average service time active transactions, in milliseconds

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

sar(1), sar(1M), vmstat(1M), time(2), ctime(3C), attributes(5),
 scsi_vhci(7D)

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NOTES

The sum of CPU utilization might vary slightly from 100 because of rounding errors in the production of a percentage figure.

NAME	ipqosconf – configure the IPQoS facility
SYNOPSIS	<pre> /usr/sbin/ipqosconf /usr/sbin/ipqosconf -a <i>conf_file</i> [-vs] /usr/sbin/ipqosconf -c /usr/sbin/ipqosconf -f /usr/sbin/ipqosconf -l /usr/sbin/ipqosconf -L </pre>
DESCRIPTION	The <code>ipqosconf</code> utility configures the Quality of Service facility of the Internet Protocol (IP). Only superusers can use this command. Without arguments, <code>ipqosconf</code> displays the actual IPQoS configuration. Configuration is not preserved across reboot. You must apply the configuration every time that the machine reboots. To apply the configuration early in the boot phase, you can populate the <code>/etc/inet/ipqosinit.conf</code> file, which is then read from the <code>inetsvc</code> startup script.
OPTIONS	The following options are supported: -a <i>conf_file</i> Apply the configuration in <i>conf_file</i>. If the <i>conf_file</i> is <code>-</code>, <code>ipqosconf</code> reads from standard input. -c Populate the boot file with the current configuration. -f Flush the configuration. -l List the current applied configuration. -L List the current configuration in verbose mode. In addition to the information that the <code>-l</code> option provides, the <code>-L</code> option provides filters and classes configured through other means than the <code>ipqosconf</code> command. This option also provides the full set of filters that were created by <code>ipqosconf</code> by representing a multi-homed host in a configuration file -s Log messages to <code>syslog</code> during an <code>-a</code> operation. -v Toggle verbose mode during an <code>-a</code> operation. The <code>-v</code> option causes all messages to go to the console in addition to their normal destination. Messages intended to go to <code>syslog</code>, because the <code>-s</code> flag is set or because it is a log message, still go to <code>syslog</code> as well as the console.
CONFIGURATION FILE	The configuration file is composed of a format version and a succession of configuration (action) blocks. There are different configuration blocks for each type of action that is being configured.

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Format Version	The first line of the configuration file specifies the format version contained in the configuration file. The following entry specifies the format version: <pre>fmt_version x.x</pre> where <i>x.x</i> is the format version. 1.0 is the only supported version.
Configuration Blocks	Following the format version, are a succession of configuration (action) blocks that are different for each type of action being configured. A configuration block always has the following structure : <pre> action { name action_name module module_name params_clause "" cf_clauses } action_name ::= string module_name ::= ipgpc dlcosmk dscpmk flowacct tswtclmt tokenmt params_clause ::= params { parameters params_stats "" } parameters ::= prm_name_value parameters "" prm_name_value ::= param_name param_value </pre>
Modules	The <i>param_name</i> and the types of <i>param_value</i> are specific to a given module. <pre> params_stats ::= global_stats boolean cf_clauses ::= class_clause cf_clauses filter_clause cf_clauses "" class_clause ::= class { name class_name next_action next_action_name class_stats "" } class_name ::= string next_action_name ::= string class_stats ::= enable_stats boolean boolean ::= TRUE FALSE filter_clause ::= filter { name filter_name class class_name parameters } </pre>


```
filter_name      ::= string
```

There must be exactly one configuration block belonging to module `ipgpc`. The action must be named `ipgpc.classify`. All other actions should be reachable from `ipgpc` by way of parameters of type `action` or the `next_action` of a class.

The set of types that are used for parameters of the different modules are:

```
action           ::=      string
protocol         ::=      1..255
port             ::=      1..65535
uint8            ::=      0..255
uint32           ::=      0..4294967296
int32            ::=      -2147483648..2147483648
address          ::= < see the description section >
ifname           ::= < interface name recognized by SIOGLIFINDEX ioctl >
enum             ::=      string | { string_list }
boolean          ::=      TRUE | FALSE
integer_array    ::=      { range_value_list }
map_index        ::=      uint32
address          ::=      ip_address | ip_node_name
user             ::=      uid | username
uid              ::=      0..65535
username         ::=      string
string_list      ::=      string sl_entries
sl_entries       ::=      ',' string sl_entries | ""
range_value_list ::=      range_value_entry range_value_entries
range_value_entry ::=      range ':' integer_array_value
range            ::=      uint32 '-' uint32
integer_array_value ::=      string | integer_array_number
integer_array_number ::=      uint8 | uint32
range_value_entries ::=      ';' range_value_entry range_value_entries | ""
ip_node_name     ::=      string
ip_address       ::=      v4_address | v6_address
v4_address       ::=      v4_ip_address / v4_cidr_mask |
v4_ip_address    ::=      v4_ip_address
v4_cidr_mask     ::=      1-32
v6_address       ::=      v6_ip_address / v6_cidr_mask |
v6_ip_address    ::=      v6_ip_address
v6_cidr_mask     ::=      1-128
```

METER module `tokenmt` configuration syntax :

```
red_action_name   action
yellow_action_name action
green_action_name action
committed_rate    uint32
committed_burst   uint32
peak_rate         uint32
<if present this signifies that this will be a two rate meter, not
  a single rate meter>
peak_burst        uint32
<this is the 'peak' burst size for a two rate meter, but the 'excess' burst
  size for a single rate meter>
color_aware       boolean
```

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color_map	integer_array
global_stats	boolean

METER module tswtclmt configuration syntax :

red_action_name	action
yellow_action_name	action
green_action_name	action
committed_rate	uint32
peak_rate	uint32
window	uint32
global_stats	boolean

MARKER module dscpmk configuration syntax :

next_action	action
dscp_map	int_array
dscp_detailed_stats	boolean
global_stats	boolean

MARKER module dlcosmk configuration syntax :

next_action	action
cos	map_index
global_stats	boolean

CLASSIFIER module ipgpc configuration syntax :

if_grpname	string
user	user
projid	int32
if_name	ifname
direction	enum { LOCAL_IN, LOCAL_OUT, FWD_IN, FWD_OUT}
protocol	protocol
dsfield	uint8
dsfield_mask	uint8
saddr	address
daddr	address
sport	port
dport	port
priority	uint32
precedence	uint32
ip_version	enum { V4, V6 }
global_stats	boolean

ACCOUNTING module flowacct configuration syntax

next_action	action
timer	uint32
timeout	uint32
max_limit	uint32

Types		
	<i>action</i>	A string of characters with a matching action definition. The character string can be up to twenty three characters in length. To allow for spaces the string needs to be enclosed in quotes and cannot span lines. Two special actions are pre-defined and can not have an explicit action definition. The two pre-defined actions are <code>continue</code> and <code>drop</code> . <code>continue</code> causes the packet that is passed to it to continue normal processing. <code>drop</code> causes the packet that is passed to it to be dropped.
	<i>address</i>	A machine name or address recognized by <code>getipnodebyname(3B)</code> . If a machine name is specified, and <code>ip_version</code> has been defined, the query is done using that address family. If a machine name is not specified and <code>ip_version</code> has not been defined, the query is done using the <code>AI_DEFAULT</code> flag to <code>getipnodebyname()</code> (<code>..AF_INET6..</code>). CIDR address masks following an IP address are allowed. Specify the CIDR address masks as 1-32 (for v4) or 1-128 (for v6). CIDR addresses are disallowed for node names.
	<i>enum</i>	Either one of the supported values or comma delimited list of support values, enclosed in curly braces.
	<i>ifname</i>	A non-NULL, existing interface name recognized by the <code>SIOGLIFINDEX</code> socket ioctl.
	<i>integer_array</i>	A comma delimited set of <i>range/value</i> pairs , enclosed in curly braces. Specify <i>range</i> in the format <i>x-y</i> , where <i>x</i> and <i>y</i> are integers that denote the range of array indexes to which the value applies. The minimum value for both <i>x</i> and <i>y</i> is 0. The maximum value for <i>x</i> is particular to the parameter. Any array indexes not referred to in the set of ranges are left at their previous value.
	<i>map_index</i>	A non-negative integer used as an index into any maps associated with a parameter of this type. The maximum value of this type is dictated by the number of entries in the associated maps. The index starts at 0.
	<i>port</i>	Either a service name recognized by <code>getservbyname(3SOCKET)</code> or an integer 1-65535.
	<i>protocol</i>	Either a protocol name recognized by <code>getprotobyname(3SOCKET)</code> or an integer 1-255.

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Parameters	<i>string</i>	A character string. Enclose <i>string</i> in quotes. <i>string</i> cannot span multiple lines.
	<i>user</i>	Either a valid user ID or username for the system that is being configured.
	The configuration file can contain the following parameters	
	color_aware	A value of TRUE or FALSE, indicating whether or not the configured action takes account of the previous packet coloring when classifying.
	color_map	An integer array that defines which values of the dscp field correspond with which colors for when the color_aware parameter is set to TRUE.
	committed_burst	The committed burst size in bits.
	committed_rate	The committed rate in bits per second.
	cos	The value used to determine the underlying driver level priority applied to the packet which is defined in 802.1D.
	daddr	The destination address of the datagram.
	direction	The value used to build a filter matching only part of the traffic.
		This parameter is of type enum with valid values of LOCAL_IN (local bound traffic), LOCAL_OUT (local sourced traffic), FWD_IN (forwarded traffic entering the system), and FWD_OUT (forwarded traffic exiting the system).
	dport	The destination port of the datagram.
	dscp_detailed_stats	A value of TRUE or FALSE that determines whether detailed statistics are switched on for this dscp action.
	dscp_map	Specify TRUE to switch on or FALSE to switch off. The <i>integer_array</i> that supplies the values that IP packets with a given dscp value have their dscp re-marked with.
	dsfield	The existing value is used to index into the array where the new value is taken from. The array is of size 64, meaning valid indexes are 0-63 and valid values are also 0-63. The DS field of the IP datagram header. If you specify this parameter, you must also specify the dsfield_mask parameter.

dsfield_mask	The mask applied to the dsfield parameter to determine the bits against which to match.
global_stats	A value of TRUE or FALSE to enable or disable the statistic collection for this action.
green_action_name	The action to be executed for packets that are deemed to be green.
if_grpname	The interface group name.
if_name	The name of an interface recognized by the SIOGLIFINDEX ioctl. This parameter is of type ifname.
ip_version	This parameter is of type enum and has valid values of V4 and V6. If it is set to V4 only then only ipv4addresses are requested for a specified hostname. If it is set to V6, only ipv6 addresses are returned if there are any, otherwise v4 mapped v6 addresses are returned. If both V4 and V6 are specified, or if ip_version is not specified, then both ipv4 and ipv6 addresses are requested for a specified hostname.
max_limit	The maximum number of flow entries present at one time in the flowacct actions in the memory resident table.
next_action	The action to be executed when the current action is complete. This value can be either the name of an action defined in the configuration file, or one of the two special action types: drop and continue. See Types for additional information on special action types.
peak_burst	The peak burst size, for a two rate meter, or excess burst size, for a single rate meter, in bits.
peak_rate	The peak rate in bits per second.
precedence	An integer that is used to order filters. If there are two matching filters that have the same priority value, the one with the lower precedence value is the one matched. This parameter should be used because the order of the filters in a configuration file has no influence on their relative precedence.
priority	An integer that represents the relative priority of a filter. If there are two matching filters, the one with the

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	higher priority value is the one matched. Multiple filters can have the same priority.
projid	The project ID of the process sending the data. This value is always -1 for received traffic.
protocol	The Upper Layer Protocol against which this entry is matched.
red_action_name	The action to be executed for packets that are determined to be red.
saddr	The source address of the datagram.
sport	The source port of the datagram.
timeout	The timeout in milliseconds after which flows are written to the accounting file.
timer	The period in milliseconds at which timed-out flows are checked for.
user	The user ID or username of the process sending the data. This value is always -1 for received traffic.
window	The window size in ms.
yellow_action_name	The action to be executed for packets that are determined to be yellow.
SECURITY	None.
EXAMPLES	EXAMPLE 1 Sending All Traffic From eng to the AF 1 Class of Service This example sends all traffic from eng to the AF 1 class of service. It is documented in four separate steps: The following step creates a tokenmt action with three outcomes: <pre>#meter for class 1. action { name AF_CL1 module tokenmt params{ committed_rate 64 committed_burst 75 peak_burst 150 global_stats TRUE red_action_name drop yellow_action_name markAF12 green_action_name markAF11 } }</pre> The following step creates two dscpmk actions:

EXAMPLE 1 Sending All Traffic From eng to the AF 1 Class of Service (Continued)

```
#class 1, low drop precedence.
action {
    name markAF11
    module dscpmk
    params{
        dscp_map {0-63:28}
        dscp_detailed_stats TRUE
        global_stats TRUE
        next_action acct1
    }
}
#class 1, medium drop precedence.
action {
    name markAF12
    module dscpmk
    params {
        dscp_map {0-63:30}
        dscp_detailed_stats TRUE
        global_stats TRUE
        next_action acct1
    }
}
```

The following step creates an accounting action:

```
#billing for transmitted class 1 traffic.
action {
    name acct1
    module flowacct
    params {
        timer 10
        timeout 30
        global_stats TRUE
    }
max_limit 1024
next_action continue
}
```

The following step creates an ipgpc action:

```
#traffic from eng sent, traffic from ebay dropped.
action {
    name ipgpc.classify
    module ipgpc
    class {
        name from_eng
        enable_stats TRUE
        next_action AF_CL1
    }
    class {
        name from_ebay
        enable_stats TRUE
        next_action drop
    }
}
```

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EXAMPLE 1 Sending All Traffic From eng to the AF 1 Class of Service (Continued)

```

filter {
    name from_eng
    saddr eng-subnet
    class from_eng
}
filter {
    name from_ebay
    saddr ebay-subnet
    class from_ebay
}
}

```

FILES /etc/inet/ipqosinit.conf Contains the IPQoS configuration loaded at boot time. If this file exists, it is read from /etc/initd.d/inetsvc after /usr is mounted.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWqosu
Interface Stability	Evolving

SEE ALSO syslog(3C), getipnodebyname(3SOCKET), getprotobyname(3SOCKET), getservbyname(3SOCKET), attributes(5), dlcosmk(7IPP), dscpmk(7IPP), flowacct(7IPP), ipgpc(7IPP), ipqos(7IPP), tokenmt(7IPP), tswtclmt(7IPP)

DIAGNOSTICS ipqosconf sends messages to syslog of facility user, severity notice when any changes are made to the IPQoS configuration.

Errors that occur during an ipqosconf operation send an error message to the console by default. For the application of a new configuration if the -s option is set then these messages are sent to syslog as facility user, severity error instead. If the -v option is present during an application then all error and change notification messages are sent to the console as well as their default destination.

NAME	ipsecconf – configure system wide IPsec policy
SYNOPSIS	<pre> /usr/sbin/ipsecconf /usr/sbin/ipsecconf -a <i>file</i> [-q] /usr/sbin/ipsecconf -d <i>index</i> /usr/sbin/ipsecconf -f /usr/sbin/ipsecconf -l [-n] </pre>
DESCRIPTION	The <code>ipsecconf</code> utility configures the IPsec policy for a host. Once the policy is configured, all outbound and inbound datagrams are subject to policy checks as they exit and enter the host. If no entry is found, no policy checks will be completed, and all the traffic will pass through. Datagrams that are being forwarded will not be subjected to policy checks that are added using this command. See <code>ifconfig(1M)</code> and <code>tun(7M)</code> for information on how to protect forwarded packets. Depending upon the match of the policy entry, a specific action will be taken. This command can be run only by superuser. Each entry can protect traffic in either one direction (requiring a pair of entries) or by a single policy entry which installs the needed symmetric <code>sadb</code> rules. When the command is issued without any arguments, the list of (file policy entries) loaded are shown. To display the (<code>spd p.e.s</code>) use the <code>-l</code> option. Both will display the index number for the entry. Note, since one file policy entry (FPE) can generate multiple SPD pol entries (SPEs), the list of FPEs may not show all the actual entries. However, it is still useful in determining what rules have been added to get the <code>spd</code> into its current state. You can use the <code>-d</code> option with the index to delete a given policy in the system. If the <code>-d</code> option removes an FPE entry that produces multiple SPEs, only then SPD with the same policy index as the FPE will be removed. This can produce a situation where there may be SPEs when there are no FPEs With no options, the entries are displayed in the order that they were added, which is not necessarily the order that the traffic match will take place. To view the order in which the traffic match will take place, use the <code>-l</code> option. The rules are ordered such that all bypass rules are checked first, then ESP rules, then AH rules. After that, they are checked in the order entered. Policy entries are not preserved across reboot. Thus the policy needs to be added everytime the machine reboots. To configure policies early in the boot, one can setup policies in the <code>/etc/inet/ipsecinit.conf</code> file, which are then read from the <code>inetinit</code> startup script. See SECURITY for issues in securing this file.

ipsecconf(1M)

OPTIONS

ipsecconf supports the following option:

-a <i>file</i>	Add the IPsec policy to the system as specified by each entry in the file. An IPsec configuration file contains one or more entries that specify the configuration. Once the policy is added, all outbound and inbound datagrams are subject to policy checks. Entries in the files are described in the OPERANDS section below. Examples can be found in the EXAMPLES section below. Policy is latched for TCP/UDP sockets on which a connect(3SOCKET) or accept(3SOCKET) is issued. So, the addition of new policy entries may not affect such endpoints or sockets. However, the policy will be latched for a socket with an existing non-null policy. Thus, make sure that there are no preexisting connections that will be subject to checks by the new policy entries. The feature of policy latching explained above may change in the future. It is not advisable to depend upon this feature.
-d <i>index</i>	Delete the policy denoted by the index. The index is obtained by invoking ipsecconf without any arguments, or with the -l option. See DESCRIPTION for more information. Once the entry is deleted, all outbound and inbound datagrams affected by this policy entry will not be subjected to policy checks. Be advised that with connections for which the policy has been latched, packets will continue to go out with the same policy, even if it has been deleted. It is advisable to use the -l option to find the correct policy index.
-f	Flush all the policies in the system. Constraints are similar to the -d option with respect to latching.
-l	Listing of the internal system policy table. When ipsecconf is invoked without any arguments, a complete list of policy entries with indexes added by the user since boot is displayed. The current table can differ from the previous one if, for example, a multi-homed entry was added or policy reordering occurred, or if a single rule entry generates two spd rules. In the case of a multi-homed entry, all the addresses are listed explicitly. If a mask was not specified earlier but was instead inferred from the address, it will be explicitly listed here. This option is used to view policy entries in the correct order. The outbound and inbound policy entries are listed separately.
-n	Show network addresses, ports, protocols in numbers. The -n option may only be used with the -l option.

	-q	Quiet mode. Suppresses the warning message generated when adding policies.
OPERANDS	Each policy entry contains 3 parts specified as follows: <pre>{pattern} action {properties}</pre> or <pre>{pattern} action {properties} ["or" action {properties}]*</pre> Every policy entry begins on a new line and can span multiple lines. <i>pattern</i> specifies the traffic pattern that should be matched against the outbound and inbound datagrams. If there is a match, a specific <i>action</i> determined by the second argument will be taken, depending upon the <i>properties</i> of the policy entry. If there is an <code>or</code> in the rule (multiple action-properties for a given pattern), a transmitter will use the first action-property pair that works, while a receiver will use any that are acceptable. <i>pattern</i> and <i>properties</i> are name-value pairs where name and value are separated by a <code><space></code>, <code><tab></code> or <code><newline></code>. Multiple name-value pairs should be separated by <code><space></code>, <code><tab></code> or <code><newline></code>. The beginning and end of the pattern and properties are marked by <code>{</code> and <code>}</code> respectively. Files can contain multiple policy entries. An unspecified name-value pair in the <i>pattern</i> will be considered as a wildcard. Wildcard entries match any corresponding entry in the datagram. One thing to remember is that UDP port 500 is always bypassed regardless of any policy entries. This is a requirement for <code>in.iked(1M)</code> to work. File can be commented by using a <code>#</code> as the first character. Comments may be inserted either at the beginning or the end of a line. The complete syntax of a policy entry is: <pre>policy ::= { <pattern1> } <action1> { <properties1> } { <pattern2> } <action2> { <properties2> } ['or' <action2> { <properties2> }]* pattern1 ::= <pattern_name_value_pair1>* pattern2 ::= <pattern_name_value_pair2>* action1 ::= apply permit bypass pass action2 ::= bypass pass drop ipsec properties1 ::= {<prop_name_value_pair1>} properties2 ::= {<prop_name_value_pair2>} pattern_name_value_pair1 ::=</pre>	

ipsecconf(1M)

```

saddr <address>/<prefix> |
src <address>/<prefix> |
srcaddr <address>/<prefix> |
smask <mask> |
sport <port> |
daddr <address>/<prefix> |
dst <address>/<prefix> |
dstaddr <address>/<prefix> |
dmask <mask> |
dport <port> |
ulp <protocol> |
proto <protocol>

pattern_name_value_pair2 ::=
    raddr <address>/<prefix> |
    remote <address>/<prefix> |
    rport <port> |
    laddr <address>/<prefix> |
    local <address>/<prefix> |
    lport <port> |
    ulp <protocol> |
    proto <protocol> |
    dir <dir_val2>

address ::= <IPv4 dot notation> | <IPv6 colon notation> |
            <String recognized by gethostbyname> |
            <String recognized by getnetbyname>

prefix ::= <number>

mask ::= <0xhexdigit[hexdigit]> | <0Xhexdigit[hexdigit]> |
         <IPv4 dot notation>

port ::= <number> | <String recognized by getservbyname>

protocol ::= <number> | <String recognized by getprotobyname>

prop_name_value_pair1 ::=
    auth_algs <auth_alg> |
    encr_algs <encr_alg> |
    encr_auth_algs <auth_alg> |
    sa <sa_val> |
    dir <dir_val1>

prop_name_value_pair2 ::=
    auth_algs <auth_alg> |
    encr_algs <encr_alg> |
    encr_auth_algs <auth_alg> |
    sa <sa_val>

auth_alg ::= <auth_alname> ['(' <keylen> ')']
auth_alname ::= any | md5 | hmac-md5 | sha | sha1 | hmac-sha |
                hmac-sha1 | <number>

encr_alg ::= <encr_alname> ['(' <keylen> ')']
encr_alname ::= any | aes | aes-cbc | des | des-cbc | 3des |
                3des-cbc | blowfish | blowfish-cbc | <number>

```

```
keylen ::= <number> | <number>'..' | '..'<number> | <number>'..'<number>

sa_val ::= shared | unique

dir_val1 ::= out | in
dir_val2 ::= out | in | both

number ::= < 0 | 1 | 2 ... 9> <number>
```

Policy entries may contain the following (name value) pairs in the *pattern* field. Each (name value) pair may appear only once in given policy entry.

laddr/plen
local/plen

The value that follows is the local address of the datagram with the prefix length. Only *plen* leading bits of the source address of the packet will be matched. *plen* is optional. Local means destination on incoming and source on outgoing packets. The source address value can be a hostname as described in `getaddrinfo(3XSOCKET)` or a network name as described in `getnetbyname(3XNET)` or a host address or network address in the Internet standard dot notation. See `inet_addr(3XNET)`. If a hostname is given and `getaddrinfo(3XSOCKET)` returns multiple addresses for the host, then policy will be added for each of the addresses with other entries remaining the same.

raddr/plen
remote/plen

The value that follows is the remote address of the datagram with the prefix length. Only *plen* leading bits of the remote address of the packet will be matched. *plen* is optional. Remote means source on incoming packets and destination on outgoing packets. The remote address value can be a hostname as described in `getaddrinfo(3SOCKET)` or a network name as described in `getnetbyname(3XNET)` or a host address or network address in the Internet standard dot notation. See `inet_addr(3XNET)`. If a hostname is given and `getaddrinfo(3SOCKET)` returns multiple addresses for the host, then policy will be added for each of the addresses with other entries remaining the same.

src/plen
srcaddr/plen
saddr/plen

The value that follows is the source address of the datagram with the prefix length. Only *plen* leading bits of the source address of the packet will be matched. *plen* is optional.

The source address value can be a hostname as described in `getaddrinfo(3XSOCKET)` or a network name as described in `getnetbyname(3XNET)` or a host address or network address in the Internet standard dot notation. See `inet_addr(3XNET)`.

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	If a hostname is given and <code>getaddrinfo(3XSOCKET)</code> returns multiple addresses for the host, then policy will be added for each of the addresses with other entries remaining the same.
<i>daddr/plen</i> <i>dest/plen</i> <i>dstaddr/plen</i>	The value that follows is the destination address of the datagram with the prefix length. Only <i>plen</i> leading bits of the destination address of the packet will be matched. <i>plen</i> is optional. See <i>saddr</i> for valid values that can be given. If multiple source and destination addresses are found, then a policy entry that covers each source address-destination address pair will be added to the system.
<i>smask</i>	For IPv4 only. The value that follows is the source mask. If prefix length is given with <i>saddr</i>, this should not be given. This can be represented either in hexadecimal number with a leading 0x or 0X, for example, 0xffff0000, 0Xffff0000 or in the Internet decimal dot notation, for example, 255.255.0.0 and 255.255.255.0. The mask should be contiguous and the behavior is not defined for non-contiguous masks. <i>smask</i> is considered only when <i>saddr</i> is given. For both IPv4 and IPv6 addresses, the same information can be specified as a <i>slen</i> value attached to the <i>saddr</i> parameter.
<i>dmask</i>	Analogous to <i>smask</i>.
<i>lport</i>	The value that follows is the local port of the datagram. This can be either a port number or a string searched with a NULL proto argument, as described in <code>getservbyname(3XNET)</code>
<i>rport</i>	The value that follows is the remote port of the datagram. This can be either a port number or a string searched with a NULL proto argument, as described in <code>getservbyname(3XNET)</code>
<i>sport</i>	The value that follows is the source port of the datagram. This can be either a port number or a string searched with a NULL proto argument, as described in <code>getservbyname(3XNET)</code>
<i>dport</i>	The value that follows is the destination port of the datagram. This can be either a port number or a string as described in <code>getservbyname(3XNET)</code> searched with NULL proto argument.
<i>proto</i> <i>ulp</i>	The value that follows is the Upper Layer Protocol that this entry should be matched against. It could be a number or a string as described in <code>getprotobyname(3XNET)</code>. If no <i>smask</i> or <i>plen</i> is specified, a <i>plen</i> of 32 for IPv4 or 128 for IPv6 will be used.

If no smask or plen is specified, a plen of 32 for IPv4 or 128 for IPv6 will be used, meaning a host.

Policy entries may contain the following (name value) pairs in the properties field. Each (name value) pair may appear only once in a given policy entry.

auth_algs

An acceptable value following this implies that IPsec AH header will be present in the outbound datagram. Values following this describe the authentication algorithms that will be used while applying the IPsec AH on outbound datagrams and verified to be present on inbound datagrams. See *RFC 2402*.

This entry can contain either a string or a decimal number.

string

This should be either MD5 or HMAC-MD5 denoting the HMAC-MD5 algorithm as described in *RFC 2403*, and SHA1, or HMAC-SHA1 or SHA or HMAC-SHA denoting the HMAC-SHA algorithm described in *RFC 2404*. The string can also be ANY, which denotes no-preference for the algorithm. Default algorithms will be chosen based upon the SAs available at this time for manual SAs and the key negotiating daemon for automatic SAs. Strings are not case-sensitive.

number

A number in the range 1-255. This is useful when new algorithms can be dynamically loaded.

If *auth_algs* is not present, the AH header will not be present in the outbound datagram, and the same will be verified for the inbound datagram.

encr_algs

An acceptable value following this implies that IPsec ESP header will be present in the outbound datagram. The value following this describes the encryption algorithms that will be used to apply the IPsec ESP protocol to outbound datagrams and verify it to be present on inbound datagrams. See *RFC 2406*.

This entry can contain either a string or a decimal number. Strings are not case-sensitive.

string

Can be one of the following:

string value:	Algorithm Used:	See RFC:
DES or DES-CBC	DES-CBC	2405
3DES or 3DES-CBC	3DES-CBC	2451
BLOWFISH or BLOWFISH-CBC	BLOWFISH-CBC	2451
AES or AES-CBC	AES-CBC	2451

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The value can be `NULL`, which implies a `NULL` encryption, pursuant to RFC 2410. This means that the payload will not be encrypted. The string can also be `ANY`, which indicates no-preference for the algorithm. Default algorithms will be chosen depending upon the SAs available at the time for manual SAs and upon the key negotiating daemon for automatic SAs. Strings are not case-sensitive.

number

A decimal number in the range 1-255. This is useful when new algorithms can be dynamically loaded.

encr_auth_algs

An acceptable value following `encr_auth_algs` implies that the IPsec ESP header will be present in the outbound datagram. The values following `encr_auth_algs` describe the authentication algorithms that will be used while applying the IPsec ESP protocol on outbound datagrams and verified to be present on inbound datagrams. See *RFC 2406*. This entry can contain either a string or a number. Strings are case-insensitive.

string Valid values are the same as the ones described for `auth_algs` above.

number This should be a decimal number in the range 1-255. This is useful when new algorithms can be dynamically loaded.

If `encr_algs` is present and `encr_auth_algs` is not present in a policy entry, the system will use an ESP SA regardless of whether the SA has an authentication algorithm or not.

If `encr_algs` is not present and `encr_auth_algs` is present in a policy entry, null encryption will be provided, which is equivalent to `encr_algs` with `NULL`, for outbound and inbound datagrams.

If both `encr_algs` and `encr_auth_algs` are not present in a policy entry, ESP header will not be present for outbound datagrams and the same will be verified for inbound datagrams.

If both `encr_algs` and `encr_auth_algs` are present in a policy entry, ESP header with integrity checksum will be present on outbound datagrams and the same will be verified for inbound datagrams.

For `encr_algs`, `encr_auth_algs`, and `auth_algs` a key length specification may be present. This is either a single value specifying the only valid key length for the algorithm or a range specifying the valid minimum and/or maximum key lengths. Minimum or maximum lengths may be omitted.

dir

Values following this decides whether this entry is for outbound or inbound datagram. Valid values are strings that should be one of the following:

out This means that this policy entry should be considered only for outbound datagrams.

in	This means that this policy entry should be considered only for inbound datagrams.
both	This means that this policy entry should be considered for both inbound and outbound datagrams
This entry is not needed when the action is "apply", "permit" or "ipsec". But if it is given while the action is "apply" or "permit", it should be "out" or "in" respectively. This is mandatory when the action is "bypass".	
sa	Values following this decide the attribute of the security association. Value indicates whether a unique security association should be used or any existing SA can be used. If there is a policy requirement, SAs are created dynamically on the first outbound datagram using the key management daemon. Static SAs can be created using ipseckey(1M). The values used here determine whether a new SA will be used/obtained. Valid values are strings that could be one of the following:
unique	Unique Association. A new/unused association will be obtained/used for packets matching this policy entry. If an SA that was previously used by the same 5 tuples, that is, {Source address, Destination address, Source port, Destination Port, Protocol (for example, TCP/UDP)} exists, it will be reused. Thus uniqueness is expressed by the 5 tuples given above. The security association used by the above 5 tuples will not be used by any other socket. For inbound datagrams, uniqueness will not be verified.
shared	Shared association. If an SA exists already for this source-destination pair, it will be used. Otherwise a new SA will be obtained. This is the default.
This is mandatory only for outbound policy entries and should not be given for entries whose action is "bypass". If this entry is not given for inbound entries, for example, when "dir" is in or "action" is permit, it will be assumed to be shared.	
Action follows the pattern and should be given before properties. It should be one of the following and this field is mandatory.	
ipsec	Use IPsec for the datagram as described by the properties, if the pattern matches the datagram. If ipsec is given without a dir spec , the pattern is matched to incoming and outgoing datagrams.
apply	Apply IPsec to the datagram as described by the properties, if the pattern matches the datagram. If apply is given, the pattern is matched only on the outbound datagram.
permit	Permit the datagram if the pattern matches the incoming datagram and satisfies the constraints described by the properties. If it does not satisfy the properties, discard the datagram. If permit is given, the pattern is matched only for inbound datagrams.

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bypass

pass

Bypass any policy checks if the pattern matches the datagram. `dir` in the properties decides whether the check is done on outbound or inbound datagrams. All the `bypass` entries are checked before checking with any other policy entry in the system. This has the highest precedence over any other entries. `dir` is the only field that should be present when action is `bypass`.

drop

Drop any packets that match the pattern.

If the file contains multiple policy entries, for example, they are assumed to be listed in the order in which they are to be applied. In cases of multiple entries matching the outbound and inbound datagram, the first match will be taken. The system will reorder the policy entry, that is, add the new entry before the old entry, only when:

- The level of protection is "stronger" than the old level of protection. Currently, strength is defined as:

AH and ESP > ESP > AH

The standard uses of AH and ESP were what drove this ranking of "stronger". There are flaws with this. ESP can be used either without authentication, which will allow cut-and-paste or replay attacks, or without encryption, which makes it equivalent or slightly weaker than AH. An administrator should take care to use ESP properly. See `ipsecesp(7P)` for more details.

If the new entry has `bypass` as action, `bypass` has the highest precedence. It can be added in any order, and the system will still match all the `bypass` entries before matching any other entries. This is useful for key management daemons which can use this feature to bypass IPsec as it protects its own traffic.

Entries with both AH (`auth_algs` present in the policy entry) and ESP (`encr_auth_algs` or `encr_auth_algs` present in the policy entry) protection are ordered after all the entries with AH and ESP and before any AH-only and ESP-only entries. In all other cases the order specified by the user is not modified, that is, newer entries are added at the end of all the old entries. See `EXAMPLES`.

A new entry is considered duplicate of the old entry if an old entry matches the same traffic pattern as the new entry. See `EXAMPLES` for information on duplicates.

SECURITY

If, for example, the policy file comes over the wire from an NFS mounted file system, an adversary can modify the data contained in the file, thus changing the policy configured on the machine to suit his needs. Administrators should be cautious about transmitting a copy of the policy file over a network.

Policy is latched for TCP/UDP sockets on which a `connect(3SOCKET)` or `accept(3SOCKET)` has been issued. Adding new policy entries will not have any effect on them. This feature of latching may change in the future. It is not advisable to depend upon this feature.

Make sure to set up the policies before starting any communications, as existing connections may be affected by the addition of new policy entries. Similarly, do not change policies in the middle of a communication.

Note that certain `ndd` tunables affect how policies configured with this tool are enforced; see `ipsecesp(7P)` for more details.

If your source address is a host that can be looked up over the network, and your naming system itself is compromised, then any names used will no longer be trustworthy.

EXAMPLES

EXAMPLE 1 Protecting Outbound TCP Traffic With ESP and the AES Algorithm

The following example specified that any TCP packet from `spiderweb` to `arachnid` should be encrypted with AES, and the SA could be a shared one. It does not verify whether or not the inbound traffic is encrypted.

```
#
# Protect the outbound TCP traffic between hosts spiderweb
# and arachnid with ESP and use AES algorithm.
#
{
    laddr spiderweb
    raddr arachnid
    ulp tcp
    dir out
} ipsec {
    encr_algs AES
}
```

EXAMPLE 2 Verifying Whether or Not Inbound Traffic is Encrypted

Example 1 does not verify whether or not the inbound traffic is encrypted. The entry in this example protects inbound traffic:

```
#
# Protect the TCP traffic on inbound with ESP/DES from arachnid
# to spiderweb
#
{
    laddr spiderweb
    raddr arachnid
    ulp tcp
    dir in
} ipsec {
    encr_algs AES
}
```

`sa` can be absent for inbound policy entries as it implies that it can be a shared one. Uniqueness is not verified on inbound. Note that in both the above entries, authentication was never specified. This can lead to cut and paste attacks. As mentioned previously, though the authentication is not specified, the system will still use an ESP SA with `encr_auth_alg` specified, if it was found in the SA tables.

EXAMPLE 3 Protecting All Traffic Between Two Hosts

The following example protects both directions at once:

```
{
    laddr spiderweb
    raddr arachnid
    ulp tcp
} ipsec {
    encr_algs AES
}
```

EXAMPLE 4 Authenticating All Inbound Traffic to the Telnet Port

This entry specifies that any inbound datagram to telnet port should come in authenticated with the SHA1 algorithm. Otherwise the datagram should not be permitted. Without this entry, traffic destined to port number 23 can come in clear. `sa` is not specified, which implies that it is shared. This can be done only for inbound entries. You need to have an equivalent entry to protect outbound traffic so that the outbound traffic is authenticated as well, remove the `dir`.

```
#
# All the inbound traffic to the telnet port should be
# authenticated.
#
{
    lport telnet
    dir in
} ipsec {
    auth_algs sha1
}
```

EXAMPLE 5 Verifying Inbound Traffic is Null-Encrypted

The first entry specifies that any packet with address `host-B` should not be checked against any policies. The second entry specifies that all inbound traffic from `network-B` should be encrypted with a NULL encryption algorithm and the MD5 authentication algorithm. NULL encryption implies that ESP header will be used without encrypting the datagram. As the first entry is `bypass` it need not be given first in order, as `bypass` entries have the highest precedence. Thus any inbound traffic will be matched against all `bypass` entries before any other policy entries.

```
#
# Make sure that all inbound traffic from network-B is NULL
# encrypted, but bypass for host-B alone from that network.
# Add the bypass first.
{
    raddr host-B
    dir in
} bypass {}

# Now add for network-B.
{
```

EXAMPLE 5 Verifying Inbound Traffic is Null-Encrypted (Continued)

```

        raddr network-B/16
        dir in
    } ipsec {
    encr_algs NULL
    encr_auth_algs md5
    }

```

EXAMPLE 6 Entries to Bypass Traffic from IPsec

The first two entries provide that any datagram leaving the machine with source port 53 or coming into port number 53 should not be subjected to IPsec policy checks, irrespective of any other policy entry in the system. Thus the latter two entries will be considered only for ports other than port number 53.

```

#
# Bypass traffic for port no 53
#
{lport 53} bypass {}
{rport 53} bypass {}
{raddr spiderweb } ipsec {encr_algs any sa unique}

```

EXAMPLE 7 Protecting Outbound Traffic

```

#
# Protect the outbound traffic from all interfaces.
#
{raddr spiderweb dir out} ipsec {auth_algs any sa unique}

```

If the `gethostbyname(3XNET)` call for `spiderweb` yields multiple addresses, multiple policy entries will be added for all the source address with the same properties.

```

{
    laddr arachnid
    raddr spiderweb
    dir in
} ipsec {auth_algs any sa unique}

```

If the `gethostbyname(3XNET)` call for `spiderweb` and the `gethostbyname(3XNET)` call for `arachnid` yield multiple addresses, multiple policy entries will be added for each (`saddr daddr`) pair with the same properties. Use `ipsecconf -l` to view all the policy entries added.

EXAMPLE 8 Bypassing Unauthenticated Traffic

```

#
# Protect all the outbound traffic with ESP except any traffic
# to network-b which should be authenticated and bypass anything
# to network-c
#
{raddr network-b/16 dir out} ipsec {auth_algs any}

```

EXAMPLE 8 Bypassing Unauthenticated Traffic (Continued)

```
{dir out} ipsec {encr_algs any}
{raddr network-c/16 dir out} bypass {} # NULL properties
```

Note that `bypass` can be given anywhere and it will take precedence over all other entries. `NULL` pattern matches all the traffic.

EXAMPLE 9 Encrypting IPv6 Traffic with 3DES and MD5

The following entry on the host with the link local address `fe80::a00:20ff:fe21:4483` specifies that any outbound traffic between the hosts with IPv6 link-local addresses `fe80::a00:20ff:fe21:4483` and `fe80::a00:20ff:felf:e346` must be encrypted with 3DES and MD5.

```
{
  laddr fe80::a00:20ff:fe21:4483
  raddr fe80::a00:20ff:felf:e346
  dir out
} ipsec {
  encr_algs 3DES
  encr_auth_algs MD5
}
```

EXAMPLE 10 Verifying IPv6 Traffic is Authenticated with SHA1

The following two entries require that all IPv6 traffic to and from the IPv6 site-local network `fec0:abcd::0/32` be authenticated with SHA1.

```
{raddr fec0:abcd::0/32} ipsec { auth_algs SHA1 }
```

EXAMPLE 11 Key Lengths

```
# use aes at any key length
{raddr spiderweb} ipsec {encr_algs aes}

# use aes with a 192 bit key
{raddr spiderweb} ipsec {encr_algs aes(192)}

# use aes with any key length up to 192 bits
# i.e. 192 bits or less
{raddr spiderweb} ipsec {encr_algs aes(..192)}

# use aes with any key length of 192 or more
# i.e. 192 bits or more
{raddr spiderweb} ipsec {encr_algs aes(192..)}

#use aes with any key from 192 to 256 bits
{raddr spiderweb} ipsec {encr_algs aes(192..256)}

#use any algorithm with a key of 192 bits or longer
{raddr spiderweb} ipsec {encr_algs any(192..)}
```

EXAMPLE 12 Using “or”

The following entry allows traffic using the AES or Blowfish algorithms from the remote machine spiderweb:

```
{raddr spiderweb} ipsec {encr_algs aes} or {encr_algs blowfish}
```

FILES	/var/run/ipsecpolicy.conf	Cache of IPsec policies currently configured for the system, maintained by ipsecconf command. Do not edit this file.
	/etc/inet/ipsecinit.conf	File containing IPsec policies to be installed at the time the system transitions from run-level 2 or 3. If present, these policies are loaded after /usr is mounted but before any non-boot-time routing information is processed and before any Internet services are started, including naming services.
	/etc/inet/ipsecinit.sample	Sample input file for ipsecconf.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	Evolving

SEE ALSO in.iked(1M), init(1M), ifconfig(1M), ipseckey(1M), accept(3SOCKET), connect(3SOCKET), gethostbyname(3XNET), getnetbyname(3XNET), getprotobyname(3XNET), getservbyname(3XNET), getaddrinfo(3SOCKET), socket(3SOCKET), attributes(5), ipsec(7P), ipsec(7P), tun(7M)

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ipseccnf(1M)

Madsen, C. and Doraswamy, N. *RFC 2405, The ESP DES-CBC Cipher Algorithm With Explicit IV*. The Internet Society. 1998.

Pereira, R. and Adams, R. *RFC 2451, The ESP CBC-Mode Cipher Algorithms*. The Internet Society. 1998.

Frankel, S. and Kelly, R. Glenn, *The AES Cipher Algorithm and Its Use With IPsec*, 2001.

DIAGNOSTICS

Bad "string" on line *N*.

Duplicate "string" on line *N*.

string refers to one of the names in pattern or properties. A Bad string indicates that an argument is malformed; a Duplicate string indicates that there are multiple arguments of a similar type, for example, multiple Source Address arguments..

Error before or at line *N*.

Indicates parsing error before or at line *N*.

Non-existent index

Reported when the *index* for delete is not a valid one.

spd_msg return: File exists

Reported when there is already a policy entry that matches the traffic of this new entry.

NAME	ipseckey – manually manipulate an IPsec Security Association Database (SADB)						
SYNOPSIS	<pre> ipseckey [-nvp] ipseckey [-nvp] -f <i>filename</i> ipseckey [-nvp] [delete get] SA_TYPE {EXTENSION <i>value</i>...} ipseckey [-np] [monitor passive_monitor pmonitor] ipseckey [-nvp] flush {SA_TYPE} ipseckey [-nvp] dump {SA_TYPE} ipseckey [-nvp] save SA_TYPE {<i>filename</i>} ipseckey [-nvp] -s <i>filename</i> </pre>						
DESCRIPTION	The ipseckey command is used to manually manipulate the security association databases of the network security services, ipsecak(7P) and ipsecesp(7P). You can use the ipseckey command to set up security associations between communicating parties when automated key management is not available. While the ipseckey utility has only a limited number of general options, it supports a rich command language. The user may specify requests to be delivered by means of a programmatic interface specific for manual keying. See pf_key(7P). When ipseckey is invoked with no arguments, it will enter an interactive mode which prints a prompt to the standard output and accepts commands from the standard input until the end-of-file is reached. Some commands require an explicit security association (“SA”) type, while others permit the SA type to be unspecified and act on all SA types. ipseckey uses a PF_KEY socket and the message types SADB_ADD, SADB_DELETE, SADB_GET, SADB_UPDATE, SADB_FLUSH, and SADB_X_PROMISC. Thus, you must be a superuser to use this command. ipseckey handles sensitive cryptographic keying information. Please read the SECURITY CONSIDERATIONS section for details on how to use this command securely.						
OPTIONS	<table> <tr> <td>-f [<i>filename</i>]</td><td>Read commands from an input file, <i>filename</i>. The lines of the input file are identical to the command line language. The load command provides similar functionality. The -s option or the save command can generate files readable by the -f argument.</td></tr> <tr> <td>-n</td><td>Prevent attempts to print host and network names symbolically when reporting actions. This is useful, for example, when all name servers are down or are otherwise unreachable.</td></tr> <tr> <td>-p</td><td>Paranoid. Do not print any keying material, even if saving SAs. Instead of an actual hexadecimal digit, print an X when this flag is turned on.</td></tr> </table>	-f [<i>filename</i>]	Read commands from an input file, <i>filename</i> . The lines of the input file are identical to the command line language. The load command provides similar functionality. The -s option or the save command can generate files readable by the -f argument.	-n	Prevent attempts to print host and network names symbolically when reporting actions. This is useful, for example, when all name servers are down or are otherwise unreachable.	-p	Paranoid. Do not print any keying material, even if saving SAs. Instead of an actual hexadecimal digit, print an X when this flag is turned on.
-f [<i>filename</i>]	Read commands from an input file, <i>filename</i> . The lines of the input file are identical to the command line language. The load command provides similar functionality. The -s option or the save command can generate files readable by the -f argument.						
-n	Prevent attempts to print host and network names symbolically when reporting actions. This is useful, for example, when all name servers are down or are otherwise unreachable.						
-p	Paranoid. Do not print any keying material, even if saving SAs. Instead of an actual hexadecimal digit, print an X when this flag is turned on.						

ipseckey(1M)

COMMANDS

-s [<i>filename</i>]	The opposite of the -f option. If '-' is given for a <i>filename</i> , then the output goes to the standard output. A snapshot of all current SA tables will be output in a form readable by the -f option. The output will be a series of add commands, but with some names not used. This occurs because a single name may often indicate multiple addresses.
-v	Verbose. Print the messages being sent into the PF_KEY socket, and print raw seconds values for lifetimes.
add	Add an SA. Because it involves the transfer of keying material, it cannot be invoked from the shell, lest the keys be visible in ps(1) output. It can be used either from the interactive ipseckey> prompt or in a command file specified by the -f command. The add command accepts all extension-value pairs described below.
update	Update SA lifetime, and in the cases of larval SAs (leftover from aborted automated key management), keying material and other extensions. Like add, this command cannot be invoked from the shell because keying material would be seen by the ps(1) command. It can be used either from the interactive ipseckey> prompt or in a command file specified by the -f command. The update command accepts all extension-value pairs, but normally is only used for SA lifetime updates.
delete	Delete a specific SA from a specific SADB. This command requires the spi extension, and the dest extension for IPsec SAs. Other extension-value pairs are superfluous for a delete message.
get	Lookup and display a security association from a specific SADB. Like delete, this command only requires spi and dest for IPsec.
flush	Remove all SA for a given SA_TYPE, or all SA for all types.
monitor	Continuously report on any PF_KEY messages. This uses the SADB_X_PROMISC message to enable messages that a normal PF_KEY socket would not receive to be received. See pf_key(7P).
passive_monitor	Like monitor, except that it does not use the SADB_X_PROMISC message.
pmonitor	Synonym for passive_monitor.

SECURITY ASSOCIATION TYPES	dump	Will display all SAs for a given SA type, or will display all SAs. Because of the large amount of data generated by this command, there is no guarantee that all SA information will be successfully delivered, or that this command will even complete.
	save	Is the command analog of the -s option. It is included as a command to provide a way to snapshot a particular SA type, for example, esp or ah.
	help	Prints a brief summary of commands.
	all	Specifies all known SA types. This type is only used for the flush and dump commands. This is equivalent to having no SA type for these commands.
	ah	Specifies the IPsec Authentication Header ("AH") SA.
	esp	Specifies the IPsec Encapsulating Security Payload ("ESP") SA.
EXTENSION VALUE TYPES	Commands like add, delete, get, and update require that certain extensions and associated values be specified. The extensions will be listed here, followed by the commands that use them, and the commands that require them. Requirements are currently documented based upon the IPsec definitions of an SA. Required extensions may change in the future. <number> can be in either hex (0xnnn), decimal (nnn) or octal (0nnn). <string> is a text string. <hexstr> is a long hexadecimal number with a bit-length. Extensions are usually paired with values; however, some extensions require two values after them.	
	spi <number> Specifies the security parameters index of the SA. This extension is required for the add, delete, get and update commands.	
	replay <number> Specifies the replay window size. If not specified, the replay window size is assumed to be zero. It is not recommended that manually added SAs have a replay window. This extension is used by the add and update commands.	
	state <string> <number> Specifies the SA state, either by numeric value or by the strings "larval", "mature", "dying" or "dead". If not specified, the value defaults to mature. This extension is used by the add and update commands.	
	auth_alg <string> <number> authalg <string> <number> Specifies the authentication algorithm for an SA, either by numeric value, or by strings indicating an algorithm name. Current authentication algorithms include:	
	HMAC-MD5	md5, hmac-md5
	HMAC-SH-1	sha, sha-1, hmac-sha1, hmac-sha

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Often, algorithm names will have several synonyms. This extension is required by the `add` command for certain SA types. It is also used by the `update` command.

`encr_alg <string>|<number>`

`encr_alg <string>|<number>`

Specifies the encryption algorithm for an SA, either by numeric value, or by strings indicating an algorithm name. Current encryption algorithms include DES ("des"), Triple-DES ("3des"), Blowfish ("blowfish"), and AES ("aes"). This extension is required by the `add` command for certain SA types. It is also used by the `update` command.

The next six extensions are lifetime extensions. There are two varieties, "hard" and "soft". If a hard lifetime expires, the SA will be deleted automatically by the system. If a soft lifetime expires, an `SADB_EXPIRE` message will be transmitted by the system, and its state will be downgraded to dying from mature. See `pf_key(7P)`. The `monitor` command to key allows you to view `SADB_EXPIRE` messages.

`soft_bytes <number>`

`hard_bytes <number>`

Specifies the number of bytes that this SA can protect. If this extension is not present, the default value is zero, which means that the SA will not expire based on the number of bytes protected. This extension is used by the `add` and `update` commands.

`soft_addtime <number>`

`hard_addtime <number>`

Specifies the number of seconds that this SA can exist after being added or updated from a larval SA. An update of a mature SA does not reset the initial time that it was added. If this extension is not present, the default value is zero, which means the SA will not expire based on how long it has been since it was added. This extension is used by the `add` and `update` commands.

`soft_usetime <number>`

`hard_usetime <number>`

Specifies the number of seconds this SA can exist after first being used. If this extension is not present, the default value is zero, which means the SA will not expire based on how long it has been since it was added. This extension is used by the `add` and `update` commands.

`saddr <address|name>`

`srcaddr <address|name>`

`saddr6 <IPv6 address>`

`srcaddr6 <IPv6 address>`

`src <address|name>`

`src6 <IPv6 address>`

`srcaddr <address>` and `src <address>` are synonyms that indicate the source address of the SA. If unspecified, the source address will either remain unset, or it will be set to a wildcard address if a destination address was supplied. To not

specify the source address is valid for IPsec SAs. Future SA types may alter this assumption. This extension is used by the `add`, `update`, `get` and `delete` commands.

```
daddr <address|name>
dstaddr <address|name>
daddr6 <IPv6 address|name>
dstaddr6 <IPv6 address|name>
dst <addr|name>
dst6 <IPv6 address|name>
```

`dstaddr <addr>` and `dst <addr>` are synonyms that indicate the destination address of the SA. If unspecified, the destination address will remain unset. Because IPsec SAs require a specified destination address and `spi` for identification, this extension, with a specific value, is required for the `add`, `update`, `get` and `delete` commands.

If a name is given, `ipseckey` will attempt to invoke the command on multiple SAs with all of the destination addresses that the name can identify. This is similar to how `ipseccnf` handles addresses.

If `dst6` or `dstaddr6` is specified, only the IPv6 addresses identified by a name are used.

```
proxyaddr <address|name>
proxy <address|name>
```

`proxyaddr <address>` and `proxy <address>` are synonyms that indicate the proxy address for the SA. A proxy address is used for an SA that is protecting an inner protocol header. The proxy address is the source address of the inner protocol's header. This extension is used by the `add` and `update` commands.

```
authkey <hexstring>
```

Specifies the authentication key for this SA. The key is expressed as a string of hexadecimal digits, with an optional `/` at the end, for example, `123/12`. Bits are counted from the most-significant bits down. For example, to express three '1' bits, the proper syntax is the string `"e/3"`. For multi-key algorithms, the string is the concatenation of the multiple keys. This extension is used by the `add` and `update` commands.

```
enckey <hexstring>
```

Specifies the encryption key for this SA. The syntax of the key is the same as `authkey`. A concrete example of a multi-key encryption algorithm is `3des`, which would express itself as a 192-bit key, which is three 64-bit parity-included DES keys. This extension is used by the `add` and `update` commands.

Keying material is very sensitive and should be generated as randomly as possible. Some algorithms have known weak keys. IPsec algorithms have built-in weak key checks, so that if a weak key is in a newly added SA, the `add` command will fail with an invalid value.

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Certificate identities are very useful in the context of automated key management, as they tie the SA to the public key certificates used in most automated key management protocols. They are less useful for manually added SAs. Unlike other extensions, `srcidtype` takes two values, a `type`, and an actual value. The type can be one of the following:

<code>prefix</code>	An address prefix.
<code>fqdn</code>	A fully-qualified domain name.
<code>domain</code>	Domain name, synonym for <code>fqdn</code> .
<code>user_fqdn</code>	User identity of the form <code>user@fqdn</code> .
<code>mailbox</code>	Synonym for <code>user_fqdn</code> .

The value is an arbitrary text string, which should identify the certificate.

`srcidtype <type, value>`

Specifies a source certificate identity for this SA. This extension is used by the `add` and `update` commands.

`dstidtype <type, value>`

Specifies a destination certificate identity for this SA. This extension is used by the `add` and `update` commands

SECURITY CONSIDERATIONS

The `ipseckey` command allows a privileged user to enter cryptographic keying information. If an adversary gains access to such information, the security of IPsec traffic is compromised. The following issues should be taken into account when using the `ipseckey` command.

1. Is the TTY going over a network (interactive mode)?
 - If it is, then the security of the keying material is the security of the network path for this TTY's traffic. Using `ipseckey` over a clear-text telnet or rlogin session is risky.
 - Even local windows may be vulnerable to attacks where a concealed program that reads window events is present.
2. Is the file accessed over the network or readable to the world (`-f` option)?
 - A network-mounted file can be sniffed by an adversary as it is being read. A world-readable file with keying material in it is also risky.

If your source address is a host that can be looked up over the network, and your naming system itself is compromised, then any names used will no longer be trustworthy.

Security weaknesses often lie in misapplication of tools, not the tools themselves. Administrators are urged to be cautious when using `ipseckey`. The safest mode of operation is probably on a console, or other hard-connected TTY.

For further thoughts on this subject, see the afterward by Matt Blaze in Bruce Schneier's *Applied Cryptography: Protocols, Algorithms, and Source Code in C*.

EXAMPLES**EXAMPLE 1** Emptying Out All SAs

To empty out all SA:

```
example# ipseckey flush
```

EXAMPLE 2 Flushing Out IPsec AH SAs Only

To flush out only IPsec AH SAs:

```
example# ipseckey flush ah
```

EXAMPLE 3 Saving All SAs To Standard Output

To save all SAs to the standard output:

```
example# ipseckey save all
```

EXAMPLE 4 Saving ESP SAs To The File /tmp/snapshot

To save ESP SAs to the file /tmp/snapshot:

```
example# ipseckey save esp /tmp/snapshot
```

EXAMPLE 5 Deleting an IPsec SA

To delete an IPsec SA, only the SPI and the destination address are needed:

```
example# ipseckey delete esp spi 0x2112 dst 224.0.0.1
```

EXAMPLE 6 Getting Information on an IPsec SA

Likewise, getting information on a SA only requires the destination address and SPI:

```
example# ipseckey get ah spi 0x5150 dst mypeer
```

EXAMPLE 7 Adding or Updating IPsec SAs

Adding or updating SAs requires entering interactive mode:

```
example# ipseckey
ipseckey> add ah spi 0x90125 src me.domain.com dst you.domain.com \
    authalg md5 authkey 1234567890abcdef1234567890abcdef
ipseckey> update ah spi 0x90125 dst you.domain.com hard_bytes \
    16000000 ipseckey> exit
```

EXAMPLE 8 Adding an SA in the Opposite Direction

In the case of IPsec, SAs are unidirectional. To communicate securely, a second SA needs to be added in the opposite direction. The peer machine also needs to add both SAs.

```
example# ipseckey
ipseckey> add ah spi 0x2112 src you.domain.com dst me.domain.com \
    authalg md5 authkey bde359723576fdea08e56cbe876e24ad \
```

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EXAMPLE 8 Adding an SA in the Opposite Direction (Continued)

```
        hard_bytes 16000000
ipseckey> exit
```

EXAMPLE 9 Monitoring PF_KEY Messages

Monitoring for PF_KEY messages is straightforward:

```
example# ipseckey monitor
```

EXAMPLE 10 Using Commands in a File

Commands can be placed in a file that can be parsed with the `-f` option. This file may contain comment lines that begin with the `"#"` symbol. For example:

```
# This is a sample file for flushing out the ESP table and
# adding a pair of SAs.

flush esp

### Watch out! I have keying material in this file. See the
### SECURITY CONSIDERATIONS section in this manual page for why this can be
### dangerous .

add esp spi 0x2112 src me.domain.com dst you.domain.com \
    authalg md5 authkey bde359723576fdea08e56cbe876e24ad \
    encralg des encrkey be02938e7def2839 hard_usetime 28800
add esp spi 0x5150 src you.domain.com dst me.domain.com \
    authalg md5 authkey 930987dbe09743ade09d92b4097d9e93 \
    encralg des encrkey 8bd4a52e10127deb hard_usetime 28800

## End of file - This is a gratuitous comment
```

EXAMPLE 11 Adding SAs for IPv6 Addresses

The following commands from the interactive-mode create an SA to protect IPv6 traffic between the site-local addresses

```
example # ipseckey
ipseckey> add esp spi 0x6789 src6 fec0:bbbb::4483 dst6 fec0:bbbb::7843
        authalg md5 authkey bde359723576fdea08e56cbe876e24ad
        encralg des encrkey be02938e7def2839 hard_usetime 28800
ipseckey>exit
```

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

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ATTRIBUTE TYPE	ATTRIBUTE VALUE
Interface Stability	Evolving

SEE ALSO ps(1), ipsecconf(1M), route(1M), attributes(5), ipsec(7P), ipsecah(7P), ipsecesp(7P), pf_key(7P)

Schneier, B., *Applied Cryptography: Protocols, Algorithms, and Source Code in C*. Second ed. New York, New York: John Wiley & Sons, 1996.

DIAGNOSTICS Parse error on line N.
If an interactive use of ipseckey would print usage information, this would print instead. Usually preceded by another diagnostic.

Unexpected end of command line.
An additional argument was expected on the command line.

Unknown
A value for a specific extension was unknown.

Address type N not supported.
A name-to-address lookup returned an unsupported address family.

is not a bit specifier
bit length N is too big for
string is not a hex string
Keying material was not entered appropriately.

Can only specify single
A duplicate extension was entered.

Don't use extension for <string> for <command>.
An extension not used by a command was used.

One of the entered values is incorrect: Diagnostic code NN: <msg>
This is a general invalid parameter error. The diagnostic code and message provides more detail about what precise value was incorrect and why.

NOTES In spite of its IPsec-specific name, ipseckey is analogous to route(1M), in that it is a command-line interface to a socket-based administration engine, in this case, PF_KEY. PF_KEY was originally developed at the United States Naval Research Laboratory.

To have machines communicate securely with manual keying, SAs need to be added by all communicating parties. If two nodes wish to communicate securely, both nodes need the appropriate SAs added.

In the future ipseckey may be invoked under additional names as other security protocols become available to PF_KEY.

kadb(1M)

NAME	kadb – a kernel debugger
SYNOPSIS	
SPARC	<pre>ok boot device_specifier kadb [-d] [boot-flags] > b kadb [-d] [boot-flags]</pre>
x86	<pre>select (b)oot or (i)nterpreter: b kadb [-d] [boot-flags] select (b)oot or (i)nterpreter: i kadb [-d] [boot-flags]</pre>
DESCRIPTION	kadb is an interactive kernel debugger with a user interface similar to adb(1), the assembly language debugger. kadb must be loaded prior to the standalone program it is to debug. kadb runs with the same environment as the standalone program, so it shares many resources with that program. The debugger is cognizant of and able to control multiple processors, should they be present in a system. When kadb is started, it requests the default filename from boot(1M), and if loaded non-interactively (without the -d option), it loads the default filename. On systems which support both 32-bit and 64-bit operating system, boot(1M) chooses an appropriate default filename for that system. If loaded interactively (by specifying the -d option), kadb prompts with the default filename, which can be changed before continuing. The default filename can be specified on the boot(1M) command line. See boot(1M) for details. Before loading the 64-bit kernel explicitly, review the information in boot(1M) for restrictions on running the 64-bit kernel on certain configurations. Unlike adb(1), kadb runs in the same supervisor virtual address space as the program being debugged, although it maintains a separate context. The debugger runs as a <i>co-process</i> that cannot be killed (no :k command as in adb) or rerun (no :r command as in adb) . There is no signal control (no :i, :t, or \$i commands as in adb), although the keyboard facilities (CTRL-C, CTRL-S, and CTRL-Q) are simulated. In the case of the UNIX system kernel, the keyboard abort sequence suspends kernel operations and breaks into the debugger. This behavior may be disabled by way of the kbd(1) command and may not be the current default on all systems. See kb(7M) for more information. As the kernel is composed of the core image file and the set of loadable modules already in memory, kadb has the capability of debugging all of these by traversing special data structures. kadb makes use of this feature to allow it to reference any kernel data structure, even if it resides in a loadable module. kadb sets the -d flag by default so the program being debugged can tell it is being watched. If this flag is not given, kadb loads and immediately runs the default kernel .

Most adb(1) commands function in kadb as they do in adb. As with adb -k, \$p works when debugging kernels. The verbs ? and / are equivalent in kadb, as there is only one address space in use.

The keyboard abort sequence is L1+A on keyboards with an L1 key, and F1+A on keyboards with no L1 key. On serial lines, the default abort sequence is a BREAK signal, but this can be changed to the sequence “carriage return, tilde, control‐B” using:

```
kbd -a alternate
```

See kbd(1).

Once aborted, kadb responds with the following:

```
kadb [cpu] :
```

where *cpu* is the number of the CPU on which kadb is currently executing.

OPTIONS The following options are supported:

-d Interactive startup. If specified, kadb stops after loading and displays the kadb: prompt, followed by the name of the default program to debug.

The user may either press RETURN to debug the default program, or BACK SPACE followed by the name of another program to debug.

OPERANDS The following operands are supported:

boot-flags Specifies boot flags as arguments to kadb. The specified boot-flags are passed to the program being debugged. See boot(1M) for available boot-flags.

SPARC Only *device-specifier* Specifies the device from which to load. See monitor(1M).

USAGE

Kernel Macros As with adb(1), kernel macros can be used with kadb, but they cannot be read from a file at runtime. Use the kadb \$M command to list all of the built-in kadb macros.

Commands kadb reads commands from the standard input and displays responses on the standard output. kadb supports the majority of the adb(1) commands. kadb does not support the following adb commands: :k, :r, :i, :t, or \$i. See adb(1).

Additionally, kadb supports the following commands:

[
Performs the same function as :e in adb(1), but requires only one keystroke and no RETURN (ENTER on x86 based systems).

]

Performs the same function as :s in adb(1), but requires only one keystroke and no RETURN (ENTER on x86 based systems).

:a

Sets a hardware access (read or write) breakpoint using the processor hardware facilities. The syntax and action for this command is the same as the :b command in adb, with the following exceptions:

- The breakpoint triggers if any bytes from the breakpoint for length bytes are being accessed. See §1 below for setting the length of a hardware breakpoint.
- Breakpoints should be aligned for the length specified. Any address is valid for length 1. Addresses divisible by 2 should be used for length 2 (short). Addresses divisible by 4 should be used for length 4 (int).
- Detection of an access breakpoint occurs after completion of the instruction that caused it.
- There are a limited number (4) of hardware breakpoint registers, and, when set, this uses one.
- As this breakpoint does not modify memory locations, this command will work on locations that are not in core at the time the breakpoint is set.

@fmt

Used in the same manner as the adb / and ? commands. Specify @ as a physical memory address as opposed to the normal virtual address. Specify fmt as any of the formats used with the adb / command. This command is useful for displaying memory that may not be mapped, for example, kernel page tables or buffers used for DMA by device drivers.

function:: call arg1, arg2, arg3, ...

Invokes kernel functions with 0 or more arguments. Using this command results in a response such as:

```
retval = function(arg1,arg2,arg3,...);
```

where *retval* is the return value of the function. This feature can be error prone, as functions may have side effects that cause failures if the kernel is continued.

:p

Sets a hardware access (read or write) breakpoint using the processor hardware facilities when an instruction at the specified address is run. The §1 operation has no effect on this type of breakpoint. This breakpoint occurs before the instruction is executed.

:P

Works as :a, but this command will only breakpoint when an access is made to the address in x86 I/O space. See :a.

:w

Sets a write hardware access breakpoint using the processor hardware facilities.

	<code>[length]\$l</code>	Sets the default data length for an access or write breakpoint. <i>length</i> can be set to 1 for byte, 2 for short, and 4 for int word accesses. If <i>length</i> is not specified, 1 byte is assumed. Once set, this value affects any newly set access or write breakpoints, but does not affect ones set before this operation.
	<code>\$b</code>	Displays two additional columns that <code>kadb</code> does not. The first is the <code>type</code> column which indicates <code>soft</code> for a normal breakpoint, <code>access</code> for an access hardware breakpoint, <code>write</code> for a write hardware breakpoint, and <code>inst</code> for an instruction hardware breakpoint. The second is the <code>len</code> column which for access and write breakpoints indicate the length of the operation to break on.
SPARC	<code>\$q</code>	Gives control to the boot prom, from which you may reboot the system.
	<code>cpu:x</code>	Switches the active CPU to <i>cpu</i> . Thereafter, commands such as <code>\$r</code> and <code>\$c</code> displays the registers and stack of the new CPU, <i>cpu</i> .
x86	<code>port:i</code>	Inputs a byte for display from <i>port</i> . <i>port</i> is an address-specified I/O port. For example, <code>330:i</code> inputs from address port 330.
	<code>port:i8</code>	Same as the <code>:i</code> command. See <code>:i</code> .
	<code>port:i16</code>	Inputs two bytes for display from <i>port</i> . <i>port</i> is an address-specified I/O port.
	<code>port:i32</code>	Inputs four bytes for display from <i>port</i> . <i>port</i> is an address-specified I/O port.
	<code>port,data:o</code>	Outputs a byte to <i>port</i> . <i>port</i> is an address-specified I/O port. <code>[address],[data]:o</code> outputs the value <i>data</i> to address I/O <i>port</i> . For example, <code>330,80:o</code> outputs 80 to address port 330.
	<code>port,data:o8</code>	Same as the <code>:o</code> command. See <code>port,data:o</code> .
	<code>port,data:o16</code>	Outputs two bytes to <i>port</i> . <i>port</i> is an address-specified I/O port.
	<code>port,data:o32</code>	Outputs four bytes to <i>port</i> . <i>port</i> is an address-specified I/O port.
	<code>\$q</code>	Prompts the user with: Type 'y' if you really want to reboot. Responding with a y or Y causes the system to reboot. Responding with anything other than a y or Y returns control to <code>kadb</code> . Use this feature when you cannot press the reset switch on your machine. Because using <code>\$q</code> may result in data loss, this command should only be used when you would press the reset switch or power off your system.
Online Help Commands	<code>::help</code>	Displays the formats of <code>kadb</code> commands and extended commands.
	<code>::?</code>	Same as the <code>::help</code> command. See <code>::help</code> .

kadb(1M)

Scroll Control Feature	<code>::morehelp</code> Displays additional information about commonly used commands and provides an explanation of data formats. <code>num::more</code> A common problem with using kadb is that scrolling is sometimes too fast and that CTRL-s and CTRL-q are inexact controls. A conditional scroll control feature similar to more(1) has been added to kadb. To enable this feature, the user specifies the number of lines to be displayed, followed by <code>::more</code>. For example, the command <code>14::more</code> displays 14 (current radix) lines, followed by the <code>--More--</code> prompt. At this prompt, press: ENTER or RETURN to display one more line. Press c, C, or CTRL-c to interrupt the display. Press any other key to display the next <i>num</i> number of specified lines (14 in this example). The command <code>::more</code> displays the current setting for the number of lines that kadb displays before printing the <code>--More--</code> prompt. The initial scroll control value of this feature is 0, meaning that scrolling is disabled. Once enabled, the <code>0::more</code> command disables the scroll control feature.

kadb(1M)

pci\-ide#_init:b

The output from the the \$b command indicates whether the breakpoint is of type "deferred" (defr) or is another type.

FILES

/platform/*platform-name*/kadb
primary debugger path

/platform/*hardware-class-name*/kadb
alternative debugger path for some platforms

/platform/*platform-name*/kernel/unix
primary default 32-bit kernel

/platform/*hardware-class-name*/kernel/unix
alternative default 32-bit kernel for some platforms

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcar

SEE ALSO

adb(1), more(1), uname(1), boot(1M), kernel(1M), attributes(5), kb(7M)

SPARC Only

kbd(1), monitor(1M), obpsym(1M)

DIAGNOSTICS

When there is no current command or format, kadb comments about syntax errors, abnormal termination of commands, and the like.

WARNINGS

SPARC Only

On a SPARC based system, kadb cannot reliably single-step over instructions which change the processor status register.

SPARC and IA

If a breakpoint or watchpoint is triggered while the console frame buffer is powered off, the system can crash and be left in a state from which it is difficult to recover. If one of these is triggered while the monitor is powered off, you will not be able to see the debugger output.

NOTES

platform-name can be found using the -i option of uname(1). *hardware-class-name* can be found using the -m option of uname(1).

kadmin(1M)

NAME	kadmin, kadmin.local – Kerberos database administration program
SYNOPSIS	<pre> /usr/sbin/kadmin [-r realm] [-p principal] [-q query] [-s admin_server [:port]] [[-c credential_cache] [-k [-t keytab]] [-w password]] /usr/sbin/kadmin.local [-r realm] [-p principal] [-q query] [-d dbname] [-e "enc:salt..."] [-m] [-D] </pre>
DESCRIPTION	kadmin and kadmin.local are interactive command-line interfaces to the Kerberos V5 administration system. They provide for the maintenance of Kerberos principals, policies, and service key tables (keytabs). kadmin and kadmin.local provide identical functionality; the difference is that kadmin.local can run only on the master KDC and does not use Kerberos authentication. Except as explicitly noted otherwise, this man page will use kadmin to refer to both versions. By default, both versions of kadmin attempt to determine your user name and perform operations on behalf of your "username/admin" instance. Operations performed are subject to privileges granted or denied to this user instance by the Kerberos ACL file (see <code>kadm5 .acl(4)</code>). You may perform administration as another user instance by using the <code>-p</code> option. The remote version, kadmin, uses Kerberos authentication and an encrypted RPC to operate securely from anywhere on the network. It normally prompts for a password and authenticates the user to the Kerberos administration server, kadmind, whose service principal is <i>kadmin/admin</i>. Some options specific to the remote version permit the password prompt to be bypassed. The <code>-c</code> option searches the named credentials cache for a valid ticket for the <i>kadmin/admin</i> service and uses it to authenticate the user to the Kerberos admin server without a password. The <code>-k</code> option searches a keytab for a credential to authenticate to the <i>kadmin/admin</i> service, and again no password is collected. If kadmin has collected a password, it requests a <i>kadmin/admin</i> Kerberos service ticket from the KDC, and uses that service ticket to interact with kadmind. The local version, kadmin.local, must be run with an effective UID of root, and normally uses a key from the <code>/var/krb5/.k5.realm</code> stash file (see <code>kdb5_util(1M)</code>) to decrypt information from the database rather than prompting for a password. The <code>-m</code> option will bypass the <code>.k5.realm</code> stash file and prompt for the master password. OPTIONS The following options are supported: <code>-c credential_cache</code> Search <i>credential_cache</i> for a service ticket for the <i>kadmin/admin</i> service; it can be acquired with the <code>kinit(1)</code> program. If this option is not specified, kadmin requests a new service ticket from the KDC, and stores it in its own temporary credentials cache. <code>-d dbname</code> Specify a non-standard database name. [Local only] <code>-D</code> Turn on debug mode. [Local only]

- e "*enc:salt ...*"
Specify a different encryption type and/or key salt. [Local only]
- k [-t *keytab*]
Use the default keytab (-k) or a specific keytab (-t *keytab*) to decrypt the KDC response instead of prompting for a password. In this case, the default principal will be *host/hostname*. This is primarily used for keytab maintenance.
- m
Accept the database master password from the keyboard rather than using the */var/krb5/.k5.realm* stash file. [Local only]
- p *principal*
Authenticate *principal* to the *kadmin/admin* service. Otherwise, *kadmin* will append */admin* to the primary principal name of the default credentials cache, the value of the *USER* environment variable, or the username as obtained with *getpwuid*, in that order of preference.
- q *query*
Pass *query* directly to *kadmin*, which will perform *query* and then exit. This can be useful for writing scripts.
- r *realm*
Use *realm* as the default database realm.
- s *admin_server[:port]*
Administer the specified admin server at the specified port number (*port*). This can be useful in administering a realm not known to your client.
- w *password*
Use *password* instead of prompting for one. Note that placing the password for a Kerberos principal with administration access into a shell script can be dangerous if unauthorized users gain read access to the script or can read arguments of this command through *ps(1)*.

COMMANDS

- list_requests*
Lists all the commands available for *kadmin*. Aliased by *lr* and *?*.
- get_privs*
Lists the current Kerberos administration privileges (ACLs) for the principal that is currently running *kadmin*. The privileges are based on the */etc/krb5/kadm5.acl* file on the master KDC. Aliased by *getprivs*.
- add_principal [options] newprinc*
Creates a new principal, *newprinc*, prompting twice for a password. If the *-policy* option is not specified and a policy named *default* exists, then the *default* policy is assigned to the principal; note that the assignment of the *default* policy occurs automatically only when a principal is first created, so the *default* policy must already exist for the assignment to occur. The automatic assignment of the *default* policy can be suppressed with the *-clearpolicy* option. This command requires the *add* privilege. Aliased by *addprinc* and *ank*. The options are:

- expire *expdate*
Expiration date of the principal. See the Time Formats section for the valid absolute time formats that you can specify for *expdate*.
- pwexpire *pwexpdate*
Password expiration date. See the Time Formats section for the valid absolute time formats that you can specify for *pwexpdate*.
- maxlife *maxlife*
Maximum ticket life for the principal. See the Time Formats section for the valid time duration formats that you can specify for *maxlife*.
- maxrenewlife *maxrenewlife*
Maximum renewable life of tickets for the principal. See the Time Formats section for the valid time duration formats that you can specify for *maxrenewlife*.
- kvno *kvno*
Explicitly set the key version number.
- policy *policy*
Policy used by the principal. If both the -policy and -clearpolicy options are not specified, the default policy is used if it exists; otherwise, the principal will have no policy. Also note that the password and principal name must be different when you add a new principal with a specific policy or the default policy.
- clearpolicy
-clearpolicy prevents the default policy from being assigned when -policy is not specified. This option has no effect if the default policy does not exist.
- {-|+}allow_postdated
-allow_postdated prohibits the principal from obtaining postdated tickets. (Sets the KRB5_KDB_DISALLOW_POSTDATED flag.) +allow_postdated clears this flag.
- {-|+}allow_forwardable
-allow_forwardable prohibits the principal from obtaining forwardable tickets. (Sets the KRB5_KDB_DISALLOW_FORWARDABLE flag.) +allow_forwardable clears this flag.
- {-|+}allow_renewable
-allow_renewable prohibits the principal from obtaining renewable tickets. (Sets the KRB5_KDB_DISALLOW_RENEWABLE flag.) +allow_renewable clears this flag.
- {-|+}allow_proxiabile
-allow_proxiabile prohibits the principal from obtaining proxiabile tickets. (Sets the KRB5_KDB_DISALLOW_PROXIABLE flag.) +allow_proxiabile clears this flag.

```

{-|+}allow_dup_skey
  -allow_dup_skey disables user-to-user authentication for the principal by
  prohibiting this principal from obtaining a session key for another user. (Sets the
  KRB5_KDB_DISALLOW_DUP_SKEY flag.) +allow_dup_skey clears this flag.

{-|+}requires_preauth
  +requires_preauth requires the principal to preauthenticate before being
  allowed to kinit. (Sets the KRB5_KDB_REQUIRES_PRE_AUTH flag.)
  -requires_preauth clears this flag.

{-|+}requires_hwauth
  +requires_hwauth requires the principal to preauthenticate using a hardware
  device before being allowed to kinit. (Sets the KRB5_KDB_REQUIRES_HW_AUTH
  flag.) -requires_hwauth clears this flag.

{-|+}allow_svr
  -allow_svr prohibits the issuance of service tickets for the principal. (Sets the
  KRB5_KDB_DISALLOW_SVR flag.) +allow_svr clears this flag.

{-|+}allow_tgs_req
  -allow_tgs_req specifies that a Ticket-Granting Service (TGS) request for a
  service ticket for the principal is not permitted. This option is useless for most
  things. +allow_tgs_req clears this flag. The default is +allow_tgs_req. In
  effect, -allow_tgs_req sets the KRB5_KDB_DISALLOW_TGT_BASED flag on
  the principal in the database.

{-|+}allow_tix
  -allow_tix forbids the issuance of any tickets for the principal. +allow_tix
  clears this flag. The default is +allow_tix. In effect, -allow_tix sets the
  KRB5_KDB_DISALLOW_ALL_TIX flag on the principal in the database.

{-|+}needchange
  +needchange sets a flag in attributes field to force a password change;
  -needchange clears it. The default is -needchange. In effect, +needchange
  sets the KRB5_KDB_REQUIRES_PWCHANGE flag on the principal in the database.

{-|+}password_changing_service
  +password_changing_service sets a flag in the attributes field marking this
  as a password change service principal (useless for most things).
  -password_changing_service clears the flag. This flag intentionally has a
  long name. The default is -password_changing_service. In effect,
  +password_changing_service sets the KRB5_KDB_PWCHANGE_SERVICE
  flag on the principal in the database.

-randkey
  Sets the key of the principal to a random value.

-pw password
  Sets the key of the principal to the specified string and does not prompt for a
  password. Note that using this option in a shell script can be dangerous if
  unauthorized users gain read access to the script.

```

Example:

```
kadmin: addprinc tlyu/admin
WARNING: no policy specified for "tlyu/admin@ACME.COM";
defaulting to no policy.
Enter password for principal tlyu/admin@ACME.COM:
Re-enter password for principal tlyu/admin@ACME.COM:
Principal "tlyu/admin@ACME.COM" created.
kadmin:
```

Errors:

KADM5_AUTH_ADD (requires add privilege)

KADM5_BAD_MASK (should not happen)

KADM5_DUP (principal exists already)

KADM5_UNK_POLICY (policy does not exist)

KADM5_PASS_Q_* (password quality violations)

delete_principal [-force] *principal*

Deletes the specified principal from the database. This command prompts for deletion, unless the -force option is given. This command requires the delete privilege. Aliased by delprinc.

Example:

```
kadmin: delprinc mwm_user
Are you sure you want to delete the principal
"mwm_user@ACME.COM"? (yes/no): yes
Principal "mwm_user@ACME.COM" deleted.
Make sure that you have removed this principal from
all kadmin ACLs before reusing.
kadmin:
```

Errors:

KADM5_AUTH_DELETE (requires delete privilege)

KADM5_UNK_PRINC (principal does not exist)

modify_principal [*options*] *principal*

Modifies the specified principal, changing the fields as specified. The options are as above for add_principal, except that password changing is forbidden by this command. In addition, the option -clearpolicy will clear the current policy of a principal. This command requires the modify privilege. Aliased by modprinc.

Errors:

KADM5_AUTH_MODIFY (requires modify privilege)

KADM5_UNK_PRINC (principal does not exist)

KADM5_UNK_POLICY (policy does not exist)

KADM5_BAD_MASK (should not happen)

change_password [*options*] *principal*

Changes the password of *principal*. Prompts for a new password if neither `-randkey` or `-pw` is specified. Requires the `changepw` privilege, or that the principal that is running the program to be the same as the one changed. Aliased by `cpw`. The following options are available:

`-randkey`

Sets the key of the principal to a random value.

`-pw password`

Sets the password to the specified string. Not recommended.

Example:

```
kadmin: cpw systest
Enter password for principal systest@ACME.COM:
Re-enter password for principal systest@ACME.COM:
Password for systest@ACME.COM changed.
kadmin:
```

Errors:

KADM5_AUTH_MODIFY (requires the `modify` privilege)

KADM5_UNK_PRINC (principal does not exist)

KADM5_PASS_Q_* (password policy violation errors)

KADM5_PADD_REUSE (password is in principal's password history)

KADM5_PASS_TOOSOON (current password minimum life not expired)

get_principal [`-terse`] *principal*

Gets the attributes of *principal*. Requires the `inquire` privilege, or that the principal that is running the program to be the same as the one being listed. With the `-terse` option, outputs fields as quoted tab-separated strings. Aliased by `getprinc`.

Examples:

```
kadmin: getprinc tlyu/admin
Principal: tlyu/admin@ACME.COM
Expiration date: [never]
Last password change: Mon Aug 12 14:16:47 EDT 1996
Password expiration date: [none]
Maximum ticket life: 0 days 10:00:00
Maximum renewable life: 7 days 00:00:00
Last modified: Mon Aug 12 14:16:47 EDT 1996
(example_user/admin@ACME.COM)
Last successful authentication: [never]
Last failed authentication: [never]
Failed password attempts: 0
Number of keys: 2 Key: vno 1, DES cbc mode with CRC-32,
no salt Key: vno 1, DES cbc mode with CRC-32,
Version 4 Attributes:
Policy: [none]
kadmin: getprinc -terse systest
```

kadmin(1M)

```
systest@ACME.COM 3      86400      604800      1 785926535      753241234
785900000
tlyu/admin@ACME.COM      786100034      0      0
kadmin:
```

Errors:

KADM5_AUTH_GET (requires the get [inquire] privilege)

KADM5_UNK_PRINC (principal does not exist)

list_principals [*expression*]

Retrieves all or some principal names. *expression* is a shell-style glob expression that can contain the wild-card characters `?`, `*`, and `[]`'s. All principal names matching the expression are printed. If no expression is provided, all principal names are printed. If the expression does not contain an `@` character, an `@` character followed by the local realm is appended to the expression. Requires the `list` privilege. Aliased by `listprincs`, `get_principals`, and `getprincs`.

Examples:

```
kadmin: listprincs test*
test3@ACME.COM
test2@ACME.COM
test1@ACME.COM
testuser@ACME.COM
kadmin:
```

add_policy [*options*] *policy*

Adds the named policy to the policy database. Requires the `add` privilege. Aliased by `addpol`. The following options are available:

-maxlife *maxlife*

sets the maximum lifetime of a password. See the `Time Formats` section for the valid time duration formats that you can specify for *maxlife*.

-minlife *minlife*

sets the minimum lifetime of a password. See the `Time Formats` section for the valid time duration formats that you can specify for *minlife*.

-minlength *length*

sets the minimum length of a password.

-minclasses *number*

sets the minimum number of character classes allowed in a password. The valid values are:

1	only letters (himom)
2	both letters and numbers (hi2mom)
3	letters, numbers, and punctuation (hi2mom!)

-history *number*

sets the number of past keys kept for a principal.

Errors:

KADM5_AUTH_ADD (requires the add privilege)

KADM5_DUP (policy already exists)

delete_policy *policy*

Deletes the named policy. Prompts for confirmation before deletion. The command will fail if the policy is in use by any principals. Requires the delete privilege. Aliased by delpol.

Example:

```
kadmin: del_policy guests
Are you sure you want to delete the
policy "guests"? (yes/no): yes
Policy "guests" deleted.
kadmin:
```

Errors:

KADM5_AUTH_DELETE (requires the delete privilege)

KADM5_UNK_POLICY (policy does not exist)

KADM5_POLICY_REF (reference count on policy is not zero)

modify_policy [*options*] *policy*

Modifies the named policy. Options are as above for add_policy. Requires the modify privilege. Aliased by modpol.

Errors:

KADM5_AUTH_MODIFY (requires the modify privilege)

KADM5_UNK_POLICY (policy does not exist)

get_policy [-terse] *policy*

Displays the values of the named policy. Requires the inquire privilege. With the -terse flag, outputs the fields as quoted strings separated by tabs. Aliased by getpol.

Examples:

```
kadmin: get_policy admin
Policy: admin
Maximum password life: 180 days 00:00:00
Minimum password life: 00:00:00
Minimum password length: 6
Minimum number of password character classes: 2
Number of old keys kept: 5
Reference count: 17
kadmin: get_policy -terse
admin admin    15552000    0    6    2    5    17
kadmin:
```

Errors:

KADM5_AUTH_GET (requires the get privilege)

KADM5_UNK_POLICY (policy does not exist)

list_policies [*expression*]

Retrieves all or some policy names. *expression* is a shell-style glob expression that can contain the wild-card characters `?`, `*`, and `[]`'s. All policy names matching the expression are printed. If no expression is provided, all existing policy names are printed. Requires the `list` privilege. Aliased by `listpols`, `get_policies`, and `getpols`.

Examples:

```
kadmin: listpols
test-pol dict-only once-a-min test-pol-nopw
kadmin: listpols t*
test-pol test-pol-nopw kadmin:
```

ktadd [-k *keytab*] [-q] [*principal* | -glob *princ-exp*] [...]

Adds a principal or all principals matching *princ-exp* to a keytab, randomizing each principal's key in the process. Requires the `inquire` and `changepw` privileges. An entry for each of the principal's unique encryption types is added, ignoring multiple keys with the same encryption type but different salt types. If the `-k` argument is not specified, the default keytab file, `/etc/krb5/krb5.keytab`, is used. If the `-q` option is specified, less status information is displayed. Aliased by `xst`. The `-glob` option requires the `list` privilege. Also, note that if you use `-glob` to create a keytab, you need to remove `/etc/krb5/kadm5.keytab` and create it again if you want to use `-p */admin` with `kadmin`.

princ-exp follows the same rules described for the `list_principals` command.

Example:

```
kadmin: ktadd -k /tmp/new-keytab nfs/chicago
Entry for principal nfs/chicago with kvno 2,
encryption type DES-CBC-CRC added to keytab
WRFILE:/tmp/new-keytab.
kadmin:
```

ktremove [-k *keytab*] [-q] *principal* [*kvno* | `all` | `old`]

Removes entries for the specified principal from a keytab. Requires no privileges, since this does not require database access. If `all` is specified, all entries for that principal are removed; if `old` is specified, all entries for that principal except those with the highest kvno are removed. Otherwise, the value specified is parsed as an integer, and all entries whose kvno match that integer are removed. If the `-k` argument is not specified, the default keytab file, `/etc/krb5/krb5.keytab`, is used. If the `-q` option is specified, less status information is displayed. Aliased by `ktrem`.

Example:

```
kadmin: kremove -k /tmp/new-keytab nfs/chicago
Entry for principal nfs/chicago with kvno 2
removed from keytab
WRFILE:/tmp/new-keytab.
kadmin:
```


quit

Quits kadmin. Aliased by exit and q.

Time Formats

Various commands in kadmin can take a variety of time formats, specifying time durations or absolute times. The kadmin option variables *maxrenewlife*, *maxlife*, and *minlife* are time durations, whereas *expdate* and *pwexpdate* are absolute times.

Examples:

```
kadmin: modprinc -expire "12/31 7pm" jdb
kadmin: modprinc -maxrenewlife "2 fortnight" jdb
kadmin: modprinc -pwexpire "this sunday" jdb
kadmin: modprinc -expire never jdb
kadmin: modprinc -maxlife "7:00:00pm tomorrow" jdb
```

Note that times which do not have the "ago" specifier default to being absolute times, unless they appear in a field where a duration is expected. In that case, the time specifier will be interpreted as relative. Specifying "ago" in a duration can result in unexpected behavior.

The following time formats and units can be combined to specify a time. The time and date format examples are based on the date and time of July 2, 1999, 1:35:30 p.m.

Time Format	Examples
<i>hh[:mm][:ss][am/pm/a.m./p.m.]</i>	1p.m., 1:35, 1:35:30pm

Variable	Description
<i>hh</i>	hour (12-hour clock, leading zero permitted but not required)
<i>mm</i>	minutes
<i>ss</i>	seconds

Date Format	Examples
<i>mm/dd[/yy]</i>	07/02, 07/02/99
<i>yyyy-mm-dd</i>	1999-07-02
<i>dd-month-yyyy</i>	02-July-1999
<i>month [,yyyy]</i>	Jul 02, July 02,1999
<i>dd month[yyyy]</i>	02 JULY, 02 july 1999

Variable Description

kadmin(1M)

<i>dd</i>	day
<i>mm</i>	month
<i>yy</i>	year within century (00-38 is 2000 to 2038; 70-99 is 1970 to 1999)
<i>yyyy</i>	year including century
<i>month</i>	locale's full or abbreviated month name

Time Units	Examples
[+ -#] year	"-2 year"
[+ -#] month	"2 months"
[+ -#] fortnight	
[+ -#] week	
[+ -#] day	
[+ -#] hour	
[+ -#] minute	
[+ -#] min	
[+ -#] second	
[+ -#] sec	
tomorrow	
yesterday	
today	
now	
this	"this year"
last	"last saturday"
next	"next month"
sunday	
monday	
tuesday	
wednesday	
thursday	
friday	

**ENVIRONMENT
VARIABLES**

saturday	
never	

You can also use the following time modifiers: first, second, third, fourth, fifth, sixth, seventh, eighth, ninth, tenth, eleventh, twelfth, and ago.

See `environ(5)` for descriptions of the following environment variables that affect the execution of `kadmin`:

PAGER The command to use as a filter for paging output. This can also be used to specify options. The default is `more(1)`.

FILES

`/var/krb5/principal.db`
Kerberos principal database.

`/var/krb5/principal.kadm5`
Kerberos administrative database. Contains policy information.

`/var/krb5/principal.kadm5.lock`
Lock file for the Kerberos administrative database. This file works backwards from most other lock files (that is, `kadmin` will exit with an error if this file does *not* exist).

`/var/krb5/kadm5.dict`
Dictionary of strings explicitly disallowed as passwords.

`/etc/krb5/kadm5.acl`
List of principals and their `kadmin` administrative privileges.

`/etc/krb5/kadm5.keytab`
Keytab for *kadmin/admin* principal.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkdcu
Interface Stability	Evolving

SEE ALSO

`kpasswd(1)`, `more(1)`, `gkadmin(1M)`, `kadmind(1M)`, `kdb5_util(1M)`, `kadm5.acl(4)`, `kdc.conf(4)`, `krb5.conf(4)`, `attributes(5)`, `environ(5)`, `SEAM(5)`

HISTORY

The `kadmin` program was originally written by Tom Yu at MIT, as an interface to the OpenVision Kerberos administration program.

DIAGNOSTICS

The `kadmin` command is currently incompatible with the MIT `kadmind` daemon interface, so you cannot use this command to administer an MIT-based Kerberos database. However, SEAM-based Kerberos clients can still use a MIT-based KDC.

kadmind(1M)

NAME	kadmind – Kerberos administration daemon
SYNOPSIS	/usr/lib/kadmind [-d] [-m] [-p <i>port-number</i>] [-r <i>realm</i>]
DESCRIPTION	kadmind runs on the master key distribution center (KDC), which stores the principal and policy databases. kadmind accepts remote requests to administer the information in these databases. Remote requests are sent, for example, by <code>kpasswd(1)</code>, <code>gkamdin(1M)</code>, and <code>kadmin(1M)</code> commands, all of which are clients of kadmind. When you install a KDC, kadmind is set up in the <code>init</code> scripts to start automatically when the KDC is rebooted. kadmind requires a number of configuration files to be set up for it to work: <code>/etc/krb5/kdc.conf</code> The KDC configuration file contains configuration information for the KDC and the Kerberos administration system. kadmind understands a number of configuration variables (called relations) in this file, some of which are mandatory and some of which are optional. In particular, kadmind uses the <code>acl_file</code>, <code>dict_file</code>, <code>admin_keytab</code>, and <code>kadmind_port</code> relations in the <code>[realms]</code> section. Refer to the <code>kdc.conf(4)</code> man page for information regarding the format of the KDC configuration file. <code>/etc/krb5/kadm5.keytab</code> kadmind requires akeytab (key table) containing correct entries for the <code>kadmin/admin</code> and <code>kadmin/changepw</code> principals for every realm that kadmind answers requests. The keytab can be created with the <code>kadmin.local(1M)</code>, <code>kdb5_util(1M)</code> command. The location of the keytab is determined by the <code>admin_keytab</code> relation in the <code>kdc.conf(4)</code> file. <code>/etc/krb5/kadm5.acl</code> kadmind uses an ACL (access control list) to determine which principals are allowed to perform Kerberos administration actions. The path of the ACL file is determined by the <code>acl_file</code> relation in the <code>kdc.conf</code> file. See <code>kdc.conf(4)</code>. For information regarding the format of the ACL file, refer to <code>kadm5.acl(4)</code>. Note that the kadmind daemon will need to be restarted in order to reread the <code>kadm5.acl</code> file after it has been modified. You can do this, as root, with the following commands: <pre># /etc/init.d/kdc.master stop # /etc/init.d/kdc.master start</pre> After kadmind begins running, it puts itself in the background and disassociates itself from its controlling terminal.
OPTIONS	The following options are supported: -d Specifies that kadmind does not put itself in the background and does not disassociate itself from the terminal. In normal operation, you should use the default behavior, which is to allow the daemon to put itself in the background.

kadmind(1M)

- m Specifies that the master database password should be retrieved from the keyboard rather than from the stash file. When using -m, the kadmind daemon receives the password prior to putting itself in the background. If used in combination with the -d option, you must explicitly place the daemon in the background.
- p *port-number* Specifies the port on which the kadmind daemon listens for connections. The default is controlled by the kadmind_port relation in the kdc.conf(4) file.
- r *realm* Specifies the default realm that kadmind serves. If *realm* is not specified, the default *realm* of the host is used. kadmind answers requests for any realm that exists in the local KDC database and for which the appropriate principals are in its keytab.

FILES

- /var/krb5/principal.db
Kerberos principal database.
- /var/krb5/principal.kadm5
Kerberos administrative database containing policy information.
- /var/krb5/principal.kadm5.lock
Kerberos administrative database lock file. This file works backwards from most other lock files (that is, kadmin exits with an error if this file does not exist).
- /var/krb5/kadm5.dict
Dictionary of strings explicitly disallowed as passwords.
- /etc/krb5/kadm5.acl
List of principals and their kadmin administrative privileges.
- /etc/krb5/kadm5.keytab
Keytab for kadmin/admin principal.
- /etc/krb5/kdc.conf
KDC configuration information.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkdcu
Interface Stability	Evolving

SEE ALSO

kpasswd(1), gkadmin(1M), kadmin(1M), kadmin.local(1M), kdb5_util(1M), kadm5.acl(4), kdc.conf(4), attributes(5), SEAM(5)

NOTES

The Kerberos administration daemon (kadmind) is now compliant with the change-password standard mentioned in RFC 3244, which means it can now handle change-password requests from non-Solaris Kerberos clients.

kdb5_util(1M)

NAME	kdb5_util – Kerberos Database maintenance utility
SYNOPSIS	<code>/usr/sbin/kdb5_util [-d <i>dbname</i>] [-f <i>stashfile_name</i>] [-k <i>mkeytype</i>] [-m]</code> <code>[-M <i>mkeyname</i>] [-P <i>password</i>] [-r <i>realm</i>] <i>cmd</i></code>
DESCRIPTION	kdb5_util enables you to create, dump, load, and destroy the Kerberos V5 database. You can also use kdb5_util to create a stash file containing the Kerberos database master key.
OPTIONS	The following options are supported: <code>-d <i>dbname</i></code> Specify the database name. <code>.db</code> is appended to whatever name is specified. You can specify an absolute path. If you do not specify the <code>-d</code> option, the default database name is <code>/var/krb5/principal</code>, which becomes <code>/var/krb5/principal.db</code>. <code>-f <i>stashfile_name</i></code> Specify the stash file name. You can specify an absolute path. <code>-k <i>mkeytype</i></code> Specify the master key type. Valid values are <code>des-cbc-crc</code>, <code>des-cbc-md5</code>, and <code>des-cbc-raw</code>. <code>-m</code> Enter the master key manually. <code>-M <i>mkeyname</i></code> Specify the master key name. <code>-P <i>password</i></code> Use the specified <i>password</i> instead of the stash file. <code>-r <i>realm</i></code> Use <i>realm</i> as the default database realm.
OPERANDS	The following operands are supported: <i>cmd</i> Specifies whether to create, destroy, dump, or load the database, or to create a stash file. You can specify the following commands: <code>create -s</code> Creates the database specified by the <code>-d</code> option. You will be prompted for the database master password. If you specify <code>-s</code>, a stash file is created as specified by the <code>-f</code> option. If you did not specify <code>-f</code>, the default stash file name is <code>/var/krb5/.k5.realm</code>. If you use the <code>-f</code>, <code>-k</code>, or <code>-M</code> options when you create a database, then you must use the same options when modifying or destroying the database. <code>destroy</code> Destroys the database specified by the <code>-d</code> option.

stash

Creates a stash file. If `-f` was not specified, the default stash file name is `/var/krb5/.k5.realm`. You will be prompted for the master database password. This command is useful when you want to generate the stash file from the password.

dump [-verbose] [filename] [principals]

Dumps the Kerberos database to a flat file that can be used for loading or propagating to a slave KDC. See `kprop(1M)`. Specify file name for a location to dump the Kerberos database. If *filename* is not specified, the principal data is printed to standard error. Specify `-verbose` to print out the principal names to standard error in addition to being dumping into the file. Use *principals* to specify the list of principals that should be dumped.

load [-verbose] [-update] filename

Loads the database specified by *dbname* (see `-d` option, above) with data from the file specified by *filename*, which must be a file created by the `dump` command. Use `-update` to specify that the existing database should be updated; otherwise, a new database is created. Specify `-verbose` to print out the principal names to standard error, in addition to being loaded.

EXAMPLES**EXAMPLE 1** Creating File that Contains Information about Two Principals

The following example creates a file named `slavedata` that contains the information about two principals, `jdb@ACME.COM` and `pak@ACME.COM`.

```
# /usr/krb5/bin/kdb5_util dump -verbose slavedata
jdb@ACME.COM pak@ACME.COM
```

FILES

`/var/krb5/principal.db`
Kerberos principal database.

`/var/krb5/principal.kadm5`
Kerberos administrative database. Contains policy information.

`/var/krb5/principal.kadm5.lock`
Lock file for the Kerberos administrative database. This file works backwards from most other lock files (that is, `kadmin` exits with an error if this file does not exist).

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkdcu

SEE ALSO

`kpasswd(1)`, `gkadmin(1M)`, `kadmin(1M)`, `kadmind(1M)`, `kadmin.local(1M)`, `kadm5.acl(4)`, `kdc.conf(4)`, `attributes(5)`, `SEAM(5)`

kdmconfig(1M)

NAME	kdmconfig – configure or unconfigure keyboard, display, and mouse options for OpenWindows and internationalization				
SYNOPSIS	kdmconfig kdmconfig [-fv] [-s <i>hostname</i>] -c -t -u -d <i>filename</i>				
DESCRIPTION	The kdmconfig program configures or unconfigures the <code>/etc/openwin/server/etc/OWconfig</code> file with the keyboard, display, and mouse information relevant to a client's machine on x86 based systems for Solaris software. kdmconfig can also be used to set up the <i>display</i>, <i>pointer</i>, and <i>keyboard</i> entries in the <code>bootparams(4)</code> database on a server machine or the <i>monitor</i>, <i>keyboard</i>, <i>display</i>, and <i>pointer</i> keywords in a <code>sysidcfg(4)</code> file. kdmconfig can only be run by the super-user. Upon completion of device selection, kdmconfig prompts the user to test the configuration, which is done by running the window system. The kdmconfig program is normally run during installation and upon reboot, but it can also be run from the command line after the system has been installed. When configuring a client during an initial installation or a reconfigure reboot, the <code>sysidconfig(1M)</code> program will invoke kdmconfig with the <code>-c</code> option, and when the user executes the <code>sys-unconfig(1M)</code> program, kdmconfig will be executed with the <code>-u</code> option. Similarly, when you run kdmconfig from the command line, use the <code>-u</code> option to unconfigure the existing OpenWindows configuration. You can then rerun kdmconfig with the <code>-cf</code> options to create a new OpenWindows configuration. To edit the existing configuration, run kdmconfig from the command line without options. After each reboot, kdmconfig will be invoked by the system with the <code>-t</code> (test mode) option to ensure autoconfiguration capability and identify possible conflicts between the current configuration and the one recorded in the <code>OWconfig</code> file.				
OPTIONS	The valid options are: <table> <tr> <td>-c</td><td>Run the program in the configuration mode. This mode is used to create or update the <code>OWconfig</code> file. When invoked in this way, kdmconfig first looks for the relevant configuration information in the <code>bootparams(4)</code> databases. It also takes into account the information returned from device probes, unless the <code>-s</code> option is also used. The <code>bootparams(4)</code> databases available to the client are all of the <code>/etc/bootparams</code> files on servers on the same subnet as the client, provided the server machine is running the <code>bootparamd(1M)</code> daemon. kdmconfig is invoked with the <code>-c</code> option when called by <code>sysidconfig(1M)</code></td></tr> <tr> <td>-d <i>filename</i></td><td>Set up a <code>sysidcfg(4)</code> file. This option displays the same screens as the <code>-c</code> option, but the information you specify is saved as <code>sysidcfg(4)</code> keywords (<i>monitor</i>, <i>keyboard</i>, <i>display</i>, and <i>pointer</i>). This enables you to use a <code>sysidcfg(4)</code> file to preconfigure a system's device information and bypass kdmconfig during an installation.</td></tr> </table>	-c	Run the program in the configuration mode. This mode is used to create or update the <code>OWconfig</code> file. When invoked in this way, kdmconfig first looks for the relevant configuration information in the <code>bootparams(4)</code> databases. It also takes into account the information returned from device probes, unless the <code>-s</code> option is also used. The <code>bootparams(4)</code> databases available to the client are all of the <code>/etc/bootparams</code> files on servers on the same subnet as the client, provided the server machine is running the <code>bootparamd(1M)</code> daemon. kdmconfig is invoked with the <code>-c</code> option when called by <code>sysidconfig(1M)</code>	-d <i>filename</i>	Set up a <code>sysidcfg(4)</code> file. This option displays the same screens as the <code>-c</code> option, but the information you specify is saved as <code>sysidcfg(4)</code> keywords (<i>monitor</i> , <i>keyboard</i> , <i>display</i> , and <i>pointer</i>). This enables you to use a <code>sysidcfg(4)</code> file to preconfigure a system's device information and bypass kdmconfig during an installation.
-c	Run the program in the configuration mode. This mode is used to create or update the <code>OWconfig</code> file. When invoked in this way, kdmconfig first looks for the relevant configuration information in the <code>bootparams(4)</code> databases. It also takes into account the information returned from device probes, unless the <code>-s</code> option is also used. The <code>bootparams(4)</code> databases available to the client are all of the <code>/etc/bootparams</code> files on servers on the same subnet as the client, provided the server machine is running the <code>bootparamd(1M)</code> daemon. kdmconfig is invoked with the <code>-c</code> option when called by <code>sysidconfig(1M)</code>				
-d <i>filename</i>	Set up a <code>sysidcfg(4)</code> file. This option displays the same screens as the <code>-c</code> option, but the information you specify is saved as <code>sysidcfg(4)</code> keywords (<i>monitor</i> , <i>keyboard</i> , <i>display</i> , and <i>pointer</i>). This enables you to use a <code>sysidcfg(4)</code> file to preconfigure a system's device information and bypass kdmconfig during an installation.				

	<i>filename</i> is the <code>sysidcfg(4)</code> file that is created, and it is created in the directory where <code>kdmconfig</code> is being run unless a path is specified. If <i>filename</i> already exists in the specified directory, the keywords are appended to the existing file.
-f	Force screens mode. When this option is invoked, no network probing will be performed. This is helpful when debugging the client's configuration environment. Note that the <code>-s</code> option implies the use of <code>-f</code> , bypassing network probing when setting up a server.
-s <i>hostname</i>	Set up the <code>bootparams(4)</code> database on this machine for the specified client. This option presents the same screens as it does when run on a client, but instead writes the resulting information to the <code>/etc/bootparams</code> file. Also, <code>-s</code> implies the use of the <code>-f</code> option. That is, the program will always present the screens to the user when invoked this way. This option will reconfigure the <code>nsswitch.conf(4)</code> file to look for a <code>bootparams(4)</code> database on a local server. This option is only available to the super-user.
-t	Run the program in test mode. In this mode, <code>kdmconfig</code> will use device probe information to determine whether the <code>OWconfig</code> file contains complete and up-to-date information about the keyboard, display, and mouse. If the information is accurate, <code>kdmconfig</code> will exit silently. Otherwise, <code>kdmconfig</code> will prompt for the super-user password and proceed to a normal editing session (as though it had been run without options).
-u	Unconfigure the system, returning it to an "out-of-the-box" state. In this state, the factory default keyboard, mouse, and display are selected as a result of removing the device configuration entries from the <code>/etc/openwin/server/etc/OWconfig</code> file. This may result in an unusable configuration for the display server.
-v	Enable verbose mode. Normally, <code>kdmconfig</code> will not produce any output. This option is helpful for debugging, as it records the different actions taken by <code>kdmconfig</code> on <code>stderr</code> .
No Options	Run without options, <code>kdmconfig</code> is used to edit the current configuration. <code>kdmconfig</code> uses the information from the <code>OWconfig</code> file in addition to information obtained from the <code>bootparams(4)</code> file and from device probes. In other respects, it is similar to using the <code>-c</code> option of <code>kdmconfig</code> .
FILES	<code>/etc/openwin/server/etc/OWconfig</code> OpenWindows configuration file <code>/etc/bootparams</code> contains list of clients that diskless clients use for booting <code>/etc/nsswitch.conf</code> name service configuration file

kdmconfig(1M)

x86 Only /dev/openprom installed devices and properties

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	x86
Availability	SUNWos86r

SEE ALSO bootparamd(1M), sys-unconfig(1M), sysidconfig(1M), bootparams(4),
nsswitch.conf(4), sysidcfg(4), attributes(5)

NAME	kernel – UNIX system executable file containing basic operating system services
SYNOPSIS	kernel-name [-afsrvx]
DESCRIPTION	The operating system image, or kernel, is the collection of software comprising the image files (unix and genunix) and the modules loaded at any instant in time. The system will not function without a kernel to control it. The kernel is loaded by the boot(1M) command in a machine-specific way. The kernel may be loaded from disk, CD-ROM, or DVD (diskfull boot) or over the network (diskless boot). In either case, the directories under /platform and /kernel must be readable and must contain executable code which is able to perform the required kernel service. If the -a flag is given, the user is able to supply different pathnames for the default locations of the kernel and modules. See boot(1M) for more information on loading a specific kernel. If the kernel name is not explicitly specified, then on systems capable of supporting the 64-bit kernel, the boot program will attempt to load the 64-bit kernel in preference to the 32-bit kernel by default. See boot(1m). The moddir variable contains a colon-separated list of directories that the kernel searches for modules. moddir can be set in the /etc/system file. The minimal default is /platform/platform-name/kernel:/kernel:/usr/kernel, but this default can be overridden by a specific platform. It is common for many systems to override the default path with: <pre>/platform/platform-name/kernel:/platform/hardware-class-name\ /kernel:/kernel:/usr/kernel</pre> where <i>platform-name</i> can be found using the -i option of uname(1), and <i>hardware-class-name</i> can be found using the -m option of uname(1). The kernel configuration can be controlled using the /etc/system file (see system(4)). genunix is the platform-independent component of the base kernel.
OPTIONS	The following options are supported: -a Asks the user for configuration information, such as where to find the system file, where to mount root, and even override the name of the kernel itself. Default responses will be contained in square brackets ([]), and the user may simply enter RETURN to use the default response (note that RETURN is labeled ENTER on some keyboards). To help repair a damaged /etc/system file, enter /dev/null at the prompt that asks for the pathname of the system configuration file. See system(4). -f Causes Autoclient systems to flush and reinitialize the client system's local cache. This flag is ignored for all non-Autoclient systems. -r Reconfiguration boot. The system will probe all attached hardware devices and assign nodes in the file system to represent only those devices actually

kernel(1M)

	found. It will also configure the logical namespace in <code>/dev</code> as well as the physical namespace in <code>/devices</code> . See <code>add_drv(1M)</code> and <code>rem_drv(1M)</code> for additional information about maintaining device drivers.																		
	-s Boots only to init level 's'. See <code>init(1M)</code> .																		
	-v Boots with verbose messages enabled. If this flag is not given, the messages are still printed, but the output is directed to the system logfile. See <code>syslogd(1M)</code> .																		
	-x Does not boot in clustered mode. This option only has an effect when a version of Sun Cluster software that supports this option has been installed.																		
EXAMPLES	See <code>boot(1M)</code> for examples and instructions on how to boot.																		
FILES	<code>/kernel</code> Contains kernel components common to all platforms within a particular instruction set that are needed for booting the system. of the core image file. <code>/platform/platform-name/kernel</code> The platform-specific kernel components. <code>/platform/hardware-class-name/kernel</code> The kernel components specific to this hardware class. <code>/usr/kernel</code> Contains kernel components common to all platforms within a particular instruction set. The directories in this section can potentially contain the following subdirectories: <table> <tr> <td><code>drv</code></td><td>Loadable device drivers</td></tr> <tr> <td><code>exec</code></td><td>The modules that execute programs stored in various file formats.</td></tr> <tr> <td><code>fs</code></td><td>File system modules</td></tr> <tr> <td><code>misc</code></td><td>Miscellaneous system-related modules</td></tr> <tr> <td><code>sched</code></td><td>Operating system schedulers</td></tr> <tr> <td><code>strmod</code></td><td>System V STREAMS loadable modules</td></tr> <tr> <td><code>sys</code></td><td>Loadable system calls</td></tr> </table> SPARC <table> <tr> <td><code>cpu</code></td><td>Processor specific modules</td></tr> <tr> <td><code>tod</code></td><td>Time-Of-Day hardware interface modules</td></tr> </table> Additionally, some of the subdirectories mentioned above contain <code>sparcv9</code> subdirectories that contain 64-bit versions of the same module classes. For example, <code>/kernel/drv/sparcv9</code> and <code>/platform/sun4u/kernel/cpu/sparcv9</code>.	<code>drv</code>	Loadable device drivers	<code>exec</code>	The modules that execute programs stored in various file formats.	<code>fs</code>	File system modules	<code>misc</code>	Miscellaneous system-related modules	<code>sched</code>	Operating system schedulers	<code>strmod</code>	System V STREAMS loadable modules	<code>sys</code>	Loadable system calls	<code>cpu</code>	Processor specific modules	<code>tod</code>	Time-Of-Day hardware interface modules
<code>drv</code>	Loadable device drivers																		
<code>exec</code>	The modules that execute programs stored in various file formats.																		
<code>fs</code>	File system modules																		
<code>misc</code>	Miscellaneous system-related modules																		
<code>sched</code>	Operating system schedulers																		
<code>strmod</code>	System V STREAMS loadable modules																		
<code>sys</code>	Loadable system calls																		
<code>cpu</code>	Processor specific modules																		
<code>tod</code>	Time-Of-Day hardware interface modules																		
x86	<code>mach</code> x86 hardware support																		

kernel(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcar, SUNWcarx

SEE ALSO uname(1), isainfo(1), add_drv(1M), boot(1M), init(1M), kadb(1M), rem_drv(1M), savecore(1M), syslogd(1M), system(4), attributes(5)

SPARC Only monitor(1M)

DIAGNOSTICS The kernel gives various warnings and error messages. If the kernel detects an unrecoverable fault, it will panic or halt.

BUGS Bugs in the kernel often result in kernel panics.

Reconfiguration boot does not currently remove filesystem entries for devices that have been physically removed from the system.

h2>keyserv(1M)

NAME	keyserv – server for storing private encryption keys					
SYNOPSIS	keyserv [-c] [-d -e] [-D] [-n] [-s <i>sizespec</i>]					
DESCRIPTION	keyserv is a daemon that is used for storing the private encryption keys of each user logged into the system. These encryption keys are used for accessing secure network services such as secure NFS and NIS+. Normally, root’s key is read from the file <code>/etc/.rootkey</code> when the daemon is started. This is useful during power-fail reboots when no one is around to type a password. keyserv will not start up if the system does not have a secure rpc domain configured. Set up the domain name by using the <code>/usr/bin/domainname</code> command. Usually the <code>/etc/init.d/inetinit</code> script reads the domain from <code>/etc/defaultdomain</code>. Invoking the <code>domainname</code> command without arguments tells you if you have a domain set up. The <code>/etc/default/keyserv</code> file contains the following default parameter settings. See FILES. <table><tr><td>ENABLE_NOBODY_KEYS</td><td colspan="2">Specifies whether default keys for nobody are used. <code>ENABLE_NOBODY_KEYS=NO</code> is equivalent to the <code>-d</code> command-line option. The default value for <code>ENABLE_NOBODY_KEYS</code> is YES.</td></tr></table>			ENABLE_NOBODY_KEYS	Specifies whether default keys for nobody are used. <code>ENABLE_NOBODY_KEYS=NO</code> is equivalent to the <code>-d</code> command-line option. The default value for <code>ENABLE_NOBODY_KEYS</code> is YES.	
ENABLE_NOBODY_KEYS	Specifies whether default keys for nobody are used. <code>ENABLE_NOBODY_KEYS=NO</code> is equivalent to the <code>-d</code> command-line option. The default value for <code>ENABLE_NOBODY_KEYS</code> is YES.					
OPTIONS	-c	Do not use disk caches. This option overrides any <code>-s</code> option.				
	-D	Run in debugging mode and log all requests to keyserv.				
	-d	Disable the use of default keys for nobody. See FILES.				
	-e	Enable the use of default keys for nobody. This is the default behavior. See FILES.				
	-n	Root’s secret key is not read from <code>/etc/.rootkey</code> . Instead, keyserv prompts the user for the password to decrypt root’s key stored in the <code>publickey</code> database and then stores the decrypted key in <code>/etc/.rootkey</code> for future use. This option is useful if the <code>/etc/.rootkey</code> file ever gets out of date or corrupted.				
	-s <i>sizespec</i>	Specify the size of the extended Diffie-Hellman common key disk caches. The <i>sizespec</i> can be one of the following forms:				
		<i>mechtype</i> =size	size is an integer specifying the maximum number of entries in the cache, or an integer immediately followed by the letter <i>M</i> , denoting the maximum size in MB.			
		size	This form of <i>sizespec</i> applies to all caches.			

keyserv(1M)

See nisauthconf(1M) for mechanism types. Note that the des mechanism, AUTH_DES, does not use a disk cache.

FILES /etc/.rootkey

/etc/default/keyserv Contains default settings. You can use command-line options to override these settings.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO keylogin(1), keylogout(1), nisauthconf(1M), publickey(4), attributes(5)

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

killall(1M)

NAME	killall – kill all active processes				
SYNOPSIS	/usr/sbin/killall [<i>signal</i>]				
DESCRIPTION	killall is used by shutdown(1M) to kill all active processes not directly related to the shutdown procedure. killall terminates all processes with open files so that the mounted file systems will be unbusied and can be unmounted. killall sends <i>signal</i> (see kill(1)) to the active processes. If no <i>signal</i> is specified, a default of 15 is used. The killall command can be run only by the super-user.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	kill(1), ps(1), fuser(1M), shutdown(1M), signal(3C), attributes(5)				

NAME	kprop – Kerberos database propagation program
SYNOPSIS	<code>/usr/lib/kprop [-d] [-f <i>file</i>] [-p <i>port-number</i>] [-r <i>realm</i>] [-s <i>keytab</i>] [<i>host</i>]</code>
DESCRIPTION	kprop is a command-line utility used for propagating a Kerberos database from a master KDC to a slave KDC. This command must be run on the master KDC. See the <i>Solaris System Administration Guide, Vol. 6</i> on how to set up periodic propagation between the master KDC and slave KDCs. To propagate a Kerberos database, the following conditions must be met: ■ The slave KDCs must have an <code>/etc/krb5/kpropd.ac1</code> file that contains the principals for the master KDC and all the slave KDCs. ■ A keytab containing a host principal entry must exist on each slave KDC. ■ The database to be propagated must be dumped to a file using <code>kdb5_util(1M)</code>.
OPTIONS	The following options are supported: <code>-d</code> Enable debug mode. Default is debug mode disabled. <code>-f <i>file</i></code> File to be sent to the slave KDC. Default is the <code>/var/krb5/slave_datatrans</code> file. <code>-p <i>port-number</i></code> Propagate <i>port-number</i>. Default is port 754. <code>-r <i>realm</i></code> Realm where propagation will occur. Default <i>realm</i> is the local realm. <code>-s <i>keytab</i></code> Location of the keytab. Default location is <code>/etc/krb5/krb5.keytab</code>.
OPERANDS	The following operands are supported: <i>host</i> Name of the slave KDC.
EXAMPLES	EXAMPLE 1 Propagating the Kerberos Database The following example propagates the Kerberos database from the <code>/tmp/slave_data</code> file to the slave KDC <code>london</code>. The machine <code>london</code> must have a host principal keytab entry and the <code>kpropd.ac1</code> file must contain an entry for the all the KDCs. <pre># kprop -f /tmp/slave_data london</pre>
FILES	<code>/etc/krb5/kpropd.ac1</code> List of principals of all the KDCs; resides on each slave KDC. <code>/etc/krb5/krb5.keytab</code> Keytab for Kerberos clients. <code>/var/krb5/slave_datatrans</code> Kerberos database propagated to the KDC slaves.

kprop(1M)

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkdcu

SEE ALSO

`kpasswd(1)`, `gkadmin(1M)`, `kadmind(1M)`, `kadmin.local(1M)`, `kdb5_util(1M)`,
`kadm5.acl(4)`, `kdc.conf(4)`, `attributes(5)`, `SEAM(5)`

Solaris System Administration Guide, Security Services

NAME	krb5kdc – KDC daemon
SYNOPSIS	/usr/lib/krb5kdc [-d <i>dbpath</i>] [-r <i>realm</i>] [-R <i>replaycachename</i>] [-m] [-k <i>masterenctype</i>] [-M <i>masterkeyname</i>] [-p <i>port</i>] [-n]
DESCRIPTION	krb5kdc is the daemon that runs on the master and slave KDCs to process the Kerberos tickets. For Kerberos to function properly, krb5kdc must be running on at least one KDC that the Kerberos clients can access. Prior to running krb5kdc, you must initialize the Kerberos database using kdb5_util(1M). See the <i>Solaris System Administration Guide, Security Services</i> or instructions on setting up KDCs and initialize the Kerberos database.
OPTIONS	The following options are supported: -d <i>dbpath</i> Specify the path to the database; default value is /var/krb5. -r <i>realm</i> Specify the realm name; default is the local realm name. -R <i>replaycachename</i> Specify the replay cache name; default value is krb5kdc_rcache. -m Specify that the master key for the database is to be entered manually. -k <i>masterenctype</i> Specify the encryption type for encrypting the database. The default value is des-cbc-crc. -M <i>masterkeyname</i> Specify the principal to retrieve the master key for the database. -p <i>port</i> Specify the port that will be used by the KDC to listen for incoming requests. -n Specify that krb5kdc should not detach from the terminal.
FILES	/var/krb5/principal.db Kerberos principal database. /var/krb5/principal.kadm5 Kerberos administrative database. This file contains policy information. /var/krb5/principal.kadm5.lock Kerberos administrative database lock file. This file works backwards from most other lock files (that is, kadmin will exit with an error if this file does <i>not</i> exist). /etc/krb5/kdc.conf KDC configuration file. This file is read at startup. /etc/krb5/kpropd.acl File that defines the access control list for propagating the Kerberos database using kprop.

krb5kdc(1M)

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkdcu

SEE ALSO

`kpasswd(1)`, `gkadmin(1M)`, `kadmind(1M)`, `kadmin.local(1M)`, `kdb5_util(1M)`, `kadm5.acl(4)`, `kdc.conf(4)`, `attributes(5)`, `SEAM(5)`

Solaris System Administration Guide, Security Services

NAME	kstat – display kernel statistics																
SYNOPSIS	<pre>kstat [-lpq] [-T u d] [-c <i>class</i>] [-m <i>module</i>] [-i <i>instance</i>] [-n <i>name</i>] [-s <i>statistic</i>] [interval [count]] kstat [-lpq] [-T u d] [-c <i>class</i>] [<i>module:instance:name:statistic...</i>] [interval [count]]</pre>																
DESCRIPTION	The kstat utility examines the available kernel statistics, or kstats, on the system and reports those statistics which match the criteria specified on the command line. Each matching statistic is printed with its module, instance, and name fields, as well as its actual value. Kernel statistics may be published by various kernel subsystems, such as drivers or loadable modules; each kstat has a module field that denotes its publisher. Since each module may have countable entities (such as multiple disks associated with the sd(7D) driver) for which it wishes to report statistics, the kstat also has an instance field to index the statistics for each entity; kstat instances are numbered starting from zero. Finally, the kstat is given a name unique within its module. Each kstat may be a special kstat type, an array of name-value pairs, or raw data. In the name-value case, each reported value is given a label, which we refer to as the statistic. Known raw and special kstats are given statistic labels for each of their values by kstat; thus, all published values can be referenced as <i>module:instance:name:statistic</i>. When invoked without any module operands or options, kstat will match all defined statistics on the system. Example invocations are provided below. All times are displayed as fractional seconds since system boot.																
OPTIONS	The tests specified by the following options are logically ANDed, and all matching kstats will be selected. A regular expression containing shell metacharacters must be protected from the shell by enclosing it with the appropriate quotes. The argument for the -c, -i, -m, -n, and -s options may be specified as a shell glob pattern, or a Perl regular expression enclosed in <code>'/'</code> characters. <table> <tr> <td>-c <i>class</i></td><td>Displays only kstats that match the specified class.</td></tr> <tr> <td>-i <i>instance</i></td><td>Displays only kstats that match the specified instance.</td></tr> <tr> <td>-l</td><td>Lists matching kstat names without displaying values.</td></tr> <tr> <td>-m <i>module</i></td><td>Displays only kstats that match the specified module.</td></tr> <tr> <td>-n <i>name</i></td><td>Displays only kstats that match the specified name.</td></tr> <tr> <td>-p</td><td>Displays output in parseable format. All example output in this document is given in this format. If this option is not specified, kstat produces output in a human-readable, table format.</td></tr> <tr> <td>-q</td><td>Displays no output, but return appropriate exit status for matches against given criteria.</td></tr> <tr> <td>-s <i>statistic</i></td><td>Displays only kstats that match the specified statistic.</td></tr> </table>	-c <i>class</i>	Displays only kstats that match the specified class.	-i <i>instance</i>	Displays only kstats that match the specified instance.	-l	Lists matching kstat names without displaying values.	-m <i>module</i>	Displays only kstats that match the specified module.	-n <i>name</i>	Displays only kstats that match the specified name.	-p	Displays output in parseable format. All example output in this document is given in this format. If this option is not specified, kstat produces output in a human-readable, table format.	-q	Displays no output, but return appropriate exit status for matches against given criteria.	-s <i>statistic</i>	Displays only kstats that match the specified statistic.
-c <i>class</i>	Displays only kstats that match the specified class.																
-i <i>instance</i>	Displays only kstats that match the specified instance.																
-l	Lists matching kstat names without displaying values.																
-m <i>module</i>	Displays only kstats that match the specified module.																
-n <i>name</i>	Displays only kstats that match the specified name.																
-p	Displays output in parseable format. All example output in this document is given in this format. If this option is not specified, kstat produces output in a human-readable, table format.																
-q	Displays no output, but return appropriate exit status for matches against given criteria.																
-s <i>statistic</i>	Displays only kstats that match the specified statistic.																

kstat(1M)

	<code>-T d u</code>	Displays a time stamp before each statistics block, either in <code>ctime(3C)</code> format ('d') or as an alphanumeric representation of the value returned by <code>time(2)</code> ('u').
OPERANDS	The following operands are supported:	
	<i>module:instance:name:statistic</i>	Alternate method of specifying module, instance, name, and statistic as described above. Each of the module, instance, name, or statistic specifiers may be a shell glob pattern or a Perl regular expression enclosed by '/' characters. It is possible to use both specifier types within a single operand. Leaving a specifier empty is equivalent to using the '*' glob pattern for that specifier.
	<i>interval</i>	The number of seconds between reports.
	<i>count</i>	The number of reports to be printed.
EXAMPLES	In the following examples, all the command lines in a block produce the same output, as shown immediately below. The exact statistics and values will of course vary from machine to machine.	
	EXAMPLE 1 Using the <code>kstat</code> Command	
	<pre>example\$ kstat -p -m unix -i 0 -n system_misc -s 'avenrun*' example\$ kstat -p -s 'avenrun*' example\$ kstat -p 'unix:0:system_misc:avenrun*' example\$ kstat -p '::::avenrun*' example\$ kstat -p '::::/^avenrun_/d+min\$/'</pre>	
	<pre>unix:0:system_misc:avenrun_15min 3 unix:0:system_misc:avenrun_1min 4 unix:0:system_misc:avenrun_5min 2</pre>	
	EXAMPLE 2 Using the <code>kstat</code> Command	
	<pre>example\$ kstat -p -m cpu_stat -s 'intr*' example\$ kstat -p cpu_stat::::/^intr/</pre>	
	<pre>cpu_stat:0:cpu_stat0:intr 29682330 cpu_stat:0:cpu_stat0:intrblk 87 cpu_stat:0:cpu_stat0:intrthread 15054222 cpu_stat:1:cpu_stat1:intr 426073 cpu_stat:1:cpu_stat1:intrblk 51 cpu_stat:1:cpu_stat1:intrthread 289668 cpu_stat:2:cpu_stat2:intr 134160 cpu_stat:2:cpu_stat2:intrblk 0 cpu_stat:2:cpu_stat2:intrthread 131 cpu_stat:3:cpu_stat3:intr 196566 cpu_stat:3:cpu_stat3:intrblk 30 cpu_stat:3:cpu_stat3:intrthread 59626</pre>	

EXAMPLE 2 Using the kstat Command *(Continued)***EXAMPLE 3** Using the kstat Command

```
example$ kstat -p :::state '::::avenrun*'
example$ kstat -p :::state :::/^avenrun/
```

```
cpu_info:0:cpu_info0:state      on-line
cpu_info:1:cpu_info1:state      on-line
cpu_info:2:cpu_info2:state      on-line
cpu_info:3:cpu_info3:state      on-line
unix:0:system_misc:avenrun_15min      4
unix:0:system_misc:avenrun_1min 10
unix:0:system_misc:avenrun_5min 3
```

EXAMPLE 4 Using the kstat Command

```
example$ kstat -p 'unix:0:system_misc:avenrun*' 1 3
```

```
unix:0:system_misc:avenrun_15min      15
unix:0:system_misc:avenrun_1min 11
unix:0:system_misc:avenrun_5min 21
```

```
unix:0:system_misc:avenrun_15min      15
unix:0:system_misc:avenrun_1min 11
unix:0:system_misc:avenrun_5min 21
```

```
unix:0:system_misc:avenrun_15min      15
unix:0:system_misc:avenrun_1min 11
unix:0:system_misc:avenrun_5min 21
```

EXAMPLE 5 Using the kstat Command

```
example$ kstat -p -T d 'unix:0:system_misc:avenrun*' 5 2
```

```
Thu Jul 22 19:39:50 1999
unix:0:system_misc:avenrun_15min      12
unix:0:system_misc:avenrun_1min 0
unix:0:system_misc:avenrun_5min 11
```

```
Thu Jul 22 19:39:55 1999
unix:0:system_misc:avenrun_15min      12
unix:0:system_misc:avenrun_1min 0
unix:0:system_misc:avenrun_5min 11
```

EXAMPLE 6 Using the kstat Command

```
example$ kstat -p -T u 'unix:0:system_misc:avenrun*' 932668656
```

```
unix:0:system_misc:avenrun_15min      14
unix:0:system_misc:avenrun_1min 5
unix:0:system_misc:avenrun_5min 18
```

EXIT STATUS

The following exit values are returned:

0 One or more statistics were matched.

kstat(1M)

- 1 No statistics were matched.
- 2 Invalid command line options were specified.
- 3 A fatal error occurred.

FILES /dev/kstat kernel statistics driver

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO sh(1), time(2), ctime(3C), gmatch(3GEN), kstat(3KSTAT), attributes(5), kstat(7D), sd(7D), kstat(9S)

NOTES If the pattern argument contains glob or Perl RE metacharacters which are also shell metacharacters, it will be necessary to enclose the pattern with appropriate shell quotes.

NAME	kttkt_warnd – Kerberos warning daemon	
SYNOPSIS	/usr/lib/krb5/kttkt_warnd	
DESCRIPTION	kttkt_warnd is a daemon on Kerberos clients that can warn users when their Kerberos tickets are about to expire. It is invoked by <code>inetd</code> when a ticket-granting ticket (TGT) is obtained for the first time, such as after using the <code>kinit</code> command. <code>kttkt_warnd</code> can be configured through the <code>/etc/krb5/warn.conf</code> file on the client. In <code>warn.conf</code>, you can specify that you be supplied notice, through <code>syslog</code>, of ticket expiration.	
FILES	<code>/etc/krb5/warn.conf</code>	Kerberos warning configuration file
SEE ALSO	<code>inetd(1M)</code> , <code>warn.conf(4)</code> , <code>SEAM(5)</code>	

labelit(1M)

NAME	labelit – list or provide labels for file systems	
SYNOPSIS	labelit [-F <i>FSType</i>] [-V] [-o <i>FSType-specific-options</i>] <i>special</i> [<i>operands</i>]	
DESCRIPTION	The labelit utility is used to write or display labels on unmounted disk file systems.	
OPTIONS	The following options are supported: -F <i>FSType</i> Specify the <i>FSType</i> on which to operate. The <i>FSType</i> should either be specified here or be determinable from /etc/vfstab by matching the <i>special</i> with an entry in the table. If no matching entry is found, the default file system type specified in /etc/default/fs will be used. -V Echo complete command line. This option may be used to verify and validate the command line. Additional information obtained using a /etc/vfstab lookup is included in the output. The command is not executed. -o Specify <i>FSType</i>-specific options. See the manual page for the labelit module specific to the file system type.	
OPERANDS	The following operands are supported. If no operands are specified, labelit will display the value of the labels. <i>special</i> The disk partition (for example, /dev/rdisk/c0t3d0s6). The device may not be on a remote machine. <i>operands</i> <i>FSType</i>-specific operands. Consult the manual page of the <i>FSType</i>-specific labelit command for detailed descriptions.	
USAGE	See largefile(5) for the description of the behavior of labelit when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).	
EXIT STATUS	The following exit values are returned: 0 Write or display of labels was successful. non-zero An error occurred.	
FILES	/etc/vfstab List of default parameters for each file system. /etc/default/fs Default local file system type. Default values can be set for the following flags in /etc/default/fs. For example: LOCAL=ufs LOCAL The default partition for a command if no <i>FSType</i> is specified.	

labelit(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO labelit_hdfs(1M), labelit_udfs(1M), labelit_ufs(1M), volcopy(1M),
vfstab(4), attributes(5), largefile(5)

NOTES This utility may not be supported for all *FSTypes*.

labelit_hfs(1M)

NAME	labelit_hfs – provide and print labels for hfs file systems																		
SYNOPSIS	/usr/sbin/labelit -F hfs [generic_options] [-o specific_options] special																		
DESCRIPTION	labelit can be used to provide labels for unmounted CD-ROM images (CD-ROMs may not be labeled, as they are read-only media). generic_options are options supported by the generic labelit command. If no specific_options are specified, labelit prints the current value of all label fields. The special name should be the physical disk section (for example, /dev/dsk/c0d0s6).																		
OPTIONS	-o Use one or more of the following name=value pairs separated by commas (with no intervening spaces) to specify values for specific label fields. According to the ISO 9660 specification, only certain sets of characters may be used to fill in these labels. Thus, “d-characters” below refers to the characters ‘A’ through ‘Z’, the digits ‘0’ through ‘9’, and the ‘_’ (underscore) character. “a-characters” below refers to ‘A’ through ‘Z’, ‘0’ through ‘9’, space, and the following characters: !"%&'()*+,-./:;<=>?_. <table><tr><td>absfile=</td><td>Abstract file identifier, d-characters, 37 characters maximum.</td></tr><tr><td>applid=</td><td>Application identifier, d-characters, 128 characters maximum.</td></tr><tr><td>bibfile=</td><td>Bibliographic file identifier, d-characters, 37 characters maximum.</td></tr><tr><td>copyfile=</td><td>Copyright file identifier, d-characters, 128 maximum.</td></tr><tr><td>prepid=</td><td>Data preparer identifier, d-characters, 128 maximum.</td></tr><tr><td>pubid=</td><td>Publisher identifier, d-characters, 128 maximum.</td></tr><tr><td>sysid=</td><td>System identifier, a-characters, 32 maximum.</td></tr><tr><td>valid=</td><td>Volume identifier, d-characters, 32 maximum.</td></tr><tr><td>volsetid=</td><td>Volume set identifier, d-characters, 128 maximum.</td></tr></table>	absfile=	Abstract file identifier, d-characters, 37 characters maximum.	applid=	Application identifier, d-characters, 128 characters maximum.	bibfile=	Bibliographic file identifier, d-characters, 37 characters maximum.	copyfile=	Copyright file identifier, d-characters, 128 maximum.	prepid=	Data preparer identifier, d-characters, 128 maximum.	pubid=	Publisher identifier, d-characters, 128 maximum.	sysid=	System identifier, a-characters, 32 maximum.	valid=	Volume identifier, d-characters, 32 maximum.	volsetid=	Volume set identifier, d-characters, 128 maximum.
absfile=	Abstract file identifier, d-characters, 37 characters maximum.																		
applid=	Application identifier, d-characters, 128 characters maximum.																		
bibfile=	Bibliographic file identifier, d-characters, 37 characters maximum.																		
copyfile=	Copyright file identifier, d-characters, 128 maximum.																		
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pubid=	Publisher identifier, d-characters, 128 maximum.																		
sysid=	System identifier, a-characters, 32 maximum.																		
valid=	Volume identifier, d-characters, 32 maximum.																		
volsetid=	Volume set identifier, d-characters, 128 maximum.																		
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu														
ATTRIBUTE TYPE	ATTRIBUTE VALUE																		
Availability	SUNWcsu																		
SEE ALSO	labelit(1M), volcopy(1M), attributes(5)																		

NAME	labelit_udfs – provide and print labels for udf file systems
SYNOPSIS	labelit -F udfs [<i>generic_options</i>] [-o <i>specific_options</i>] <i>special</i> [<i>fsname volume</i>]
DESCRIPTION	The labelit command writes labels on an unmounted disk that contains a universal disk file (udf) system. These labels can be used to identify volumes.
OPTIONS	The following options are supported: <i>generic_options</i> Specify <i>generic_options</i> supported by the generic labelit command. See labelit(1M) for descriptions of supported options. -o <i>specific_options</i> Specify udfs-file-system-specific options in a comma-separated list with no intervening spaces. The following <i>specific_options</i> are available: lvinfo1=<i>string</i> Specify information to be inserted in the LVInfo1 field of the Implementation Use Volume Descriptor. Information in LVInfo1 is generally used to identify the person creating the file system. The maximum length of the string specified is 35 bytes. lvinfo2=<i>string</i> Specify information to be inserted into the LVInfo2 field of the Implementation Use Volume Descriptor. Information in LVInfo2 is generally used to identify the organization responsible for creating the file system. The maximum length of the string specified is 35 bytes. lvinfo3=<i>string</i> Specify information to be inserted into the LVInfo3 field of the Implementation Use Volume Descriptor. Information in LVInfo3 is generally used to identify the contact information for the medium. The maximum length of the string specified is 35 bytes.
OPERANDS	The following operands are supported: <i>special</i> Specify <i>special</i> as the physical disk slice, for example, /dev/rdisk/c0t0d0s6. The device can not be on a remote machine. <i>fsname</i> Specify <i>fsname</i> as the mount point, (for example, root, u1, and so forth), of the file system. <i>volume</i> Specify <i>volume</i> as the physical volume name. If none of the options (<i>fsname</i>, <i>volume</i>, <i>specific_options</i>) is specified, labelit prints the current values of <i>fsname</i>, <i>volume</i>, LVInfo1, LVInfo2 and LVInfo3.
EXIT STATUS	The following exit values are returned: 0 Successful completion.

labelit_udfs(1M)

non-zero An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWudf

SEE ALSO `labelit(1M)`, `attributes(5)`

NAME	labelit_ufs – provide and print labels for ufs file systems				
SYNOPSIS	labelit -F ufs [<i>generic_options</i>] <i>special</i> [<i>fsname volume</i>]				
DESCRIPTION	labelit is used to write labels on unmounted disk file systems. Such labels may be used to uniquely identify volumes and are used by volume-oriented programs such as volcopy(1M).				
OPTIONS	The following option is supported: <i>generic_options</i> options supported by the generic labelit command. See labelit(1M).				
OPERANDS	The following operands are supported: <i>special</i> name should be the physical disk section (for example, /dev/dsk/c0d0s6). The device may not be on a remote machine. <i>fsname</i> represents the mount point (for example, root, u1, and so on) of the file system. <i>volume</i> may be used to represent the physical volume name. If <i>fsname</i> and <i>volume</i> are not specified, labelit prints the current values of these labels. Both <i>fsname</i> and <i>volume</i> are limited to six or fewer characters.				
EXIT STATUS	The following exit values are returned: 0 Write or display of labels was successful. non-zero An error occurred.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	labelit(1M), volcopy(1M), attributes(5), ufs(7FS)				

ldapaddent(1M)

NAME	ldapaddent – create LDAP entries from corresponding /etc files		
SYNOPSIS	ldapaddent [-cpv] [-a <i>authenticationMethod</i>] [-b <i>baseDN</i>] -D <i>bindDN</i> -w <i>bind_password</i> [-f <i>filename</i>] <i>database</i> ldapaddent -d [-v] [-a <i>authenticationMethod</i>] [-b <i>baseDN</i>] [-D <i>bindDN</i>] [-w <i>bind_password</i>] <i>database</i>		
DESCRIPTION	ldapaddent creates entries in LDAP containers from their corresponding /etc files. This operation is customized for each of the standard containers that are used in the administration of Solaris systems. The <i>database</i> argument specifies the type of the data being processed. Legal values for this type are one of <i>aliases</i>, <i>auto_*</i>, <i>bootparams</i>, <i>ethers</i>, <i>group</i>, <i>hosts</i> (including IPv6 addresses), <i>netgroup</i>, <i>netmasks</i>, <i>networks</i>, <i>passwd</i>, <i>shadow</i>, <i>protocols</i>, <i>publickey</i>, <i>rpc</i>, and <i>services</i>. By default, ldapaddent reads from the standard input and adds this data to the LDAP container associated with the database specified on the command line. An input file from which data can be read is specified using the -f option. The entries will be stored in the directory based on the client's configuration, thus the client must be configured to use LDAP naming services. The location where entries are to be written can be overridden by using the -b option. If the entry to be added exists in the directory, the command displays an error and exits, unless the -c option is used. Although, there is a shadow database type, there is no corresponding shadow container. Both the shadow and the passwd data is stored in the people container itself. Similarly, data from networks and netmasks databases are stored in the networks container. You must add entries from the passwd database before you attempt to add entries from the shadow database. The addition of a shadow entry that does not have a corresponding passwd entry will fail. For better performance, the recommended order in which the databases should be loaded is as follows: ■ passwd database followed by shadow database ■ networks database followed by netmasks database ■ bootparams database followed by ethers database Only the first entry of a given type that is encountered will be added to the LDAP server. The ldapaddent command skips any duplicate entries.		
OPTIONS	The ldapaddent command supports the following options: <table><tr><td>-a <i>authenticationMethod</i></td><td>Specify authentication method. The default value is what has been configured in the profile. The supported authentication methods are:</td></tr></table>	-a <i>authenticationMethod</i>	Specify authentication method. The default value is what has been configured in the profile. The supported authentication methods are:
-a <i>authenticationMethod</i>	Specify authentication method. The default value is what has been configured in the profile. The supported authentication methods are:		


```

simple
sasl/CRAM-MD5
sasl/DIGEST-MD5
tls:simple
tls:sasl/CRAM-MD5
tls:sasl/DIGEST-MD5

```

Selecting `simple` causes passwords to be sent over the network in clear text. Its use is strongly discouraged. Additionally, if the client is configured with a profile which uses no authentication, that is, either the `credentialLevel` attribute is set to `anonymous` or `authenticationMethod` is set to `none`, the user must use this option to provide an authentication method.

`-b baseDN`

Create entries in the *baseDN* directory. *baseDN* is not relative to the client's default search base, but rather, it is the actual location where the entries will be created. If this parameter is not specified, the first search descriptor defined for the service or the default container will be used.

`-c`

Continue adding entries to the directory even after an error. Entries will not be added if the directory server is not responding or if there is an authentication problem.

`-D bindDN`

Create an entry which has write permission to the *baseDN*. When used with `-d` option, this entry only needs read permission.

`-d`

Dump the LDAP container to the standard output in the appropriate format for the given database.

`-f filename`

Indicates input file to read in an */etc/* file format.

`-p`

Process the password field when loading password information from a file. By default, the password field is ignored because it is usually not valid, as the actual password appears in a shadow file.

`-w bind_password`

Password to be used for authenticating the *bindDN*. If this parameter is missing, the command will prompt for a password. NULL passwords are not supported in LDAP.

When you use `-w bind_password` to specify the password to be used for authentication, the password is visible to other users of the system by means of the `ps` command, in script files or in shell history.

ldapaddent(1M)

	-v	Verbose.
OPERANDS	The following operands are supported: <i>database</i> The name of the database or service name. Supported values are: <i>aliases</i>, <i>auto_*</i>, <i>bootparams</i>, <i>ethers</i>, <i>group</i>, <i>hosts</i> (including IPv6 addresses), <i>netgroup</i>, <i>netmasks</i>, <i>networks</i>, <i>passwd</i>, <i>shadow</i>, <i>protocols</i>, <i>publickey</i>, <i>rpc</i>, and <i>services</i>.	
EXAMPLES	EXAMPLE 1 Adding Password Entries to the Directory Server The following example show how to add password entries to the directory server: <pre>example# ldapaddent -D "cn=directory manager" -w secret \ -f /etc/passwd passwd</pre> EXAMPLE 2 Adding Group Entries The following example shows how to add group entries to the directory server using sasl/CRAM-MD5 as the authentication method: <pre>example# ldapaddent -D "cn=directory manager" -w secret \ -a "sasl/CRAM-MD5" -f /etc/group group</pre> EXAMPLE 3 Adding <i>auto_master</i> Entries The following example shows how to add <i>auto_master</i> entries to the directory server: <pre>example# dapaddent -D "cn=directory manager" -w secret \ -f /etc/auto_master auto_master</pre> EXAMPLE 4 Dumping password Entries from the Directory to File The following examples shows how to dump password entries from the directory to a file foo: <pre>example# ldapaddent -d passwd > foo</pre>	
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.	
FILES	/var/ldap/ldap_client_file /var/ldap/ldap_client_cred	Files containing the LDAP configuration of the client. These files are not to be modified manually. Their content is not guaranteed to be human readable. Use <i>ldapclient(1M)</i>

ldapaddent(1M)

to update these files.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu
Interface Stability	Evolving

SEE ALSO ldap(1), ldaplist(1), ldapmodify(1), ldapmodrdn(1), ldapsearch(1),
idsconfig(1M), ldapclient(1M), suninstall(1M), attributes(5)

ldap_cachemgr(1M)

NAME	ldap_cachemgr – LDAP daemon to manage client configuration for LDAP based Network Information Service lookups				
SYNOPSIS	<code>/usr/lib/ldap/ldap_cachemgr</code> [-l <i>log-file</i>] [-g]				
DESCRIPTION	The <code>ldap_cachemgr</code> daemon is a process that provides an up-to-date configuration cache for LDAP naming services. It is started during multi-user boot. The <code>ldap_cachemgr</code> utility provides caching for all parameters as specified and used by the LDAP naming service clients. The <code>ldap_cachemgr</code> utility uses the cache files which are originally created by executing the <code>ldapclient(1M)</code> utility, as cold start files. Updates to the cache files take place dynamically if profiles are used to configure the client. See the <code>init</code> option to <code>ldapclient(1M)</code>. The <code>ldap_cachemgr</code> utility helps improve the performance of the clients that are using LDAP as the Naming service repository. In order for the LDAP naming services to function properly, the <code>ldap_cachemgr</code> daemon must be running. <code>ldap_cachemgr</code> also improves system security by making the configuration files readable by superuser only. The cache maintained by this daemon is shared by all the processes that access LDAP Naming information. All processes access this cache through a door call. On startup, <code>ldap_cachemgr</code> initializes the cache from the cache files. See <code>ldapclient(1M)</code>. Thus, the cache survives machine reboots. The <code>ldap_cachemgr</code> daemon also acts as its own administration tool. If an instance of <code>ldap_cachemgr</code> is already running, commands are passed transparently to the running version.				
OPTIONS	The following options are supported: <table><tr><td>-g</td><td>Print current configuration and statistics to standard output. This is the only option executable without superuser privileges.</td></tr><tr><td>-l <i>log-file</i></td><td>Cause <code>ldap_cachemgr</code> to use a log file other than the default <code>/var/ldap/cachemgr.log</code>.</td></tr></table>	-g	Print current configuration and statistics to standard output. This is the only option executable without superuser privileges.	-l <i>log-file</i>	Cause <code>ldap_cachemgr</code> to use a log file other than the default <code>/var/ldap/cachemgr.log</code> .
-g	Print current configuration and statistics to standard output. This is the only option executable without superuser privileges.				
-l <i>log-file</i>	Cause <code>ldap_cachemgr</code> to use a log file other than the default <code>/var/ldap/cachemgr.log</code> .				
EXAMPLES	EXAMPLE 1 Stopping and Restarting the <code>ldap_cachemgr</code> Daemon The following example shows how to stop and to restart the <code>ldap_cachemgr</code> daemon. <pre>example# /etc/init.d/ldap.client stop example# /etc/init.d/ldap.client start</pre> EXAMPLE 2 Forcing <code>ldap_cachemgr</code> to Reread the <code>/var/ldap/ldap_client_file</code> and <code>/var/ldap/ldap_client_cred</code> Files The following example shows how to force <code>ldap_cachemgr</code> to reread the <code>/var/ldap/ldap_client_file</code> and <code>/var/ldap/ldap_client_cred</code> files				

EXAMPLE 2 Forcing ldap_cachemgr to Reread the /var/ldap/ldap_client_file and /var/ldap/ldap_client_cred Files (Continued)

example# **kill -HUP ldap_cachemgr**

FILES /var/ldap/cachemgr.log Default log file.

/var/ldap/ldap_client_file

/var/ldap/ldap_client_cred Files containing the LDAP configuration of the client. These files are not to be modified manually. Their content is not guaranteed to be human readable. Use ldapclient(1M) to update these files.

WARNINGS The ldap_cachemgr utility is included in the Solaris 9 release on an uncommitted basis only. It is subject to change or removal in a future minor release.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO ldap(1), ldapadd(1), ldapdelete(1), ldaplist(1), ldapmodify(1), ldapmodrdn(1), ldapsearch(1), kill(1), idsconfig(1M), ldapaddent(1M), ldapclient(1M), suninstall(1M), signal(3HEAD), resolv.conf(4), attributes(5)

ldapclient(1M)

NAME	ldapclient – initialize LDAP client machine or output an LDAP client profile in LDIF format
SYNOPSIS	<pre>/usr/sbin/ldapclient [-v -q] init [-a profileName=<i>profileName</i>] [-a domainName=<i>domain</i>] [-a proxyDN=<i>proxyDN</i>] [-a proxyPassword=<i>password</i>] [-a certificatePath=<i>path</i>] LDAP_server [:port_number] /usr/sbin/ldapclient [-v -q] manual [-a attrName=<i>attrVal</i>] /usr/sbin/ldapclient [-v -q] mod [-a attrName=<i>attrVal</i>] /usr/sbin/ldapclient [-v -q] list /usr/sbin/ldapclient [-v -q] uninit /usr/sbin/ldapclient [-v -q] genprofile -a profileName=<i>profileName</i> [-a attrName=<i>attrVal</i>]</pre>
DESCRIPTION	The <code>ldapclient</code> utility can be used to: ■ initialize LDAP client machines ■ restore the network service environment on LDAP clients ■ list the contents of the LDAP client cache in human readable format. The <code>init</code> form of the <code>ldapclient</code> utility is used to initialize an LDAP client machine, using a profile stored on an LDAP server specified by <code>LDAP_server</code>. The LDAP client will use the attributes in the specified profile to determine the configuration of the LDAP client. Using a configuration profile allows for easy installation of LDAP client and propagation of configuration changes to LDAP clients. The <code>ldap_cachemgr(1M)</code> utility will update the LDAP client configuration when its cache expires by reading the profile. For more information on the configuration profile refer to IETF document <i>A Configuration Schema for LDAP Based Directory User Agents</i>. The <code>manual</code> form of the <code>ldapclient</code> utility is used to initialize an LDAP client machine manually. The LDAP client will use the attributes specified on the command line. Any unspecified attributes will be assigned their default values. At least one server must be specified in the <code>defaultServerList</code> or the <code>preferredServerList</code> attributes. The <code>domainName</code> attribute must be specified if the client's <code>domainName</code> is not set. The <code>mod</code> form of the <code>ldapclient</code> utility is used to modify the configuration of an LDAP client machine that was setup manually. This option modifies only those LDAP client configuration attributes specified on the command line. The <code>mod</code> option should only be used on LDAP clients that were initialized using the <code>manual</code> option. Regardless of which method is used for initialization, if a client is to be configured to use a proxy <code>credentialLevel</code>, proxy credentials must be provided using <code>-a proxyDN=<i>proxyD</i></code> and <code>-a proxyPassword=<i>proxyPassword</i></code> options. However, if <code>-a proxyPassword=<i>proxyPassword</i></code> is not specified, <code>ldapclient</code> will prompt for it. Note that NULL passwords are not allowed in LDAP.

If any file is modified during installation, it will be backed up to `/var/ldap/restore`. The files that are typically modified during initialization are:

- `/etc/nsswitch.conf`
- `/etc/defaultdomain` (if it exists)
- `/var/yp/binding/`domainname`` (for a NIS(YP) client)
- `/var/nis/NIS_COLD_START` (for a NIS+ client)
- `/var/ldap/ldap_client_file` (for an existing LDAP client)
- `/var/ldap/ldap_client_cred` (for an existing LDAP client)

`ldapclient` does not set up a client to resolve hostnames using DNS. It simply copies `/etc/nsswitch.ldap` to `/etc/nsswitch.conf`. If you prefer to use DNS for host resolution, please refer to the DNS documentation for information on setting up DNS. See `resolv.conf(4)`.

The `list` form of the `ldapclient` utility is used to list the LDAP client configuration. The output will be human readable. LDAP configuration files are not guaranteed to be human readable.

The `uninit` form of the `ldapclient` utility is used to uninitialized the network service environment, restoring it to the state it was in prior to the last execution of `ldapclient` using `init` or `manual`. The restoration will succeed only if the machine was initialized with the `init` or `manual` form of `ldapclient`, as it uses the backup files created by these options.

The `genprofile` option is used to write an LDIF formatted configuration profile based on the attributes specified on the command line to standard output. This profile can then be loaded into an LDAP server to be used as the client profile, which can be downloaded by means of the `ldapclient init` command. Loading the LDIF formatted profile to the directory server can be done through `ldapadd(1)`, or through any server specific import tool. Note that the attributes `proxyDN`, `proxyPassword`, `certificatePath`, and `domainName` are not part of the configuration profile and thus are not permitted.

You must have superuser privileges to run the `ldapclient` command, except with the `genprofile` option.

To access the information stored in the directory, clients can either authenticate to the directory, or use an unauthenticated connection. The LDAP client is configured to have a credential level of either `anonymous` or `proxy`. In the first case, the client does not authenticate to the directory. In the second case, client authenticates to the directory using a proxy identity.

If a client is configured to use an identity, you can configure which authentication method the client will use. The LDAP client supports the following authentication methods:

```
none
simple
```

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```
sasl/CRAM-MD5
sasl/DIGEST-MD5
tls:simple
tls:sasl/CRAM-MD5
tls:sasl/DIGEST-MD5
```

Note that some directory servers may not support all of these authentication methods. For `simple`, be aware that the bind password will be sent in the clear to the LDAP server. For those authentication methods using TLS (transport layer security), the entire session is encrypted. You will need to install the appropriate certificate databases to use TLS.

Commands

The following commands are supported:

<code>init</code>	Initialize client from a profile on a server.
<code>manual</code>	Manually initialize client with the specified attribute values.
<code>mod</code>	Modify attribute values in the configuration file after a manual initialization of the client.
<code>list</code>	Write the contents of the LDAP client cache to standard output in human readable form.
<code>uninit</code>	Uninitialize an LDAP client, assuming that <code>ldapclient</code> was used to initialize the client.
<code>genprofile</code>	Generate a configuration profile in LDIF format that can then be stored in the directory for clients to use, with the <code>init</code> form of this command.

Attributes

The following attributes are supported:

`attributeMap`

Specify a mapping from an attribute defined by a service to an attribute in an alternative schema. This can be used to change the default schema used for a given service. The syntax of `attributeMap` is defined in the profile IETF draft. This option can be specified multiple times. The default value for all services is `NULL`. In the example,

```
attributeMap: passwd:uid=employeeNumber
```

the LDAP client would use the LDAP attribute `employeeNumber` rather than `uid` for the `passwd` service. This is a multivalued attribute.

`authenticationMethod`

Specify the default authentication method used by all services unless overridden by the `serviceAuthenticationMethod` attribute. Multiple values can be specified by using a semicolon-separated list. The default value is `none`. For those services that use `credentialLevel` and `credentialLevel` is `anonymous`, this attribute

is ignored. Services such as `pam_ldap` will use this attribute, even if `credentialLevel` is anonymous. The supported authentication methods are described above.

`bindTimeLimit`

The maximum time in seconds that a client should spend performing a bind operation. Set this to a positive integer. The default value is 30.

`certificatePath`

The certificate path for the location of the certificate database. The value is the path where security database files reside. This is used for TLS support, which is specified in the `authenticationMethod` and `serviceAuthenticationMethod` attributes. The default is `/var/ldap`.

`credentialLevel`

Specify the credential level the client should use to contact the directory. The credential levels supported are either `anonymous` or `proxy`. If a `proxy` credential level is specified, then the `authenticationMethod` attribute must be specified to determine the authentication mechanism. Further, if the credential level is `proxy` and at least one of the authentication methods require a bind DN, the `proxyDN` and `proxyPassword` attribute values must be set.

`defaultSearchBase`

Specify the default search base DN. There is no default. The `serviceSearchDescriptor` attribute can be used to override the `defaultSearchBase` for given services.

`defaultSearchScope=one | sub`

Specify the default search scope for the client's search operations. This default can be overridden for a given service by specifying a `serviceSearchDescriptor`. The default is one level search.

`defaultServerList`

A space separated list of server names or server addresses, either IPv4 or IPv6. If you specify server names, be sure that the LDAP client can resolve the name without the LDAP name service. You must resolve the LDAP servers' names by using either `files` or `dns`. If the LDAP server name cannot be resolved, your naming service will fail.

The port number is optional. If not specified, the default LDAP server port number 389 is used, except when TLS is specified in the authentication method. In this case, the default LDAP server port number is 636.

The format to specify the port number for an IPv6 address is:

```
[ipv6_addr]:port
```

To specify the port number for an IPv4 address, use the following format:

```
ipv4_addr:port
```

If the host name is specified, use the format:

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`host_name:port`

If you use TLS, the LDAP server's hostname must match the hostname in the TLS certificate. Typically, the hostname in the TLS certificate is a fully qualified domain name. With TLS, the LDAP server host addresses must resolve to the hostnames in the TLS certificate. You must use `files` or `dns` to resolve the host address.

`domainName`

Specify the DNS domain name. This becomes the default domain for the machine. The default is the current domain name. This attribute is only used in client initialization.

`followReferrals=true | false`

Specify the referral setting. A setting of `true` implies that referrals will be automatically followed and `false` would result in referrals not being followed. The default is `true`.

`objectclassMap`

Specify a mapping from an `objectclass` defined by a service to an `objectclass` in an alternative schema. This can be used to change the default schema used for a given service. The syntax of `objectclassMap` is defined in the profile IETF draft. This option can be specified multiple times. The default value for all services is `NULL`. In the example,

```
objectclassMap=passwd:posixAccount=unixAccount
```

the LDAP client would use the LDAP `objectclass` of `unixAccount` rather than the `posixAccount` for the `passwd` service. This is a multivalued attribute.

`preferredServerList`

Specify the space separated list of server names or server addresses, either IPv4 or IPv6, to be contacted before servers specified by the `defaultServerList` attribute. If you specify server names, be sure that the LDAP client can resolve the name without the LDAP name service. You must resolve the LDAP servers' names by using either `files` or `dns`. If the LDAP server name cannot be resolved, your naming service will fail.

The port number is optional. If not specified, the default LDAP server port number 389 is used, except when TLS is specified in the authentication method. In this case, the default LDAP server port number is 636.

The format to specify the port number for an IPv6 address is:

```
[ipv6_addr]:port
```

To specify the port number for an IPv4 address, use the following format:

```
ipv4_addr:port
```

If the host name is specified, use the format:

```
host_name:port
```

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If you use TLS, the LDAP server's hostname must match the hostname in the TLS certificate. Typically, the hostname in the TLS certificate is a fully qualified domain name. With TLS, the LDAP server host addresses must resolve to the hostnames in the TLS certificate. You must use `files` or `dns` to resolve the host address.

profileName

Specify the profile name. For `ldapclient init`, this attribute is the name of an existing profile which may be downloaded periodically depending on the value of the `profileTTL` attribute. For `ldapclient genprofile`, this is the name of the profile to be generated. The default value is `default`.

profileTTL

Specify the TTL value in seconds for the client information. This is only relevant if the machine was initialized with a client profile. If you do not want `ldap_cachemgr(1M)` to attempt to refresh the LDAP client configuration from the LDAP server, set `profileTTL` to 0 (zero). Valid values are either zero 0 (for no expiration) or a positive integer in seconds. The default value is 12 hours.

proxyDN

Specify the Bind Distinguished Name for the proxy identity. This option is required if the credential level is `proxy`, and at least one of the authentication methods requires a bind DN. There is no default value.

proxyPassword

Specify client proxy password. This option is required if the credential level is `proxy`, and at least one of the authentication methods requires a bind DN. There is no default.

searchTimeLimit

Specify maximum number of seconds allowed for an LDAP search operation. The default is 30 seconds. The server may have its own search time limit.

serviceAuthenticationMethod

Specify authentication methods to be used by a service in the form *servicename:authenticationmethod*, for example:

```
pam_ldap:tls:simple
```

For multiple authentication methods, use a semicolon-separated list. The default value is no service authentication methods, in which case, each service would default to the `authenticationMethod` value. The supported authentications are described above.

Three services support this feature: `passwd-cmd`, `keyserv`, and `pam_ldap`. The `passwd-cmd` service is used to define the authentication method to be used by `passwd(1)` to change the user's password and other attributes. The `keyserv` service is used to identify the authentication method to be used by the `chkey(1)` and `newkey(1M)` utilities. The `pam_ldap` service defines the authentication method to be used for authenticating users when `pam_ldap(5)` is configured. If this attribute is not set for any of these services, the `authenticationMethod` attribute is used to define the authentication method. This is a multivalued attribute.

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	serviceCredentialLevel Specify credential level to be used by a service. Multiple values can be specified in a space-separated list. The default value for all services is NULL. The supported credential levels are: anonymous or proxy. At present, no service uses this attribute. This is a multivalued attribute. serviceSearchDescriptor Override the default base DN for LDAP searches for a given service. The format of the descriptors also allow overriding the default search scope and search filter for each service. The syntax of serviceSearchDescriptor is defined in the profile IETF draft. The default value for all services is NULL. This is a multivalued attribute. In the example, <pre>serviceSearchDescriptor=passwd:ou=people,dc=a1,dc=acme,dc=com?one</pre> the LDAP client would do a one level search in ou=people,dc=a1,dc=acme,dc=com rather than ou=people,defaultSearchBase for the passwd service.
OPTIONS	The following options are supported: -a Specify attrName and its value. -q Quiet mode. No output is generated. -v Verbose output.
OPERANDS	The following operand is supported: <i>LDAP_server</i> An address or a name for the LDAP server from which the profile will be loaded. The current naming service specified in the nsswitch.conf file is used. Once the profile is loaded, the preferredServerList and defaultServerList specified in the profile are used.
EXAMPLES	EXAMPLE 1 Setting Up a Client By Using the Default Profile Stored on a Specified LDAP Server The following example shows how to set up a client using the default profile stored on the specified LDAP server. This command will only be successful if either the credential level in the profile is set to anonymous or the authentication method is set to none. <pre>example# ldapclient init 129.100.100.1</pre> EXAMPLE 2 Setting Up a Client Using Only One Server The following example shows how to set up a client using only one server. The authentication method is set to none, and the search base is dc=mycompany,dc=com. <pre>example# ldapclient manual -a authenticationMethod=none \ -a defaultSearchBase=dc=mycompany,dc=com \ -a defaultServerList=129.100.100.1</pre>

EXAMPLE 3 Setting Up a Client Using Only One Server That Does Not Follow Referrals

The following example shows how to set up a client using only one server. The credential level is set to proxy. The authentication method of is sasl/CRAM-MD5, with the option not to follow referrals. The domain name is xyz.mycompany.com, and the LDAP server is running on port number 386 at IP address 129.100.100.1.

```
example# ldapclient manual \
-a credentialLevel=proxy \
-a authenticationMethod=sasl/CRAM-MD5 \
-a proxyPassword=secret \
-a proxyDN=cn=proxyagent,ou=profile,dc=xyz,dc=mycompany,dc=com \
-a defaultSearchBase=dc=xyz,dc=mycompany,dc=com \
-a domainName=xyz.mycompany.com \
-a followReferrals=false \
-a defaultServerList=129.100.100.1:386
```

EXAMPLE 4 Using genprofile to Set Only the defaultSearchBase and the Server Addresses

The following example shows how to use the genprofile command to set the defaultSearchBase and the server addresses.

```
example# ldapclient genprofile -a profileName=myprofile \
-a defaultSearchBase=dc=eng,dc=sun,dc=com \
-a "defaultServerList=129.100.100.1 129.100.234.15:386" \
> myprofile.ldif
```

EXAMPLE 5 Creating a Profile That Overrides Every Default Value

The following example shows a profile that overrides every default value.

```
example# ldapclient genprofile -a profileName=eng \
-a credentialLevel=proxy -a authenticationMethod=sasl/DIGEST-MD5 \
-a bindTimeLimit=20 \
-a defaultSearchBase=dc=eng,dc=acme,dc=com \
-a "serviceSearchDescriptor=passwd:ou=people,dc=a1,dc=acme,dc=com?one" \
-a serviceAuthenticationMethod=pam_ldap:tls:simple \
-a defaultSearchScope=sub \
-a attributeMap=passwd:uid=employeeNumber \
-a objectclassMap=passwd:posixAccount=unixAccount \
-a followReferrals=false -a profileTTL=6000 \
-a preferredServerList=129.100.100.30 -a searchTimeLimit=30 \
-a "defaultServerList=29.100.200.1 129.100.100.1 204.34.5.6" > eng.ldif
```

EXIT STATUS

The following exit values are returned:

0	The command successfully executed.
1	An error occurred. An error message is output.
2	proxyDN and proxyPassword attributes are required, but they are not provided.

ldapclient(1M)

FILES	/var/ldap/ldap_client_cred	Contain the LDAP configuration of the client. These files are not to be modified manually. Their content is not guaranteed to be human readable. Use ldapclient to update them.
	/var/ldap/ldap_client_file	
	/etc/defaultdomain	System default domain name, matching the domain name of the data in the LDAP servers.
	/etc/nsswitch.conf	Configuration file for the name-service switch.
	/etc/nsswitch.ldap	Sample configuration file for the name-service switch configured with LDAP and files.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu
Interface Stability	Evolving

SEE ALSO chkey(1), ldap(1), ldapadd(1), ldapdelete(1), ldaplist(1), ldapmodify(1), ldapmodrdn(1), ldapsearch(1), idsconfig(1M), ldapaddent(1M), ldap_cachemgr(1M), suninstall(1M), resolv.conf(4), attributes(5)

NAME	link, unlink – link and unlink files and directories						
SYNOPSIS	/usr/sbin/link <i>existing-file new-file</i> /usr/xpg4/bin/link <i>existing-file new-file</i> /usr/sbin/unlink <i>file</i>						
DESCRIPTION	The link and unlink commands link and unlink files and directories. Only super-users can use these commands on directories. Use link to create a new file that points to an existing file. The <i>existing-file</i> and <i>new-file</i> operands specify the existing file and newly-created files. See OPERANDS. link and unlink directly invoke the link(2) and unlink(2) system calls, performing exactly what they are told to do and abandoning all error checking. This differs from the ln(1) command. See ln(1). While linked files and directories can be removed using unlink, it is safer to use rm(1) and rmdir(1) instead. See rm(1) and rmdir(1).						
/usr/xpg4/bin/link	If the existing file being hard linked is itself a symbolic link, then the newly created file (<i>new-file</i>) will be a hard link to the file referenced by the symbolic link, not to the symbolic link object itself (<i>existing-file</i>).						
OPERANDS	The following operands are supported: <i>existing-file</i> Specifies the name of the existing file to be linked. <i>file</i> Specifies the name of the file to be unlinked. <i>new-file</i> Specifies the name of newly created (linked) file.						
ENVIRONMENT VARIABLES	See environ(5) for descriptions of the following environment variables that affect the execution of link : LANG , LC_ALL , LC_CTYPE , LC_MESSAGES , and NLSPATH .						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu		
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWcsu						
/usr/xpg4/bin/link	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWxcu4</td></tr><tr><td>Interface Stability</td><td>Standard</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWxcu4	Interface Stability	Standard
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWxcu4						
Interface Stability	Standard						
SEE ALSO	ln(1) , rm(1) , link(2) , unlink(2) , attributes(5) , environ(5) , standards(5)						

listdgrp(1M)

NAME	listdgrp – lists members of a device group								
SYNOPSIS	/usr/bin/listdgrp <i>dgroup</i> ...								
DESCRIPTION	listdgrp displays the members of the device groups specified by the <i>dgroup</i> list.								
EXAMPLES	EXAMPLE 1 An example of listdgrp. The following example lists the devices that belong to group partitions: <pre>example% listdgrp partitions root swap usr</pre>								
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>1</td><td>Command was syntax incorrect, an invalid option used, or an internal error occurred.</td></tr><tr><td>2</td><td>A device group table could not be opened for reading.</td></tr><tr><td>3</td><td>A device group <i>dgroup</i> could not be found in the device group table.</td></tr></table>	0	Successful completion.	1	Command was syntax incorrect, an invalid option used, or an internal error occurred.	2	A device group table could not be opened for reading.	3	A device group <i>dgroup</i> could not be found in the device group table.
0	Successful completion.								
1	Command was syntax incorrect, an invalid option used, or an internal error occurred.								
2	A device group table could not be opened for reading.								
3	A device group <i>dgroup</i> could not be found in the device group table.								
FILES	/etc/dgroup.tab								
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:								
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu				
ATTRIBUTE TYPE	ATTRIBUTE VALUE								
Availability	SUNWcsu								
SEE ALSO	putdgrp(1M), attributes(5)								

NAME	listen – network listener daemon
SYNOPSIS	<code>/usr/lib/saf/listen</code> [-m <i>devstem</i>] <i>net_spec</i>
DESCRIPTION	The <code>listen</code> process “listens” to a network for service requests, accepts requests when they arrive, and invokes servers in response to those service requests. The network listener process may be used with any connection-oriented network (more precisely, with any connection-oriented transport provider) that conforms to the Transport Layer Interface (TLI) Specification. The listener internally generates a pathname for the minor device for each connection; it is this pathname that is used in the <code>utmpx</code> entry for a service, if one is created. By default, this pathname is the concatenation of the prefix <code>/dev/netspec</code> with the decimal representation of the minor device number. In either case, the representation of the minor device number will be at least two digits (for example, 05 or 27), or longer when it is necessary to accommodate minor device numbers larger than 99.
SERVER INVOCATION	When a connection indication is received, the listener creates a new transport endpoint and accepts the connection on that endpoint. Before giving the file descriptor for this new connection to the server, any designated STREAMS modules are pushed and the configuration script is executed, (if one exists). This file descriptor is appropriate for use with either TLI (see <code>t_sync(3NSL)</code>) or the sockets interface library. By default, a new instance of the server is invoked for each connection. When the server is invoked, file descriptor 0 refers to the transport endpoint, and is open for reading and writing. File descriptors 1 and 2 are copies of file descriptor 0; no other file descriptors are open. The service is invoked with the user and group IDs of the user name under which the service was registered with the listener, and with the current directory set to the HOME directory of that user. Alternatively, a service may be registered so that the listener will pass connections to a standing server process through a FIFO or a named STREAM, instead of invoking the server anew for each connection. In this case, the connection is passed in the form of a file descriptor that refers to the new transport endpoint. Before the file descriptor is sent to the server, the listener interprets any configuration script registered for that service using <code>doconfig(3NSL)</code>, although <code>doconfig</code> is invoked with both the <code>NORUN</code> and <code>NOASSIGN</code> flags. The server receives the file descriptor for the connection in a <code>strrecvfd</code> structure using an <code>I_RECVFD ioctl(2)</code>. For more details about the listener and its administration, see <code>nlsadmin(1M)</code>.
OPTIONS	<code>-mdevstem</code> The listener will use <i>devstem</i> as the prefix for the pathname.
FILES	<code>/etc/saf/pmtag/*</code>
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:

listen(1M)

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO nlsadmin(1M), pmadm(1M), sac(1M), sacadm(1M), ioctl(2), doconfig(3NSL), nlsgetcall(3NSL), nlsprovider(3NSL), t_sync(3NSL), attributes(5), streamio(7I)

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NOTES When passing a connection to a standing server, the user and group IDs contained in the `strrecvfd` structure will be those for the listener (that is, they will both be 0); the user name under which the service was registered with the listener is not reflected in these IDs.

When operating multiple instances of the listener on a single transport provider, there is a potential race condition in the binding of addresses during initialization of the listeners, if any of their services have dynamically assigned addresses. This condition would appear as an inability of the listener to bind a static-address service to its otherwise valid address, and would result from a dynamic-address service having been bound to that address by a different instance of the listener.

NAME	llc2_loop – loopback diagnostics to test the driver, adapter and network.
SYNOPSIS	<pre> /usr/lib/llc2/llc2_loop2 [-v] ppa /usr/lib/llc2/llc2_loop3 ppa sap frames /usr/lib/llc2/llc2_loop3 ppa type frames /usr/lib/llc2/llc2_loop4 [-v] ppa </pre>
DESCRIPTION	Loop 2 The loop2 test sends a NULL XID frame to the broadcast (all 1's) destination MAC address. The source SAP (Service Access Point) value used is 0x04 (SNA's SAP). Therefore, if SNA is running on the system, the loop2 test will fail. The destination SAP value is the NULL SAP (0x00). This test finds out who is listening and can receive frames sent out from a node. The verbose (-v) option displays the MAC address of responding nodes. All possible responders may not be displayed, since the loop2 test only waits for responses for 2 seconds, but during this time 50-200 nodes may be displayed. The most likely error is: Unexpected DLPI primitive <i>x</i>, expected <i>y</i>. where <i>x</i> = 5 and <i>y</i> = 6. From /usr/include/sys/dlpi.h, the expected return value from one of the DLPI primitives is 6 (DL_OK_ACK), but instead a 5 (DL_ERROR_ACK) was received. This can occur for two reasons: ■ The loop2 command was issued to a non-existent PPA (Physical Point of Attachment). ■ The SAP (0x04) is already in use (for example, the SNA subsystem is up). Loop 3 The loop3 test sends 1,495 byte Unnumbered Information (UI) frames to the NULL (all 0's) destination MAC address. This should be used along with data capture either on the local node or another node on the same LAN to verify the transmission of data. The <i>ppa</i> argument specifies the adapter on which to run the test. The <i>ppa</i> is the relative physical position of the adapter and may be ascertained by viewing the adapter configuration (see llc2_config(1)). For Token Ring or Ethernet, specify an even <i>sap</i> value from 2 through 254, or, for Ethernet only, any <i>type</i> value from 1519 (0x05ef) through 65535 (0xffff). It is advised to pick a value that is easily recognized when the data capture output is viewed. <i>frames</i> is the decimal number of 1,495 bytes packets to transmit. The test will only display a message if a failure occurs. Loop 4 The loop4 test sends a TEST frame (no information field) to the broadcast (all 1's) destination MAC address. The source SAP value used is 0x04 (SNA's SAP). Therefore, if SNA is running on the system, the loop4 test will fail. The destination SAP value is the NULL SAP (0x00). This test finds out who is listening and can receive frames sent out from a node. The verbose (-v) option displays the MAC address of responding nodes. All possible responders may not be displayed since the loop4 test only waits for responses for 2 seconds, but during this time 50-200 nodes may be displayed. The loop4 test displays information similar to the following example if other nodes are listening and respond (verbose mode):

llc2_loop(1M)

```
-Attaching
  -Binding
  -Sending TEST
  -Responders
    1-0000c0c12449
    2-08000e142990
    3-08000e142a51
    4-0000c0450044
    5-0000c0199e46
  -Unbinding
-Detaching
5 nodes responding
```

The errors displayed are the same as for loop2.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWllc

SEE ALSO llc2_config(1), llc2(4), attributes(5), llc2(7D)

NOTES For information about how to start the service, see llc2(7D)

NAME	locator – location indicator control
SYNOPSIS	/usr/sbin/locator [-f -n]
DESCRIPTION	The locator command sets or queries the state of the system locator if such a device exists. Without options, the locator command reports the current state of the system. The privileges required to use this command are hardware dependent. Typically, only the super user can get or set a locator.
OPTIONS	The following options are supported: -f Turns the locator off. -n Turns the locator on.
OPERANDS	The following operands are supported:
EXAMPLES	EXAMPLE 1 Using the <code>locator</code> Command on a Platform Which Has a System Locator LED When issued on a platform which has a system locator LED, the following command turns the locator on: <pre># locator -n # locator The 'system' locator is on</pre> EXAMPLE 2 Using the <code>locator</code> Command on a Platform Which Does Not Have a System Locator LED When issued on a platform which does not have a system locator LED, the following command attempts to turn the locator on. The command returns an error message. <pre># locator -n 'system' locator not found</pre>
EXIT STATUS	The following exit values are returned: 0 Successful completion. 1 Invalid command line input. 2 The requested operation failed.
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

locator(1M)

SEE ALSO attributes(5)

NAME	lockd – network lock daemon							
SYNOPSIS	<code>/usr/lib/nfs/lockd</code> [-g <i>graceperiod</i>] [-l <i>listen_min_backlog</i>] [-t <i>timeout</i>] [<i>nthreads</i>]							
DESCRIPTION	The <code>lockd</code> utility is part of the NFS lock manager, which supports record locking operations on NFS files. See <code>fcntl(2)</code> and <code>lockf(3C)</code>. The lock manager provides the following two functions: ■ It forwards <code>fcntl(2)</code> locking requests for NFS mounted file systems to the lock manager on the NFS server. ■ It generates local file locking operations in response to requests forwarded from lock managers running on NFS client machines. State information kept by the lock manager about these locking requests can be lost if the <code>lockd</code> is killed or the operating system is rebooted. Some of this information can be recovered as follows. When the server lock manager restarts, it waits for a grace period for all client-site lock managers to submit reclaim requests. Client-site lock managers, on the other hand, are notified by the status monitor daemon, <code>statd(1M)</code>, of the restart and promptly resubmit previously granted lock requests. If the lock daemon fails to secure a previously granted lock at the server site, then it sends <code>SIGLOST</code> to a process. Administrators wanting to change startup parameters for <code>lockd</code> should, as root, make changes in the <code>/etc/default/nfs</code> file rather than editing the <code>/etc/init.d/nfs.client</code> file. See <code>nfs(4)</code>.							
OPTIONS	The following options are supported: <table><tr><td>-g <i>graceperiod</i></td><td>Specify the number of seconds that clients have to reclaim locks after the server reboots. The default is 45 seconds. Equivalent of the <code>LOCKD_GRACE_PERIOD</code> parameter in the <code>nfs</code> file.</td></tr><tr><td>-l <i>listen_min_backlog</i></td><td>Specify the listener backlog (<i>listen_min_backlog</i>). <i>listen_min_backlog</i> is the number connect requests that are queued and waiting to be processed before new connect requests start to get dropped.</td></tr><tr><td>-t <i>timeout</i></td><td>Specify the number of seconds to wait before retransmitting a lock request to the remote server. The default value is 15 seconds. Equivalent of the <code>LOCKD_RETRANSMIT_TIMEOUT</code> parameter in the <code>nfs</code> file.</td></tr></table>		-g <i>graceperiod</i>	Specify the number of seconds that clients have to reclaim locks after the server reboots. The default is 45 seconds. Equivalent of the <code>LOCKD_GRACE_PERIOD</code> parameter in the <code>nfs</code> file.	-l <i>listen_min_backlog</i>	Specify the listener backlog (<i>listen_min_backlog</i>). <i>listen_min_backlog</i> is the number connect requests that are queued and waiting to be processed before new connect requests start to get dropped.	-t <i>timeout</i>	Specify the number of seconds to wait before retransmitting a lock request to the remote server. The default value is 15 seconds. Equivalent of the <code>LOCKD_RETRANSMIT_TIMEOUT</code> parameter in the <code>nfs</code> file.
-g <i>graceperiod</i>	Specify the number of seconds that clients have to reclaim locks after the server reboots. The default is 45 seconds. Equivalent of the <code>LOCKD_GRACE_PERIOD</code> parameter in the <code>nfs</code> file.							
-l <i>listen_min_backlog</i>	Specify the listener backlog (<i>listen_min_backlog</i>). <i>listen_min_backlog</i> is the number connect requests that are queued and waiting to be processed before new connect requests start to get dropped.							
-t <i>timeout</i>	Specify the number of seconds to wait before retransmitting a lock request to the remote server. The default value is 15 seconds. Equivalent of the <code>LOCKD_RETRANSMIT_TIMEOUT</code> parameter in the <code>nfs</code> file.							
OPERANDS	<i>nthreads</i>	Specify the maximum number of concurrent threads that the server can handle. This concurrency is achieved by up to <i>nthreads</i> threads created as needed in the kernel. <i>nthreads</i> should be based on the load expected on this server. If <i>nthreads</i> is not specified, the maximum number of concurrent threads will default to						

lockd(1M)

20. Equivalent of the LOCKD_SERVERS parameter in the `nfs` file.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnfscu

SEE ALSO `statd(1M)`, `fcntl(2)`, `lockf(3C)`, `nfs(4)`, `attributes(5)`

NAME	lockfs – change or report file system locks
SYNOPSIS	/usr/sbin/lockfs [-adefhnuw] [-c <i>string</i>] [<i>file-system</i> ...]
DESCRIPTION	lockfs is used to change and report the status of file system locks. lockfs reports the lock status and unlocks the file systems that were improperly left locked. Using lockfs to lock a file system is discouraged because this requires extensive knowledge of SunOS internals to be used effectively and correctly. When invoked with no arguments, lockfs lists the UFS file systems that are locked. If <i>file-system</i> is not specified, and -a is specified, lockfs is run on all mounted, UFS type file systems.
OPTIONS	The options are mutually exclusive: wndheuf. If you do specify more than one of these options on a lockfs command line, the utility does not protest and invokes only the last option specified. In particular, you cannot specify a flush (-f) and a lock (for example, -w) on the same command line. However, all locking operations implicitly perform a flush, so the -f is superfluous when specifying a lock. You must be super-user to use any of the following options, with the exception of -a, -f and -v. The following options are supported. -a Apply command to all mounted, UFS type file systems. <i>file-system</i> is ignored when -a is specified. -c <i>string</i> Accept a string that is passed as the comment field. The -c only takes affect when the lock is being set using the -d, -h, -n, -u, or -w options. -d Delete-lock (dlock) the specified <i>file-system</i>. dlock suspends access that could remove directory entries. -e Error-lock (elock) the specified <i>file-system</i>. elock blocks all local access to the locked file system and returns EWOULDBLOCK on all remote access. File systems are elocked by UFS on detection of internal inconsistency. They may only be unlocked after successful repair by fsck, which is usually done automatically (see mount_ufs(1M)). elocked file systems can be unmounted. -f Force a synchronous flush of all data that is dirty at the time fsflush is run to its backing store for the named file system (or for all file systems.) It is a more reliable method than using sync(1M) because it does not return until all possible data has been pushed. In the case of UFS filesystems with logging enabled, the log is also rolled before returning. Additional data can be modified by the time fsflush exits, so using one of the locking options is more likely to be of general use.

lockfs(1M)

-h	Hard-lock (hlock) the specified <i>file-system</i> . hlock returns an error on every access to the locked file system, and cannot be unlocked. hlocked file systems can be unmounted.
-n	Name-lock (nlock) the specified <i>file-system</i> . nlock suspends accesses that could change or remove existing directories entries.
-u	Unlock (unlock) the specified <i>file-system</i> . unlock awakens suspended accesses.
-v	Enable verbose output.
-w	Write-lock (wlock) the specified <i>file-system</i> . wlock suspends writes that would modify the file system. Access times are not kept while a file system is write-locked.

OPERANDS The following operands are supported.

file-system A list of path names separated by white spaces.

USAGE See largefile(5) for the description of the behavior of lockfs when encountering files greater than or equal to 2 Gbyte (2³¹ bytes).

EXAMPLES **EXAMPLE 1** Using lockfs -a

In the following examples, *filesystem* is the pathname of the mounted-on directory (mount point). Locktype is one of "write," "name," "delete," "hard," or "unlock". When enclosed in parenthesis, the lock is being set. Comment is a string set by the process that last issued a lock command.

The following example shows the lockfs output when only the -a option is specified.

```
example# /usr/sbin/lockfs -a
```

Filesystem	Locktype	Comment
/	unlock	
/var	unlock	

```
example#
```

EXAMPLE 2 Using lockfs -w

The following example shows the lockfs output when the -w option is used to write lock the /var file system and the comment string is set using the -c option. The -a option is then specified on a separate command line.

```
example# /usr/sbin/lockfs -w -c "lockfs: write lock example" /var
example# /usr/sbin/lockfs -a
```

EXAMPLE 2 Using lockfs -w (Continued)

Filesystem	Locktype	Comment
/	unlock	
/var	write	lockfs: write lock example

example#

EXAMPLE 3 Using lockfs -u

The following example shows the lockfs output when the -u option is used to unlock the /var file system and the comment string is set using the -c option.

```
example# /usr/sbin/lockfs -uc "lockfs: unlock example" /var
example# /usr/sbin/lockfs /var
```

Filesystem	Locktype	Comment
/var	unlock	lockfs: unlock example

example#

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO kill(1), mount_ufs(1M), sync(1M), attributes(5), largefile(5), ufs(7FS)

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DIAGNOSTICS

file system: Not owner
You must be root to use this command.

file system: Deadlock condition detected/avoided
A file is enabled for accounting or swapping, on *file system*.

file system: Device busy
Another process is setting the lock on *file system*.

lockstat(1M)

NAME	lockstat – report kernel lock and profiling statistics
SYNOPSIS	lockstat [-ACEHI] [-e <i>event_list</i>] [-i <i>rate</i>] [-b -t -h -s <i>depth</i>] [-n <i>nrecords</i>] [-l <i>lock</i> [, <i>size</i>]] [-d <i>duration</i>] [-f <i>function</i> [, <i>size</i>]] [-T] [-ckgwWRpP] [-D <i>count</i>] [-o <i>filename</i>] <i>command</i> [<i>args</i>]
DESCRIPTION	The lockstat utility gathers and displays kernel locking and profiling statistics. lockstat allows you to specify which events to watch (for example, “spin on adaptive mutex,” “block on read access to rwlock due to waiting writers,” and so forth) how much data to gather for each event, and how to display the data. By default, lockstat monitors all lock contention events, gathers frequency and timing data about those events, and displays the data in decreasing frequency order, so that the most common events appear first. lockstat gathers data until the specified command completes. For example, to gather statistics for a fixed-time interval, use <code>sleep(1)</code> as the command, as follows: <pre>example# lockstat sleep 5</pre> When the <code>-I</code> option is specified, lockstat establishes a per-processor high-level periodic interrupt source to gather profiling data. The interrupt handler simply generates a lockstat event whose “caller” is the interrupted PC (program counter). The profiling event is just like any other lockstat event, so all of the normal lockstat options are applicable. lockstat relies on the lockstat(7D) driver, an exclusive-access device that modifies the running kernel’s text to intercept events of interest. This imposes a small but measurable overhead on all system activity, so access to the lockstat(7D) driver is restricted to super-user by default. The system administrator may relax this restriction by changing the permissions on <code>/dev/lockstat</code>.
OPTIONS	The following options are supported:
Event Selection	If no event selection options are specified, the default is <code>-CE</code>. -A Watch all lock events. -A is equivalent to -CEH. -C Watch contention events. -E Watch error events. -e <i>event_list</i> Only watch the specified events. <i>event list</i> is a comma-separated list of events or ranges of events such as 1,4-7,35. Run lockstat with no arguments to get a brief description of all events. -H Watch hold events. -I Watch profiling interrupt events. -i <i>rate</i> Interrupt rate (per second) for -I. The default is 97 Hz, so that profiling doesn’t run in lockstep with the clock interrupt (which runs at 100 Hz).

Data Gathering (Mutually Exclusive)	-b	Basic statistics: lock, caller, number of events.
	-h	Histogram: Timing plus time-distribution histograms.
	-s <i>depth</i>	Stack trace: Histogram plus stack traces up to <i>depth</i> frames deep.
	-t	Timing: Basic plus timing for all events [default].
Data Filtering	-d <i>duration</i>	Only watch events longer than <i>duration</i> .
	-f <i>func[,size]</i>	Only watch events generated by <i>func</i> , which can be specified as a symbolic name or hex address. <i>size</i> defaults to the ELF symbol size if available, or 1 if not.
	-l <i>lock[,size]</i>	Only watch <i>lock</i> , which can be specified as a symbolic name or hex address. <i>size</i> defaults to the ELF symbol size or 1 if the symbol size is not available.
	-n <i>nrecords</i>	Maximum number of data records.
Data Reporting	-T	Trace (rather than sample) events [off by default].
	-c	Coalesce lock data for lock arrays (for example, <code>pse_mutex[]</code>).
	-D <i>count</i>	Only display the top <i>count</i> events of each type.
	-g	Show total events generated by function. For example, if <code>foo()</code> calls <code>bar()</code> in a loop, the work done by <code>bar()</code> counts as work generated by <code>foo()</code> (along with any work done by <code>foo()</code> itself). The -g option works by counting the total number of stack frames in which each function appears. This implies two things: (1) the data reported by -g can be misleading if the stack traces are not deep enough, and (2) functions that are called recursively might show greater than 100% activity. In light of issue (1), the default data gathering mode when using -g is -s 50.
	-k	Coalesce PCs within functions.
	-o <i>filename</i>	Direct output to <i>filename</i> .
	-P	Sort data by (<i>count</i> * <i>time</i>) product.
	-p	Parsable output format.
	-R	Display rates (events per second) rather than counts.
	-W	Whichever: distinguish events only by caller, not by lock.
	-w	Wherever: distinguish events only by lock, not by caller.
DISPLAY FORMATS	The following headers appear over various columns of data.	
	Count or ops/s	Number of times this event occurred, or the rate (times per second) if -R was specified.
	indv	Percentage of all events represented by this individual event.

lockstat(1M)

genr	Percentage of all events generated by this function.
cuml	Cumulative percentage; a running total of the individuals.
rcnt	Average reference count. This will always be 1 for exclusive locks (mutexes, spin locks, rwlocks held as writer) but may be greater than 1 for shared locks (rwlocks held as reader).
spin or nsec	Average number of times caller spun trying to get the lock, or average duration of the events in nanoseconds, as appropriate for the event. For the profiling event, "duration" means interrupt latency.
Lock	Address of the lock; displayed symbolically if possible.
CPU+PIL	CPU plus processor interrupt level (PIL). For example, if CPU 4 is interrupted while at PIL 6, this will be reported as cpu [4] +6.
Caller	Address of the caller; displayed symbolically if possible.

EXAMPLES

EXAMPLE 1 Measuring Kernel Lock Contention

```
example# lockstat sleep 5
```

```
Adaptive mutex spin: 2210 events in 5.055 seconds (437 events/sec)
```

Count	indv	cuml	rcnt	spin	Lock	Caller
269	12%	12%	1.00	10	service_queue	background+0xdc
249	11%	23%	1.00	8	service_queue	qenable_locked+0x64
228	10%	34%	1.00	13	service_queue	background+0x15c
68	3%	37%	1.00	7	0x30000024070	untimeout+0x1c
59	3%	40%	1.00	38	0x300066fa8e0	background+0xb0
43	2%	41%	1.00	3	rqcred_lock	svc_getreq+0x3c
42	2%	43%	1.00	34	0x30006834eb8	background+0xb0
41	2%	45%	1.00	13	0x30000021058	untimeout+0x1c
40	2%	47%	1.00	3	rqcred_lock	svc_getreq+0x260
37	2%	49%	1.00	237	0x300068e83d0	hmestart+0x1c4
36	2%	50%	1.00	7	0x30000021058	timeout_common+0x4
36	2%	52%	1.00	35	0x300066fa120	background+0xb0
32	1%	53%	1.00	9	0x30000024070	timeout_common+0x4
31	1%	55%	1.00	292	0x300069883d0	hmestart+0x1c4
29	1%	56%	1.00	36	0x300066fb290	background+0xb0
28	1%	57%	1.00	11	0x3000001e040	untimeout+0x1c
25	1%	59%	1.00	9	0x3000001e040	timeout_common+0x4
22	1%	60%	1.00	2	0x30005161110	sync_stream_buf+0xdc
21	1%	60%	1.00	29	0x30006834eb8	putq+0xa4
19	1%	61%	1.00	4	0x3000515dcb0	mdf_alloc+0xc
18	1%	62%	1.00	45	0x30006834eb8	qenable+0x8
18	1%	63%	1.00	6	service_queue	queuerun+0x168
17	1%	64%	1.00	26	0x30005418ee8	vmem_free+0x3c
[...]						

EXAMPLE 1 Measuring Kernel Lock Contention (Continued)

R/W reader blocked by writer: 76 events in 5.055 seconds (15 events/sec)

Count	indv	cuml	rcnt	nsec	Lock	Caller
23	30%	30%	1.00	22590137	0x300098ba358	ufs_dirlook+0xd0
17	22%	53%	1.00	5820995	0x3000ad815e8	find_bp+0x10
13	17%	70%	1.00	2639918	0x300098ba360	ufs_iget+0x198
4	5%	75%	1.00	3193015	0x300098ba360	ufs_getattr+0x54
3	4%	79%	1.00	7953418	0x3000ad817c0	find_bp+0x10
3	4%	83%	1.00	935211	0x3000ad815e8	find_read_lof+0x14
2	3%	86%	1.00	16357310	0x300073a4720	find_bp+0x10
2	3%	88%	1.00	2072433	0x300073a4720	find_read_lof+0x14
2	3%	91%	1.00	1606153	0x300073a4370	find_bp+0x10
1	1%	92%	1.00	2656909	0x300107e7400	ufs_iget+0x198

[...]

EXAMPLE 2 Measuring Hold Times

example# **lockstat -H -D 10 sleep 1**

Adaptive mutex spin: 513 events

Count	indv	cuml	rcnt	nsec	Lock	Caller
480	5%	5%	1.00	1136	0x300007718e8	putnext+0x40
286	3%	9%	1.00	666	0x3000077b430	getf+0xd8
271	3%	12%	1.00	537	0x3000077b430	msgio32+0x2fc
270	3%	15%	1.00	3670	0x300007718e8	strgetmsg+0x3d4
270	3%	18%	1.00	1016	0x300007c38b0	getq_noenab+0x200
264	3%	20%	1.00	1649	0x300007718e8	strgetmsg+0xa70
216	2%	23%	1.00	6251	tcp_mi_lock	tcp_snmp_get+0xfc
206	2%	25%	1.00	602	thread_free_lock	clock+0x250
138	2%	27%	1.00	485	0x300007c3998	putnext+0xb8
138	2%	28%	1.00	3706	0x300007718e8	strrput+0x5b8

[...]

EXAMPLE 3 Measuring Hold Times for Stack Traces Containing a Specific Function

example# **lockstat -H -f tcp_rput_data -s 50 -D 10 sleep 1**

Adaptive mutex spin: 11 events in 1.023 seconds (11 events/sec)

Count	indv	cuml	rcnt	nsec	Lock	Caller
9	82%	82%	1.00	2540	0x30000031380	tcp_rput_data+0x2b90

nsec	Time Distribution	count	Stack
256	@@@@@@@@@@@@@@@@	5	tcp_rput_data+0x2b90
512	@@@@@	2	putnext+0x78
1024	@@@	1	ip_rput+0xec4
2048		0	_c_putnext+0x148
4096		0	hmeread+0x31c
8192		0	hmeintr+0x36c
16384	@@@	1	

EXAMPLE 3 Measuring Hold Times for Stack Traces Containing a Specific Function
(Continued)

```

sbus_intr_wrapper+0x30
-----
Count  indiv  cuml  rcnt      nsec Lock                Caller
      1    9%  91%  1.00      1036 0x300000055380      freemsg+0x44

      nsec ----- Time Distribution ----- count      Stack
      1024 |@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@ 1      freemsg+0x44
                                                    tcp_rput_data+0x2fd0
                                                    putnext+0x78
                                                    ip_rput+0xec4
                                                    _c_putnext+0x148
                                                    hmeread+0x31c
                                                    hmeintr+0x36c

sbus_intr_wrapper+0x30
-----
[...]
```

EXAMPLE 4 Basic Kernel Profiling

For basic profiling, we don't care whether the profiling interrupt sampled `foo()+0x4c` or `foo()+0x78`; we care only that it sampled somewhere in `foo()`, so we use `-k`. The CPU and PIL aren't relevant to basic profiling because we are measuring the system as a whole, not a particular CPU or interrupt level, so we use `-W`.

```
example# lockstat -kiw -D 20 ./polltest
```

```
Profiling interrupt: 82 events in 0.424 seconds (194
events/sec)
```

```

Count  indiv  cuml  rcnt      nsec Hottest CPU+PIL      Caller
-----
      8   10%  10%  1.00      698 cpu[1]                utl0
      6    7%  17%  1.00      299 cpu[0]                read
      5    6%  23%  1.00      124 cpu[1]                getf
      4    5%  28%  1.00      327 cpu[0]                fifo_read
      4    5%  33%  1.00      112 cpu[1]                poll
      4    5%  38%  1.00      212 cpu[1]                uiomove
      4    5%  43%  1.00      361 cpu[1]                mutex_tryenter
      3    4%  46%  1.00      682 cpu[0]                write
      3    4%  50%  1.00       89 cpu[0]                pcache_poll
      3    4%  54%  1.00      118 cpu[1]                set_active_fd
      3    4%  57%  1.00      105 cpu[0]                syscall_trap32
      3    4%  61%  1.00      640 cpu[1]                (usermode)
      2    2%  63%  1.00      127 cpu[1]                fifo_poll
      2    2%  66%  1.00      300 cpu[1]                fifo_write
      2    2%  68%  1.00      669 cpu[0]                releasef
      2    2%  71%  1.00      112 cpu[1]                bt_getlowbit
      2    2%  73%  1.00      247 cpu[1]                splx
      2    2%  76%  1.00      503 cpu[0]                mutex_enter
      2    2%  78%  1.00      467 cpu[0]+10          disp_lock_enter
      2    2%  80%  1.00      139 cpu[1]                default_copyin
```


EXAMPLE 4 Basic Kernel Profiling (Continued)**EXAMPLE 5** Generated-load Profiling

In the example above, 5% of the samples were in `poll()`. This tells us how much time was spent inside `poll()` itself, but tells us nothing about how much work was *generated* by `poll()`; that is, how much time we spent in functions called by `poll()`. To determine that, we use the `-g` option. The example below shows that although `polltest` spends only 5% of its time in `poll()` itself, `poll()`-induced work accounts for 34% of the load.

Note that the functions that generate the profiling interrupt (`lockstat_intr()`, `cyclic_fire()`, and so forth) appear in every stack trace, and therefore are considered to have generated 100% of the load. This illustrates an important point: the generated load percentages do *not* add up to 100% because they are not independent. If 72% of all stack traces contain both `foo()` and `bar()`, then both `foo()` and `bar()` are 72% load generators.

```
example# lockstat -kgIW -D 20 ./polltest
```

```
Profiling interrupt: 80 events in 0.412 seconds (194 events/sec)
```

Count	genr	cuml	rcnt	nsec	Hottest	CPU+PIL	Caller
80	100%	----	1.00	310	cpu[1]		lockstat_intr
80	100%	----	1.00	310	cpu[1]		cyclic_fire
80	100%	----	1.00	310	cpu[1]		cbe_level14
80	100%	----	1.00	310	cpu[1]		current_thread
27	34%	----	1.00	176	cpu[1]		poll
20	25%	----	1.00	221	cpu[0]		write
19	24%	----	1.00	249	cpu[1]		read
17	21%	----	1.00	232	cpu[0]		write32
17	21%	----	1.00	207	cpu[1]		pcache_poll
14	18%	----	1.00	319	cpu[0]		fifo_write
13	16%	----	1.00	214	cpu[1]		read32
10	12%	----	1.00	208	cpu[1]		fifo_read
10	12%	----	1.00	787	cpu[1]		utl0
9	11%	----	1.00	178	cpu[0]		pcacheset_resolve
9	11%	----	1.00	262	cpu[0]		uiomove
7	9%	----	1.00	506	cpu[1]		(usermode)
5	6%	----	1.00	195	cpu[1]		fifo_poll
5	6%	----	1.00	136	cpu[1]		syscall_trap32
4	5%	----	1.00	139	cpu[0]		releasef
3	4%	----	1.00	277	cpu[1]		polllock

```
. . .
```

EXAMPLE 6 Gathering Lock Contention and Profiling Data for a Specific Module

In this example we use the `-f` option not to specify a single function, but rather to specify the entire text space of the `sbus` module. We gather both lock contention and profiling statistics so that contention can be correlated with overall load on the module.

```
example# modinfo | grep sbus
```

```
24 102a8b6f b8b4 59 1 sbus (SBus (sysio) nexus driver)
```

```
example# lockstat -kICE -f 0x102a8b6f,0xb8b4 sleep 10
```

```
Adaptive mutex spin: 39 events in 10.042 seconds (4 events/sec)
```

Count	indv	cuml	rcnt	spin	Lock	Caller
15	38%	38%	1.00	2	0x30005160528	sync_stream_buf
7	18%	56%	1.00	1	0x30005160d18	sync_stream_buf
6	15%	72%	1.00	2	0x300060c3118	sync_stream_buf
5	13%	85%	1.00	2	0x300060c3510	sync_stream_buf
2	5%	90%	1.00	2	0x300060c2d20	sync_stream_buf
2	5%	95%	1.00	2	0x30005161cf8	sync_stream_buf
1	3%	97%	1.00	2	0x30005161110	sync_stream_buf
1	3%	100%	1.00	2	0x30005160130	sync_stream_buf

```
Adaptive mutex block: 9 events in 10.042 seconds (1 events/sec)
```

Count	indv	cuml	rcnt	nsec	Lock	Caller
4	44%	44%	1.00	156539	0x30005160528	sync_stream_buf
2	22%	67%	1.00	763516	0x30005160d18	sync_stream_buf
1	11%	78%	1.00	462130	0x300060c3510	sync_stream_buf
1	11%	89%	1.00	288749	0x30005161110	sync_stream_buf
1	11%	100%	1.00	1015374	0x30005160130	sync_stream_buf

```
Profiling interrupt: 229 events in 10.042 seconds (23 events/sec)
```

Count	indv	cuml	rcnt	nsec	Hottest	CPU+PIL	Caller
89	39%	39%	1.00	426	cpu[0]+6		sync_stream_buf
64	28%	67%	1.00	398	cpu[0]+6		sbus_intr_wrapper
23	10%	77%	1.00	324	cpu[0]+6		iommu_dvma_kaddr_load
21	9%	86%	1.00	512	cpu[0]+6		iommu_tlb_flush
14	6%	92%	1.00	342	cpu[0]+6		iommu_dvma_unload
13	6%	98%	1.00	306	cpu[1]		iommu_dvma_sync
5	2%	100%	1.00	389	cpu[1]		iommu_dma_bindhdl

EXAMPLE 7 Determining the Average PIL (processor interrupt level) for a CPU

```
example# lockstat -Iw -l cpu[3] ./testprog
```

```
Profiling interrupt: 14791 events in 152.463 seconds (97 events/sec)
```

Count	indv	cuml	rcnt	nsec	CPU+PIL	Hottest	Caller

EXAMPLE 7 Determining the Average PIL (processor interrupt level) for a CPU
(Continued)

```
-----
13641  92%  92%  1.00      253  cpu[3]          (usermode)
    579   4%  96%  1.00      325  cpu[3]+6       ip_ocsum+0xe8
    375   3%  99%  1.00      411  cpu[3]+10      splx
    154   1% 100%  1.00      527  cpu[3]+4       fas_intr_svc+0x80
    41    0% 100%  1.00      293  cpu[3]+13      send_mondo+0x18
    1     0% 100%  1.00      266  cpu[3]+12      zsa_rxint+0x400
-----
```

FILES /dev/lockstat Lockstat driver

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu (32-bit)
	SUNWcsxu (64-bit)

SEE ALSO attributes(5), lockstat(7D), mutex(9F), rwlock(9F)

NOTES The profiling support provided by lockstat -I replaces the old (and undocumented) /usr/bin/kgmon and /dev/profile.

Tail-call elimination may affect call sites. For example, if `foo()` +0x50 calls `bar()` and the last thing `bar()` does is call `mutex_exit()`, the compiler may arrange for `bar()` to branch to `mutex_exit()` with a return address of `foo()` +0x58. Thus, the `mutex_exit()` in `bar()` will appear as though it occurred at `foo()` +0x58.

The PC in the stack frame in which an interrupt occurs may be bogus because, between function calls, the compiler is free to use the return address register for local storage.

When using the -I and -s options together, the interrupted PC will usually not appear anywhere in the stack since the interrupt handler is entered asynchronously, not by a function call from that PC.

The lockstat technology is provided on an as-is basis. The format and content of lockstat output reflect the current Solaris kernel implementation and are therefore subject to change in future releases.

lofiadm(1M)

NAME	lofiadm – administer files available as block devices through lofi
SYNOPSIS	<pre> /usr/sbin/lofiadm -a file [device] /usr/sbin/lofiadm -d file device /usr/sbin/lofiadm [file device] </pre>
DESCRIPTION	lofiadm administers lofi(7D), the loopback file driver. lofi(7D) allows a file to be associated with a block device. That file can then be accessed through the block device. This is useful when the file contains an image of some filesystem (such as a floppy or CD-ROM image), because the block device can then be used with the normal system utilities for mounting, checking or repairing filesystems. See fsck(1M) and mount(1M). Use lofiadm to add a file as a loopback device, remove such an association, or print information about the current associations.
OPTIONS	The following options are supported: <i>-a file [device]</i> Add <i>file</i> as a block device. If <i>device</i> is not specified, an available device is picked. If <i>device</i> is specified, lofiadm attempts to assign it to <i>file</i>. <i>device</i> must be available or lofiadm will fail. The ability to specify a device is provided for use in scripts that wish to re-establish a particular set of associations. <i>-d file device</i> Remove an association by <i>file</i> or <i>device</i> name, if the associated block device is not busy, and deallocates the block device.
OPERANDS	The following operands are supported: <i>file</i> Print the block device associated with <i>file</i>. <i>device</i> Print the file name associated with the block device <i>device</i>. Without arguments, print a list of the current associations. Filenames must be valid absolute pathnames. When a file is added, it is opened for reading or writing by root. Any restrictions apply (such as restricted root access over NFS). The file is held open until the association is removed. It is not actually accessed until the block device is used, so it will never be written to if the block device is only opened read-only.
EXAMPLES	EXAMPLE 1 Mounting an Existing CD-ROM Image You should ensure that Solaris understands the image before creating the CD. lofi allows you to mount the image and see if it works.

EXAMPLE 1 Mounting an Existing CD-ROM Image (Continued)

This example mounts an existing CD-ROM image (`sparc.iso`), of the Red Hat 6.0 CD which was downloaded from the Internet. It was created with the `mkisofs` utility from the Internet.

Use `lofiadm` to attach a block device to it:

```
# lofiadm -a /home/mike_s/RH6.0/sparc.iso
/dev/lofi/1
```

`lofiadm` picks the device and prints the device name to the standard output. You can run `lofiadm` again by issuing the following command:

```
# lofiadm
Block Device      File
/dev/lofi/1      /home/mike_s/RH6.0/sparc.iso
```

Or, you can give it one name and ask for the other, by issuing the following command:

```
# lofiadm /dev/lofi/1
/home/mike_s/RH6.0/sparc.iso
```

Use the `mount` command to mount the image:

```
# mount -F hsfs -o ro /dev/lofi/1 /mnt
```

Check to ensure that Solaris understands the image:

```
# df -k /mnt
Filesystem      kbytes    used    avail capacity  Mounted on
/dev/lofi/1      512418  512418         0    100%    /mnt
# ls /mnt
./          RedHat/      doc/         ls-lR        rr_moved/
../         TRANS.TBL    dosutils/    ls-lR.gz     sbin@
.buildlog   bin@         etc@         misc/        tmp/
COPYING     boot/        images/      mnt/         usr@
README      boot.cat*    kernels/     modules/
RPM-PGP-KEY dev@         lib@         proc/
```

Solaris can mount the CD-ROM image, and understand the filenames. The image was created properly, and you can now create the CD-ROM with confidence.

As a final step, unmount and detach the images:

```
# umount /mnt
# lofiadm -d /dev/lofi/1
# lofiadm
Block Device      File
```

EXAMPLE 2 Mounting a Floppy Image

This is similar to Example 1.

EXAMPLE 2 Mounting a Floppy Image *(Continued)*

Using `lofi` to help you mount files that contain floppy images is helpful if a floppy disk contains a file that you need, but the machine which you're on doesn't have a floppy drive. It is also helpful if you don't want to take the time to use the `dd` command to copy the image to a floppy.

This is an example of getting to MDB floppy for Solaris x86:

```
# lofiadm -a /export/s28/MDB_s28x_wos/latest/boot.3
/dev/lofi/1
# mount -F pcfs /dev/lofi/1 /mnt
# ls /mnt
./          COMMENT.BAT* RC.D/      SOLARIS.MAP*
../         IDENT*      REPLACE.BAT* X/
APPEND.BAT* MAKEDIR.BAT* SOLARIS/
# umount /mnt
# lofiadm -d /export/s28/MDB_s28x_wos/latest/boot.3
```

EXAMPLE 3 Making a UFS Filesystem on a File

Making a UFS filesystem on a file can be useful, particularly if a test suite requires a scratch filesystem. It can be painful (or annoying) to have to re-partition a disk just for the test suite, but you don't have to. You can `newfs` a file with `lofi`

Create the file:

```
# mkfile 35m /export/home/test
```

Attach it to a block device. You also get the character device that `newfs` requires, so `newfs` that:

```
# lofiadm -a /export/home/test
/dev/lofi/1
# newfs /dev/rlofi/1
newfs: construct a new file system /dev/rlofi/1: (y/n)? y
/dev/rlofi/1: 71638 sectors in 119 cylinders of 1 tracks, 602 sectors
          35.0MB in 8 cyl groups (16 c/g, 4.70MB/g, 2240 i/g)
super-block backups (for fsck -F ufs -o b=#) at:
   32, 9664, 19296, 28928, 38560, 48192, 57824, 67456,
```

Note that `ufs` might not be able to use the entire file. Mount and use the filesystem:

```
# mount /dev/lofi/1 /mnt
# df -k /mnt
Filesystem          kbytes    used   avail capacity  Mounted on
/dev/lofi/1          33455      9    30101      1%    /mnt
# ls /mnt
./          ../          lost+found/
# umount /mnt
# lofiadm -d /dev/lofi/1
```

EXAMPLE 4 Creating a PC (FAT) File System on a Unix File

The following series of commands creates a FAT file system on a Unix file. The file is associated with a block device created by `lofiadm`.

```
# mkfile 10M /export/test/testfs
# lofiadm -a /export/test/testfs
/dev/lofi/1
Note use of rlofi, not lofi, in following command.
# mkfs -F pcfs -o nofdisk,size=20480 /dev/rlofi/1
Construct a new FAT file system on /dev/rlofi/1: (y/n)? y
# mount -F pcfs /dev/lofi/1 /mnt
# cd /mnt
# df -k .
Filesystem            kbytes    used   avail capacity  Mounted on
/dev/lofi/1            10142      0    10142      0%      /mnt
```

ENVIRONMENT VARIABLES See `environ(5)` for descriptions of the following environment variables that affect the execution of `lofiadm`: `LC_CTYPE`, `LC_MESSAGES` and `NLSPATH`.

EXIT STATUS The following exit values are returned:

0 Successful completion.
 >0 An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `fsck(1M)`, `mount(1M)`, `mount_ufs(1M)`, `attributes(5)`, `lofi(7D)`, `lofs(7FS)`

NOTES Just as you would not directly access a disk device that has mounted file systems, you should not access a file associated with a block device except through the `lofi` file driver. It might also be appropriate to ensure that the file has appropriate permissions to prevent such access.

Associations are not persistent across reboots. A script can be used to re-establish them if required.

The abilities of `lofiadm`, and who can use them, are controlled by the permissions of `/dev/lofictl`. Read-access allows query operations, such as listing all the associations. Write-access is required to do any state-changing operations, like adding an association. As shipped, `/dev/lofictl` is owned by `root`, in group `sys`, and mode `0644`, so all users can do query operations but only `root` can change anything. The administrator can give users write-access, allowing them to add or delete associations, but that is very likely a security hole and should probably only be given to a trusted group.

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When mounting a filesystem image, take care to use appropriate mount options. In particular, the `nosuid` mount option might be appropriate for UFS images whose origin is unknown. Also, some options might not be useful or appropriate, like `logging` or `forcedirectio` for UFS. For compatibility purposes, a raw device is also exported along with the block device. For example, `newfs(1M)` requires one.

The output of `lofiadm` (without arguments) might change in future releases.

NAME	logadm – manage endlessly growing log files				
SYNOPSIS	logadm logadm [-options] logname...				
DESCRIPTION	logadm is a general log rotation tool that is suitable for running from cron(1M). Without arguments, logadm reads the <code>/etc/logadm.conf</code> file, and for every entry found in that file checks the corresponding log file to see if it should be rotated. Typically this check is done each morning by an entry in the root's crontab. If the <i>logname</i> argument is specified, logadm renames the corresponding log file by adding a suffix so that the most recent log file ends with <code>.0</code> (that is, <i>logfile.0</i>), the next most recent ends with <code>.1</code> (that is, <i>logfile.1</i>), and so forth. By default, ten versions of old log files are kept (that is, <i>logfile.0</i> through <i>logfile.9</i>) and logadm automatically deletes the oldest version when appropriate to keep the count of files at ten. logadm takes a number of <i>options</i>. You can specify these options on the command line or in the <code>/etc/logadm.conf</code> file. The logadm command searches <code>/etc/logadm.conf</code> for lines of the form <i>logname options</i> <table> <tr> <td><i>logname</i></td><td>Identifies the name of the entry in <code>/etc/logadm.conf</code>, but if no log file name is given in that entry it is assumed that the logname is the same as the actual log file name.</td></tr> <tr> <td><i>options</i></td><td> Identifies command line options exactly as they would be entered on the command line. This allows commonly used log rotation policies to be stored in the <code>/etc/logadm.conf</code> file. See EXAMPLES. If <i>options</i> are specified both in <code>/etc/logadm.conf</code> and on the command line, those in the <code>/etc/logadm.conf</code> file are applied first. Therefore, the command line options override those in <code>/etc/logadm.conf</code>. Log file names specified in <code>/etc/logadm.conf</code> may contain filename substitution characters such as <code>*</code> and <code>?</code> that are supported by <code>csh(1)</code>. </td></tr> </table> Two options control when a log file is rotated. They are: <code>-s size</code> <code>-p period</code>. When using more than one of these options at a time, there is an implied <i>and</i> between them. This means that all conditions must be met before the log is rotated. If neither of these two options are specified, the default conditions for rotating a log file are: <code>-s 1b</code> <code>-p 1w</code>, which means the log file is only rotated if the size is non-zero and if at least 1 week has passed since the last time it was rotated.	<i>logname</i>	Identifies the name of the entry in <code>/etc/logadm.conf</code> , but if no log file name is given in that entry it is assumed that the logname is the same as the actual log file name.	<i>options</i>	Identifies command line options exactly as they would be entered on the command line. This allows commonly used log rotation policies to be stored in the <code>/etc/logadm.conf</code> file. See EXAMPLES. If <i>options</i> are specified both in <code>/etc/logadm.conf</code> and on the command line, those in the <code>/etc/logadm.conf</code> file are applied first. Therefore, the command line options override those in <code>/etc/logadm.conf</code>. Log file names specified in <code>/etc/logadm.conf</code> may contain filename substitution characters such as <code>*</code> and <code>?</code> that are supported by <code>csh(1)</code>.
<i>logname</i>	Identifies the name of the entry in <code>/etc/logadm.conf</code> , but if no log file name is given in that entry it is assumed that the logname is the same as the actual log file name.				
<i>options</i>	Identifies command line options exactly as they would be entered on the command line. This allows commonly used log rotation policies to be stored in the <code>/etc/logadm.conf</code> file. See EXAMPLES. If <i>options</i> are specified both in <code>/etc/logadm.conf</code> and on the command line, those in the <code>/etc/logadm.conf</code> file are applied first. Therefore, the command line options override those in <code>/etc/logadm.conf</code>. Log file names specified in <code>/etc/logadm.conf</code> may contain filename substitution characters such as <code>*</code> and <code>?</code> that are supported by <code>csh(1)</code>.				

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By specifying `-p never` as a rotation condition, any other rotation conditions are ignored and `logadm` moves on to the expiration of old log files. By specifying `-p now` as a rotation condition, a log rotation is forced.

Unless specified by the `-o`, `-g`, or `-m` options, `logadm` replaces the log file (after renaming it) by creating an empty file whose owner, group ID, and permissions match the original file.

Three options control when old log files are expired: `-A age` `-C count` `-S size`. These options expire the oldest log files until a particular condition or conditions are met. For example, the combination `-C 5` and the `-S 10m` options expires old log files until there are no more than 5 of the *and* their combined disk usage is no more than 10 megabytes. If none of these options are specified, the default expiration is `-C 10` which keeps ten old log files. If no files are to be expired, use `-C 0` to prevent expiration by default.

OPTIONS

The following options are supported:

<code>-a <i>post_command</i></code>	Execute the <i>post_command</i> after renaming the log file. <i>post_command</i> is passed to <code>sh -c</code> . Specify <i>post_command</i> as a valid shell command. Use quotes to protect spaces or shell metacharacters in <i>post_command</i> . This option can be used to restart a daemon that is writing to the file. When rotating multiple logs with one <code>logadm</code> command, <i>post_command</i> is executed only once after all the logs are rotated, not once per rotated log.
<code>-A <i>age</i></code>	Delete any versions that have not been modified for the amount of time specified by <i>age</i> . Specify <i>age</i> as a number followed by an <code>h</code> (hours), <code>d</code> (days), <code>w</code> (weeks), <code>m</code> (months), or <code>y</code> (years).
<code>-b <i>pre_command</i></code>	Execute <i>pre_command</i> before renaming the log file. <i>pre_command</i> is passed to <code>sh -c</code> . Specify <i>pre_command</i> as a valid shell command. Use quotes to protect spaces or shell metacharacters in the <i>pre_command</i> . This option can be used to stop a daemon that is writing to the file. When rotating multiple logs with one <code>logadm</code> command, <i>pre_command</i> is executed only once before all the logs are rotated, not once per rotated log.
<code>-c</code>	Rotate the log file by copying it and truncating the original logfile to zero length, rather than renaming the file.
<code>-C <i>count</i></code>	Delete the oldest versions until there are not more than <i>count</i> files left.

	If no expire options (<code>-A</code>, <code>-C</code>, or <code>-S</code>) are specified, <code>-C 10</code> is the default. To prevent the default expire rule from being added automatically, specify <code>-C 0</code>.
<code>-e mail_addr</code>	Send error messages by email to <i>mail_addr</i>. As <code>logadm</code> is typically run from <code>cron(1M)</code>, error messages are captured by <code>cron</code> and mailed to the owner of the <code>crontab</code>. This option is useful you want the mail regarding error messages to go to another address instead. If no errors are encountered, no mail message is generated.
<code>-E cmd</code>	Execute <i>cmd</i> to expire the file, rather than deleting the old log file to expire it. <i>cmd</i> is passed it to <code>sh -c</code>. The file is considered expired after <i>cmd</i> completes. If the old log file is not removed or renamed by the <i>cmd</i>, <code>logadm</code> considers it for expiration the next time that it runs on the specified log file. If present, the keyword <code>\$file</code> is expanded in the specified <i>cmd</i> to the name of the file being expired. This option is useful for tasks such as mailing old log files to administrators, or copying old log files to long term storage.
<code>-f conf_file</code>	Use <i>conf_file</i> instead of <code>/etc/logadm.conf</code>. This option allows non-root users to keep their own <code>logadm</code> configuration files.
<code>-g group</code>	Create a new empty file with the ID specified by <i>group</i>, instead of preserving the group ID of the log file. Specify <i>group</i> by name or by numeric group ID, as accepted by <code>chgrp(1)</code>. This option requires the ability to change file group ownership using the <code>chgrp(1)</code> command.
<code>-h</code>	Print a help message that describes <code>logadm</code>'s options.
<code>-m mode</code>	Create a new empty file with the mode specified by <i>mode</i>, instead of preserving the mode of the log file. Specify <i>mode</i> in any form that is accepted by the <code>chmod(1)</code> command.
<code>-n</code>	Print the actions that the <code>logadm</code> command will perform without actually performing them.

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	This option is useful for checking arguments before making any changes to the system. It is important to remember, however, that since log rotating actions are only printed with this option, <code>logadm</code> might not find files that need expiring, but if run without the <code>-n</code> <code>logadm</code> might create a file that needs expiring by performing the log rotating actions. Therefore, if you see no files being expired with the <code>-n</code> option, files still might be expired without it.
<code>-N</code>	Prevent an error message if the specified logfile does not exist. Normally, <code>logadm</code> produces an error message if the log file is not found. With <code>-N</code>, if the log file doesn't exist <code>logadm</code> moves on to the expire rules (if any) and then to the next log file (if any), without creating the empty replacement log file.
<code>-o owner</code>	Create the new empty file with <i>owner</i>, instead of preserving the owner of the log file. Specify <i>owner</i> in any form that is accepted by the <code>chown(1)</code> command.
<code>-p period</code>	Rotate a log file after the specified time period (<i>period</i>) . Specify <i>period</i> as a number followed by <code>d</code> for days, <code>w</code> for weeks, <code>m</code> for months (really 30 days) or <code>y</code> for years. There are also two special values for period: <code>now</code> and <code>never</code>. <code>-p now</code> forces log rotation. <code>-p never</code> forces no log rotation.
<code>-P timestamp</code>	Used by <code>logadm</code> to record the last time the log was rotated in <code>/etc/logadm.conf</code>. This option uses <i>timestamp</i> to determine if the log rotation period has passed. The format of <i>timestamp</i> matches the format generated by <code>ctime(3C)</code>, with quotes around it to protect embedded spaces.
<code>-r</code>	Remove any entries corresponding to the specified <i>logname</i> from the <code>/etc/logadm.conf</code>.
<code>-R cmd</code>	Run the <i>cmd</i> when an old log file is created by a log rotation. If the keyword <code>\$file</code> is embedded in the specified command, it is expanded to the name of the old log file just created by log rotation. This option is useful for processing log file contents after rotating the log. <i>cmd</i> is executed by passing it to <code>sh -c</code>. When rotating multiple logs with one <code>logadm</code> command, the command supplied with <code>-R</code> is executed once every time a log is rotated. This is useful for post-processing a log file (that is, sorting it, removing uninteresting lines, etc.). The <code>-a</code> option is a better choice for restarting daemons after log rotation.

-s <i>size</i>	Rotate the log file only if its size is greater than or equal to <i>size</i>. Specify <i>size</i> as a number followed by the letter b for bytes, k for kilobytes, m for megabytes, or g for gigabytes.																								
-S <i>size</i>	Delete the oldest versions until the total disk space used by the old log files is less than the specified size. Specify <i>size</i> as a number followed by the letter b for bytes, k for kilobytes, m for megabytes, or g for gigabytes.																								
-t <i>template</i>	Specify the template to use when renaming log files. <i>template</i> can be a simple name, such as <code>/var/adm/oldfile</code>, or it can contain special keywords which are expanded by <code>logadm</code> and are in the form <i>\$word</i>. Allowed sequences are: <table> <tr> <td><i>\$file</i></td><td>The full path name of the file to be rotated</td></tr> <tr> <td><i>\$dirname</i></td><td>The directory of the file to be rotated</td></tr> <tr> <td><i>\$basename</i></td><td>The log file name, without the directory name</td></tr> <tr> <td><i>\$n</i></td><td>The version number, 0 is most recent, 1 is next most recent, and so forth</td></tr> <tr> <td><i>\$N</i></td><td>The same as <i>\$n</i>, but starts at 1 instead of zero</td></tr> <tr> <td><i>\$secs</i></td><td>The number of seconds since 00:00:00 UTC, January 1, 1970</td></tr> <tr> <td><i>\$nodename</i></td><td>Expands to the output of <code>uname -n</code></td></tr> <tr> <td><i>\$platform</i></td><td>Expands to the output of <code>uname -i</code></td></tr> <tr> <td><i>\$isa</i></td><td>Expands to the output of <code>uname -p</code></td></tr> <tr> <td><i>\$release</i></td><td>Expands to the output of <code>uname -r</code></td></tr> <tr> <td><i>\$machine</i></td><td>Expands to the output of <code>uname -m</code></td></tr> <tr> <td><i>\$domain</i></td><td>Expands to the output of <code>domainname</code></td></tr> </table> To actually have the dollar sign character in the file name, use <code>\$\$</code>. Any percent sequences allowed by <code>strftime(3C)</code> are also allowed, for example, <code>%d</code> expands to the day of the month. To actually have a percent sign character in the file name, use <code>%%</code>.	<i>\$file</i>	The full path name of the file to be rotated	<i>\$dirname</i>	The directory of the file to be rotated	<i>\$basename</i>	The log file name, without the directory name	<i>\$n</i>	The version number, 0 is most recent, 1 is next most recent, and so forth	<i>\$N</i>	The same as <i>\$n</i> , but starts at 1 instead of zero	<i>\$secs</i>	The number of seconds since 00:00:00 UTC, January 1, 1970	<i>\$nodename</i>	Expands to the output of <code>uname -n</code>	<i>\$platform</i>	Expands to the output of <code>uname -i</code>	<i>\$isa</i>	Expands to the output of <code>uname -p</code>	<i>\$release</i>	Expands to the output of <code>uname -r</code>	<i>\$machine</i>	Expands to the output of <code>uname -m</code>	<i>\$domain</i>	Expands to the output of <code>domainname</code>
<i>\$file</i>	The full path name of the file to be rotated																								
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<i>\$machine</i>	Expands to the output of <code>uname -m</code>																								
<i>\$domain</i>	Expands to the output of <code>domainname</code>																								

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	Both dollar-sign keywords and percent sequences can appear anywhere in the template. If the template results in a pathname with non-existent directories, they are created as necessary when rotating the log file. If no <code>-t</code> option is specified, the default template is <code>\$file.\$n</code>. Actual <i>rotation</i> of log files, where each version is shifted up until it expires is done using the <code>\$n</code> keyword. If the template does not contain the <code>\$n</code> keyword, the log file is simply renamed to the new name and then the expire rules, if any, are applied.
<code>-T pattern</code>	Normally <code>logadm</code> looks for a list of old log files by turning the template (specified with the <code>-t</code> option) into a pattern and finding existing files whose names match that pattern. The <code>-T</code> option causes the given pattern to be used instead. This option is useful if another program fiddles with the old log file names, like a <code>cron</code> job to compress them over time. The pattern is in the form of a pathname with special characters such as <code>*</code> and <code>?</code> as supported by <code>csh(1)</code> filename substitution.
<code>-v</code>	Print information about the actions being executed in verbose mode.
<code>-V</code>	Validate the configuration file. This option validates that an entry for the specified <i>logname</i> exists in the <code>/etc/logadm.conf</code> file and is syntactically correct. If <i>logname</i> is not specified, all entries in the configuration file are validated. If a <i>logname</i> argument is specified, the command validates the syntax of that entry. If the entry is found, it is printed and the exit value of the command is true. Otherwise the exit value is false.
<code>-w entryname</code>	Write an entry into the config file (that is, <code>/etc/logadm.conf</code>) which corresponds to the current command line arguments. If an entry already existed for the specified <i>entryname</i>, it is removed first. This is the preferred method for updating <code>/etc/logadm.conf</code> since using it prevents syntax errors in that file. The <i>entryname</i> is the name of the entry in <code>/etc/logadm.conf</code>, and that name can be used as the "<i>logname</i>" argument to future calls to <code>logadm</code> to take advantage of that entry. The <i>entryname</i> can be chosen to be something that is easy to specify, or it can be the actual log file name. If no log file name is provided on the command line, the entry name is assumed to be the same as the log file name. For example, the following two lines achieve the same thing, keeping two copies of rotated log files, but the first example names the entry something easier to enter on the command line:

	<pre>example% logadm -C2 -w mylog /my/really/long/log/file/name example% logadm -C2 -w /my/really/long/log/file/name</pre>
-z <i>count</i>	Compress old log files as they are created. <i>count</i> of the most recent log files are left uncompressed, therefore making the <i>count</i> most recent files easier to peruse. Use <i>count</i> of zero to compress all old logs. The compression is done with <code>gzip(1)</code> and the resulting log file has the suffix of <code>.gz</code>.
OPERANDS	The following operands are supported: <i>logname</i> Identifies the name of the entry in <code>/etc/logadm.conf</code>. If the log file name is specified in the <i>logname</i> field, it is assumed that <i>logname</i> is the same as the actual log file name.
EXAMPLES	EXAMPLE 1 Rotating a File and Keeping Previous Versions The following example rotates the <code>/var/adm/exacct/proc</code> file, keeping ten previous versions in <code>/var/adm/exacct/proc.0</code> through <code>/var/adm/exacct/proc.9</code>. Tell <code>logadm</code> to copy the file and truncate it. <pre>example% logadm -c /var/adm/exacct/proc</pre> EXAMPLE 2 Rotating syslog The following example rotates <code>syslog</code> and keeps eight log files. Old log files are put in the directory <code>/var/oldlogs</code> instead of <code>/var/log</code>: <pre>example% logadm -C8 -t'/var/oldlogs/syslog.\$n' /var/log/syslog</pre> EXAMPLE 3 Rotating <code>/var/adm/sulog</code> and Expiring Based on Age The following entry in the <code>/etc/logadm.conf</code> file rotates the <code>/var/adm/sulog</code> file and expires any copies older than 30 days. <pre>/var/adm/sulog -A 30d</pre> EXAMPLE 4 Rotating Files and Expiring Based on Disk Usage The following entry in the <code>/etc/logadm.conf</code> file rotates the <code>/var/adm/sulog</code> file and expires old log files when more than 100 megabytes are used by the sum of all the rotated log files. <pre>/var/adm/sulog -S 100m</pre>

EXAMPLE 5 Creating an Entry that Stores the Logfile Name

This example creates an entry storing the log file name and the fact that we want to keep 20 copies in `/etc/logadm.conf`, but the `-p never` means the entry is ignored by the normal `logadm` run from root's crontab every morning.

```
example% logadm -w locallog /usr/local/logfile -C20 -p never
```

Use the following entry on the command line to override the `-p never` option:

```
example% logadm -p now locallog
```

EXAMPLE 6 Rotating the apache Error and Access Logs

The following example rotates the apache error and access logs monthly to filenames based on current year and month. It keeps the 24 most recent copies and tells apache to restart after renaming the logs.

This command is run once, and since the `-w` option is specified, an entry is made in `/etc/logadm.conf` so the apache logs are rotated from now on.

```
example% logadm -w apache -p 1m -C 24 \
    -t '/var/apache/old-logs/$basename.%Y-%m' \
    -a '/usr/apache/bin/apachectl graceful' \
    '/var/apache/logs/*{access,error}_log'
```

This example also illustrates that the entry name supplied with the `-w` option doesn't have to match the log file name. In this example, the entry name is `apache` and once the line has been run, the entry in `/etc/logadm.conf` can be forced to run by executing the following command:

```
example% logadm -p now apache
```

Because the expression matching the apache log file names was enclosed in quotes, the expression is stored in `/etc/logadm.conf`, rather than the list of files that it expands to. This means that each time `logadm` runs from `cron` it expands that expression and checks all the log files in the resulting list to see if they need rotating.

The following command is an example without the quotes around the log name expression. The shell expands the last argument into a list of log files that exist at the time the command is entered, and writes an entry to `/etc/logadm.conf` that rotates the files.

```
example% logadm -w apache /var/apache/logs/*_log
```

FILES	<code>/etc/logadm.conf</code>	configuration file for <code>logadm</code> command

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `chgrp(1)`, `chmod(1)`, `chown(1)`, `cs(1)`, `gzip(1)`, `cron(1M)`, `ctime(3C)`, `strftime(3C)`, `logadm.conf(4)`, `attributes(5)`

NOTES When `logadm` applies expire conditions (supplied by the `-A`, `-C`, and `-S` options), it deletes files, the oldest first, until the conditions are satisfied. If the template used for naming the old logs contained `$n` or `$N`, `logadm` picks the highest value of `$n` or `$N` found in the old log file names first. If the template used is something else, `logadm` uses the modification time to determine which files to expire first. This may not be the expected behavior if an old log file has been modified since it was rotated.

logins(1M)

NAME	logins – list user and system login information
SYNOPSIS	/usr/bin/logins [-admopstux] [-g <i>group...</i>] [-l <i>login_name...</i>]
DESCRIPTION	This command displays information on user and system logins known to the system. Contents of the output is controlled by the command options and can include the following: user or system login, user id number, passwd account field value (user name or other information), primary group name, primary group id, multiple group names, multiple group ids, home directory, login shell, and four password aging parameters. The default information is the following: login id, user id, primary group name, primary group id and the account field value. Output is sorted by user id, system logins, followed by user logins.
OPTIONS	Options may be used together. If so, any login that matches any criteria are displayed. The following options are supported: -a Add two password expiration fields to the display. The fields show how many days a password can remain unused before it automatically becomes inactive, and the date that the password expires. -d Selects logins with duplicate uids. -g <i>group</i> Selects all users belonging to <i>group</i>, sorted by login. Multiple groups can be specified as a comma-separated list. When the -l and -g options are combined, a user is only listed once, even if the user belongs to more than one of the selected groups. -l <i>login_name...</i> Selects the requested login. Multiple logins can be specified as a comma-separated list. Depending on the nameservice lookup types set in <i>/etc/nsswitch.conf</i>, the information can come from the <i>/etc/passwd</i> and <i>/etc/shadow</i> files and other nameservices. When the -l and -g options are combined, a user is only listed once, even if the user belongs to more than one of the selected groups. -m Displays multiple group membership information. -o Formats output into one line of colon-separated fields. -p Selects logins with no passwords. -s Selects all system logins. -t Sorts output by login instead of by uid. -u Selects all user logins. -x Prints an extended set of information about each selected user. The extended information includes home directory, login shell and password aging information, each displayed on a separate line. The password information consists of password status (PS for password, NP for no password or LK for locked). If the login is

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passworded, status is followed by the date the password was last changed, the number of days required between changes, and the number of days allowed before a change is required. The password aging information shows the time interval that the user receives a password expiration warning message (when logging on) before the password expires.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO attributes(5)

lpadmin(1M)

NAME	lpadmin – configure the LP print service
SYNOPSIS	lpadmin -p <i>printer options</i> lpadmin -x <i>dest</i> lpadmin -d [<i>dest</i>] lpadmin -S <i>print-wheel</i> -A <i>alert-type</i> [-W <i>minutes</i>] [-Q <i>requests</i>] lpadmin -M -f <i>form-name</i> [-a [-o <i>filebreak</i>] [-t <i>tray-number</i>]]
DESCRIPTION	lpadmin configures the LP print service by defining printers and devices. It is used to add and change printers, to remove printers from service, to set or change the system default destination, to define alerts for printer faults, and to mount print wheels.
OPTIONS	
Adding or Changing a Printer	The first form of the lpadmin command (lpadmin -p <i>printer options</i>) configures a new printer or changes the configuration of an existing printer. It also starts the print scheduler. When creating a new printer, one of three options (-v, -U, or -s) must be supplied. In addition, only one of the following may be supplied: -e, -i, or -m; if none of these three options is supplied, the model standard is used. The -h and -l options are mutually exclusive. Printer and class names may be no longer than 14 characters and must consist entirely of the characters A-Z, a-z, 0-9, dash (-) and underscore (_). If -s is specified, the following options are invalid: -A, -e, -F, -h, -i, -l, -M, -m, -o, -U, -v, and -W. The following <i>printer options</i> may appear in any order. -A <i>alert-type</i> [-W <i>minutes</i>] The -A option is used to define an alert that informs the administrator when a printer fault is detected, and periodically thereafter, until the printer fault is cleared by the administrator. The <i>alert-types</i> are: mail Send the alert message using mail (see mail(1)) to the administrator. write Write the message to the terminal on which the administrator is logged in. If the administrator is logged in on several terminals, one is chosen arbitrarily. quiet Do not send messages for the current condition. An administrator can use this option to temporarily stop receiving further messages about a known problem. Once the fault has been cleared and printing resumes, messages will again be sent when another fault occurs with the printer.

showfault

Attempt to execute a fault handler on each system that has a print job in the queue. The fault handler is `/etc/lp/alerts/printer`. It is invoked with three parameters: *printer_name*, *date*, *file_name*. The *file_name* is the name of a file containing the fault message.

none

Do not send messages; any existing alert definition for the printer will be removed. No alert will be sent when the printer faults until a different alert-type (except `quiet`) is used.

shell-command

Run the *shell-command* each time the alert needs to be sent. The shell command should expect the message in standard input. If there are blank spaces embedded in the command, enclose the command in quotes. Notice that the `mail` and `write` values for this option are equivalent to the values `mail user-name` and `write user-name` respectively, where *user-name* is the current name for the administrator. This will be the login name of the person submitting this command unless he or she has used the `su` command to change to another user ID. If the `su` command has been used to change the user ID, then the *user-name* for the new ID is used.

list

Display the type of the alert for the printer fault. No change is made to the alert.

The message sent appears as follows:

```
The printer printer has stopped printing for the reason given below.
Fix the problem and bring the printer back on line.
Printing has stopped, but will be restarted in a few minutes;
issue an enable command if you want to restart sooner.
```

Unless someone issues the change request:

```
lp -i request-id -P ...to change the page list to print, the current request will be
reprinted from the beginning. The reason(s) it stopped (multiple reasons indicate
reprinted attempts):reason
```

The LP print service can detect printer faults only through an adequate fast filter and only when the standard interface program or a suitable customized interface program is used. Furthermore, the level of recovery after a fault depends on the capabilities of the filter.

If the *printer* is `all`, the alerting defined in this command applies to all existing printers.

If the `-W` option is not used to arrange fault alerting for *printer*, the default procedure is to mail one message to the administrator of *printer* per fault. This is equivalent to specifying `-W once` or `-W 0`. If *minutes* is a number greater than zero, an alert will be sent at intervals specified by *minutes*.

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-c *class*

Insert *printer* into the specified *class*. *class* will be created if it does not already exist.

-D *comment*

Save this *comment* for display whenever a user asks for a full description of *printer* (see `lpstat(1)`). The LP print service does not interpret this comment.

-e *printer*

Copy the interface program of an existing *printer* to be the interface program for *printer*. (Options -i and -m may not be specified with this option.)

-f *allow:form-list*

-f *deny:form-list*

Allow or deny the forms in *form-list* to be printed on *printer*. By default no forms are allowed on a new printer.

For each printer, the LP print service keeps two lists of forms: an “allow-list” of forms that may be used with the printer, and a “deny-list” of forms that may not be used with the printer. With the -f *allow* option, the forms listed are added to the allow-list and removed from the deny-list. With the -f *deny* option, the forms listed are added to the deny-list and removed from the allow-list.

If the allow-list is not empty, only the forms in the list may be used on the printer, regardless of the contents of the deny-list. If the allow-list is empty, but the deny-list is not, the forms in the deny-list may not be used with the printer. All forms can be excluded from a printer by specifying -f *deny:all*. All forms can be used on a printer (provided the printer can handle all the characteristics of each form) by specifying -f *allow:all*.

The LP print service uses this information as a set of guidelines for determining where a form can be mounted. Administrators, however, are not restricted from mounting a form on any printer. If mounting a form on a particular printer is in disagreement with the information in the allow-list or deny-list, the administrator is warned but the mount is accepted. Nonetheless, if a user attempts to issue a print or change request for a form and printer combination that is in disagreement with the information, the request is accepted only if the form is currently mounted on the printer. If the form is later unmounted before the request can print, the request is canceled and the user is notified by mail.

If the administrator tries to specify a form as acceptable for use on a printer that doesn't have the capabilities needed by the form, the command is rejected.

Notice the other use of -f, with the -M option, below.

The -T option must be invoked first with `lpadmin` to identify the printer type before the -f option can be used.

-F *fault-recovery*

This option specifies the recovery to be used for any print request that is stopped because of a printer fault, according to the value of *fault-recovery*.

<code>continue</code>	Continue printing on the top of the page where printing stopped. This requires a filter to wait for the fault to clear before automatically continuing.
<code>beginning</code>	Start printing the request again from the beginning.
<code>wait</code>	Disable printing on <i>printer</i> and wait for the administrator or a user to enable printing again.

During the wait, the administrator or the user who submitted the stopped print request can issue a change request that specifies where printing should resume. (See the `-i` option of the `lp` command.) If no change request is made before printing is enabled, printing resumes at the top of the page where stopped, if the filter allows; otherwise, the request is printed from the beginning.

`-h`

Indicate that the device associated with the printer is hardwired. If neither of the mutually exclusive options, `-h` and `-l`, is specified, `-h` is assumed.

`-i interface`

Establish a new interface program for *printer*. *interface* is the pathname of the new program. (The `-e` and `-m` options may not be specified with this option.)

`-I content-type-list`

Allow *printer* to handle print requests with the content types listed in a *content-type-list*. If the list includes names of more than one type, the names must be separated by commas or blank spaces. (If they are separated by blank spaces, the entire list must be enclosed in double quotes.)

The type `simple` is recognized as the default content type for files in the UNIX system. A `simple` type of file is a data stream containing only printable ASCII characters and the following control characters:

Control Char	Octal Value	Meaning
BACKSPACE	10	Move back one char, except at beginning of line
TAB	11	Move to next tab stop
LINEFEED (newline)	12	Move to beginning of next line
FORMFEED	14	Move to beginning of next page
RETURN	15	Move to beginning of

Control Char	Octal Value	Meaning
		current line
To prevent the print service from considering <code>simple</code> a valid type for the printer, specify either an explicit value (such as the printer type) in the <i>content-type-list</i>, or an empty list. If you do want <code>simple</code> included along with other types, you must include <code>simple</code> in the <i>content-type-list</i>. In addition to content types defined by the print administrator, the type <code>PostScript</code> is recognized and supported by the Solaris print subsystem. This includes filters to support <code>PostScript</code> as the printer content type. The type <code>any</code> is recognized as a special content type for files. When declared as the input type for a printer, it signals the print sub-system not to do any filtering on the file before sending it to the printer. Except for <code>simple</code> and <code>any</code>, each <i>content-type</i> name is freely determined by the administrator. If the printer type is specified by the <code>-T</code> option, then the printer type is implicitly considered to be also a valid content type.		
<code>-l</code>		Indicate that the device associated with <i>printer</i> is a login terminal. The LP scheduler (<code>lpsched</code>) disables all login terminals automatically each time it is started. (The <code>-h</code> option may not be specified with this option.)
<code>-m model</code>		Select <i>model</i> interface program, provided with the LP print service, for the printer. (Options <code>-e</code> and <code>-i</code> may not be specified with this option.)
<code>-M -f form-name [-a [-o filebreak]] [-t tray-number]</code>		Mount the form <i>form-name</i> on <i>printer</i> . Print requests that need the pre-printed form <i>form-name</i> will be printed on <i>printer</i> . If more than one printer has the form mounted and the user has specified any (with the <code>-d</code> option of the <code>lp</code> command) as the printer destination, then the print request will be printed on the one printer that also meets the other needs of the request.
		The page length and width, and character and line pitches needed by the form are compared with those allowed for the printer, by checking the capabilities in the <code>terminfo</code> database for the type of printer. If the form requires attributes that are not available with the printer, the administrator is warned but the mount is accepted. If the form lists a print wheel as mandatory, but the print wheel mounted on the printer is different, the administrator is also warned but the mount is accepted.
		If the <code>-a</code> option is given, an alignment pattern is printed, preceded by the same initialization of the physical printer that precedes a normal print request, with one exception: no banner page is printed. Printing is assumed to start at the top of the first page of the form. After the pattern is printed, the administrator can adjust the

mounted form in the printer and press return for another alignment pattern (no initialization this time), and can continue printing as many alignment patterns as desired. The administrator can quit the printing of alignment patterns by typing `q`.

If the `-o filebreak` option is given, a formfeed is inserted between each copy of the alignment pattern. By default, the alignment pattern is assumed to correctly fill a form, so no formfeed is added.

If the `-t tray-number` option is specified, printer tray *tray-number* will be used.

A form is “unmounted” either by mounting a new form in its place or by using the `-f none` option. By default, a new printer has no form mounted.

Notice the other use of `-f` without the `-M` option above.

`-M -S print-wheel`

Mount the *print-wheel* on *printer*. Print requests that need the *print-wheel* will be printed on *printer*. If more than one printer has *print-wheel* mounted and the user has specified any (with the `-d` option of the `lp` command) as the printer destination, then the print request will be printed on the one printer that also meets the other needs of the request.

If the *print-wheel* is not listed as acceptable for the printer, the administrator is warned but the mount is accepted. If the printer does not take print wheels, the command is rejected.

A print wheel is “unmounted” either by mounting a new print wheel in its place or by using the option `-S none`. By default, a new printer has no print wheel mounted.

Notice the other uses of the `-S` option without the `-M` option described below.

`-o option`

The `-o` option defines default printer configuration values given to an interface program. The default may be explicitly overwritten for individual requests by the user (see `lp(1)`), or taken from a preprinted form description (see `lpforms(1M)` and `lp(1)`).

There are several options which are pre-defined by the system. In addition, any number of key-value pairs may be defined. Each of the predefined and undefined options are described.

The Predefined Options

The following options are predefined: adjusting printer capabilities, adjusting printer port characteristics, configuring network printers, and controlling the use of banner.

Adjusting Printer Capabilities

`length=scaled-decimal-number`
`width=scaled-decimal-number`

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```
cpi=scaled-decimal-number  
lpi=scaled-decimal-number
```

The term *scaled-decimal-number* refers to a non-negative number used to indicate a unit of size. The type of unit is shown by a “trailing” letter attached to the number. Three types of *scaled-decimal-numbers* can be used with the LP print service: numbers that show sizes in centimeters (marked with a trailing *c*); numbers that show sizes in inches (marked with a trailing *i*); and numbers that show sizes in units appropriate to use (without a trailing letter), that is, lines, characters, lines per inch, or characters per inch.

The option values must agree with the capabilities of the type of physical printer, as defined in the terminfo database for the printer type. If they do not, the command is rejected.

The defaults are defined in the terminfo entry for the specified printer type. The defaults may be reset by:

```
lpadmin -p printername -o length=  
lpadmin -p printername -o width=  
lpadmin -p printername -o cpi=  
lpadmin -p printername -o lpi=
```

Adjusting Printer Port Characteristics

```
stty='stty-option-list' "
```

The *stty-option-list* is not checked for allowed values, but is passed directly to the stty program by the standard interface program. Any error messages produced by stty when a request is processed (by the standard interface program) are mailed to the user submitting the request.

The default for stty is:

```
stty='9600 cs8 -cstopb -parenb ixon  
-ixany opost -olcuc onlcr  
-ocrnl -onocr  
-onlret -ofill nl0 cr0 tab0 bs0 vt0 ff0'
```

The default may be reset by:

```
lpadmin -p printername -o stty=
```

Configuring Network Printers

```
dest=string protocol=string bsdctrl=string \  
timeout=non-negative-integer-seconds
```

These four options are provided to support network printing. Each option is passed directly to the interface program; any checking for allowed values is done there.

The value of *dest* is the name of the destination for the network printer; the semantics for value *dest* are dependent on the printer and the configuration. There is no default.

The value of option `protocol` sets the over-the-wire protocol to the printer. The default for option `protocol` is `bsd`. The value of option `bsdctrl` sets the print order of control and data files (BSD protocol only); the default for this option is control file first. The value of option `timeout` sets the seed value for backoff time when the printer is busy. The default value for the `timeout` option is 10 seconds. The defaults may be reset by:

```
lpadmin -p printername -o protocol=
lpadmin -p printername -o bsdctrl=
lpadmin -p printername -o timeout=
```

Controlling the Use of the Banner Page

Use the following commands to control the use of the banner page:

```
lpadmin -p printer -o nobanner
lpadmin -p printer -o banner
lpadmin -p printer -o banner=always
lpadmin -p printer -o banner=never
lpadmin -p printer -o banner=optional
```

The first and fifth commands (`-o nobanner` and `-o banner=optional`) are equivalent. The default is to print the banner page, unless a user specifies `-o nobanner` on an `lp` command line.

The second and third commands (`-o banner` and `-o banner=always`) are equivalent. Both cause a banner page to be printed always, even if a user specifies `-o nobanner`. The root user can override this command.

The fourth command (`-o banner=never`) causes a banner page never to be printed, even if a user specifies `lp -o banner`. The root user can override this command.

Undefined Options

key=value

Each *key=value* is passed directly to the interface program. Any checking for allowed values is done in the interface program.

Any default values for a given *key=value* option are defined in the interface program. If a default is provided, it may be reset by typing the key without any value:

```
lpadmin -p printername -o key=
```

`-P paper-name`

Specify a paper type list that the printer supports.

`-r class`

Remove *printer* from the specified *class*. If *printer* is the last member of *class*, then *class* will be removed.

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-S *list*

Allow either the print wheels or aliases for character sets named in *list* to be used on the printer.

If the printer is a type that takes print wheels, then *list* is a comma or space separated list of print wheel names. (Enclose the list with quotes if it contains blank spaces.) These will be the only print wheels considered mountable on the printer. (You can always force a different print wheel to be mounted.) Until the option is used to specify a list, no print wheels will be considered mountable on the printer, and print requests that ask for a particular print wheel with this printer will be rejected.

If the printer is a type that has selectable character sets, then *list* is a comma or blank separated list of character set name "mappings" or aliases. (Enclose the list with quotes if it contains blank spaces.) Each "mapping" is of the form *known-name=alias*. The *known-name* is a character set number preceded by *cs* (such as *cs3* for character set three) or a character set name from the *terminfo* database entry *csnm*. See *terminfo*(4). If this option is not used to specify a list, only the names already known from the *terminfo* database or numbers with a prefix of *cs* will be acceptable for the printer. If *list* is the word *none*, any existing print wheel lists or character set aliases will be removed.

Notice the other uses of the -S with the -M option described above.

The -T option must be invoked first with *lpadmin* to identify the printer type before the -S option can be used.

-s *system-name* [! *printer-name*]

Make a remote printer (one that must be accessed through another system) accessible to users on your system. *system-name* is the name of the remote system on which the remote printer is located it. *printer-name* is the name used on the remote system for that printer. For example, if you want to access *printer1* on *system1* and you want it called *printer2* on your system:

```
-p printer2 -s system1 !printer1
```

-T *printer-type-list*

Identify the printer as being of one or more *printer-types*. Each *printer-type* is used to extract data from the *terminfo* database; this information is used to initialize the printer before printing each user's request. Some filters may also use a *printer-type* to convert content for the printer. If this option is not used, the default *printer-type* will be unknown; no information will be extracted from *terminfo* so each user request will be printed without first initializing the printer. Also, this option must be used if the following are to work: -o *cpi*, -o *lpi*, -o *width*, and -o *length* options of the *lpadmin* and *lp* commands, and the -S and -f options of the *lpadmin* command.

If the *printer-type-list* contains more than one type, then the *content-type-list* of the `-I` option must either be specified as `simple`, as empty (`-I ""`), or not specified at all.

`-t number-of-trays`

Specify the number of trays when creating the printer.

`-u allow:login-ID-list`

`-u deny:login-ID-list`

Allow or deny the users in *login-ID-list* access to the printer. By default all users are allowed on a new printer. The *login-ID-list* argument may include any or all of the following constructs:

<i>login-ID</i>	a user on any system
<i>system-name</i> ! <i>login-ID</i>	a user on system <i>system-name</i>
<i>system-name</i> !all	all users on system <i>system-name</i>
all! <i>login-ID</i>	a user on all systems
all	all users on all systems

For each printer, the LP print service keeps two lists of users: an “allow-list” of people allowed to use the printer, and a “deny-list” of people denied access to the printer. With the `-u allow` option, the users listed are added to the allow-list and removed from the deny-list. With the `-u deny` option, the users listed are added to the deny-list and removed from the allow-list.

If the allow-list is not empty, only the users in the list may use the printer, regardless of the contents of the deny-list. If the allow-list is empty, but the deny-list is not, the users in the deny-list may not use the printer. All users can be denied access to the printer by specifying `-u deny:all`. All users may use the printer by specifying `-u allow:all`.

`-U dial-info`

The `-U` option allows your print service to access a remote printer. (It does not enable your print service to access a remote printer service.) Specifically, `-U` assigns the “dialing” information *dial-info* to the printer. *dial-info* is used with the `dial` routine to call the printer. Any network connection supported by the Basic Networking Utilities will work. *dial-info* can be either a phone number for a modem connection, or a system name for other kinds of connections. Or, if `-U direct` is given, no dialing will take place, because the name `direct` is reserved for a printer that is directly connected. If a system name is given, it is used to search for connection details from the file `/etc/uucp/Systems` or related files. The Basic Networking Utilities are required to support this option. By default, `-U direct` is assumed.

`-v device`

Associate a *device* with *printer*. *device* is the path name of a file that is writable by `lp`. Notice that the same *device* can be associated with more than one printer.

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**Removing a
Printer Destination**

The `-x dest` option removes the destination *dest* (a printer or a class), from the LP print service. If *dest* is a printer and is the only member of a class, then the class will be deleted, too. If *dest* is `all`, all printers and classes are removed. If there are no remaining local printers and the scheduler is still running, the scheduler is shut down.

No other *options* are allowed with `-x`.

**Setting/Changing
the System Default
Destination**

The `-d [dest]` option makes *dest* (an existing printer or class) the new system default destination. If *dest* is not supplied, then there is no system default destination. No other *options* are allowed with `-d`.

**Setting an Alert
for a Print Wheel**

`-S print-wheel -A alert-type [-W minutes] [-Q requests]`

The `-S print-wheel` option is used with the `-A alert-type` option to define an alert to mount the print wheel when there are jobs queued for it. If this command is not used to arrange alerting for a print wheel, no alert will be sent for the print wheel. Notice the other use of `-A`, with the `-p` option, above.

The *alert-types* are:

<code>mail</code>	Send the alert message using the <code>mail</code> command to the administrator.
<code>write</code>	Write the message, using the <code>write</code> command, to the terminal on which the administrator is logged in. If the administrator is logged in on several terminals, one is arbitrarily chosen.
<code>quiet</code>	Do not send messages for the current condition. An administrator can use this option to temporarily stop receiving further messages about a known problem. Once the <i>print-wheel</i> has been mounted and subsequently unmounted, messages will again be sent when the number of print requests reaches the threshold specified by the <code>-Q</code> option.
<code>none</code>	Do not send messages until the <code>-A</code> option is given again with a different <i>alert-type</i> (other than <code>quiet</code>).
<code>shell-command</code>	Run the <i>shell-command</i> each time the alert needs to be sent. The shell command should expect the message in standard input. If there are blanks embedded in the command, enclose the command in quotes. Notice that the <code>mail</code> and <code>write</code> values for this option are equivalent to the values <code>mail user-name</code> and <code>write user-name</code> respectively, where <i>user-name</i> is the current name for the administrator. This will be the login name of the person submitting this command unless he or she has used the <code>su</code> command to change to another user ID. If the <code>su</code> command has been used to change the user ID, then the <i>user-name</i> for the new ID is used.
<code>list</code>	Display the type of the alert for the print wheel on standard output. No change is made to the alert.

The message sent appears as follows:

```
The print wheel print-wheel needs to be mounted
on the printer(s):
printer(integer1requests) integer2 print requests
await this print wheel.
```

The printers listed are those that the administrator had earlier specified were candidates for this print wheel. The number *integer1* listed next to each printer is the number of requests eligible for the printer. The number *integer2* shown after the printer list is the total number of requests awaiting the print wheel. It will be less than the sum of the other numbers if some requests can be handled by more than one printer.

If the *print-wheel* is *all*, the alerting defined in this command applies to all print wheels already defined to have an alert.

If the *-W* option is not given, the default procedure is that only one message will be sent per need to mount the print wheel. Not specifying the *-W* option is equivalent to specifying *-W once* or *-W 0*. If *minutes* is a number greater than zero, an alert will be sent at intervals specified by *minutes*.

If the *-Q* option is also given, the alert will be sent when a certain number (specified by the argument *requests*) of print requests that need the print wheel are waiting. If the *-Q* option is not given, or *requests* is 1 or any (which are both the default), a message is sent as soon as anyone submits a print request for the print wheel when it is not mounted.

EXAMPLES

In the following examples, *prtr* can be any name up to 14 characters and can be the same name as the *ping(1M)* name.

EXAMPLE 1 Configuring an HP Postscript Printer with a Jet Direct Network Interface

The following example configures an HP postscript printer with a jet direct network interface:

```
example# lpadmin -p prtr -v /dev/null -m netstandard \
-o dest=ping_name_of_prtr:9100 -o protocol=tcp -T PS -I postscript
example# enable prtr
example# accept prtr
```

EXAMPLE 2 Configuring a Standard Postscript Network Printer

The following example configures a standard postscript network printer:

```
example# lpadmin -p prtr -v /dev/null -m netstandard \
-o dest=ping_name_of_prtr -T PS -I postscript
example# enable prtr
example# accept prtr
```

EXIT STATUS

The following exit values are returned:

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0 Successful completion.

non-zero An error occurred.

FILES

/var/spool/lp/*

/etc/lp

/etc/lp/alerts/printer fault handler for lpadmin.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpcu

SEE ALSO

enable(1), lp(1), lpstat(1), mail(1), stty(1), accept(1M), lpforms(1M),
lpsched(1M), lpssystem(1M), ping(1M), dial(3NSL), terminfo(4),
attributes(5)

System Administration Guide: Basic Administration

NAME	lpfilter – administer filters used with the LP print service
SYNOPSIS	/usr/sbin/lpfilter -f <i>filter-name</i> { - -i -l -x -F <i>pathname</i> }
DESCRIPTION	The lpfilter command is used to add, change, delete, or list a filter used with the LP print service. These filters convert the content of a file to have a content type acceptable to a printer.
OPTIONS	Arguments consist of the -f <i>filter-name</i> option and exactly one of the arguments appearing within braces ({ }) in the SYNOPSIS. - Adds or changes a filter as specified from standard input. The format of the input is specified below. If -f <i>all</i> is specified with the - option, the specified change is made to all existing filters. This is not useful. -f <i>filter-name</i> Specifies the <i>filter-name</i> of the filter to be added, changed, reset, deleted, or listed. The filter name <i>all</i> is a special filter name defined below. The -f option is required. -F <i>pathname</i> Adds or changes a filter as specified by the contents of the file <i>pathname</i>. The format of the file's contents is specified below. If -f <i>all</i> is specified with the -F option, the specified change is made to all existing filters. This is not useful. -i Resets a filter to its default settings. Using -f <i>all</i> with the -i option restores all filters for which predefined settings are available to their original settings. -l Lists a filter description. Using -f <i>all</i> with the -l option produces a list of all filters. -x Deletes a filter. Using -f <i>all</i> with the -x option results in all filters being deleted.
USAGE	
Adding or Changing a Filter	The filter named in the -f option is added to the filter table. If the filter already exists, its description is changed to reflect the new information in the input. When - is specified, standard input supplies the filter description. When -F is specified, the file <i>pathname</i> supplies the filter description. One of these two options must be specified to add or change a filter. When an existing filter is changed with the -F or - option, lines in the filter description that are not specified in the new information are not changed. When a new filter is added with this command, unspecified lines receive default values. See below. Filters are used to convert the content of a request from its initial type into a type acceptable to a printer. For a given print request, the LP print service knows the following:

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- The content type of the request (specified by `lp -T` or determined implicitly).
- The name of the printer (specified by `lp -d`).
- The printer type (specified by `lpadmin -T`).
The printer type is intended to be a printer model, but some people specify it with a content type even though `lpadmin -I` is intended for this purpose.
- The content types acceptable to the printer (specified by `lpadmin -I`).
The values specified by the `lpadmin -T` are treated as if they were specified by the `-I` option as well.
- The modes of printing asked for by the originator of the request (specified by various options to `lp`).

The system uses the above information to construct a list of one or more filters that converts the document's content type into a content type acceptable to the printer and consumes all `lp` arguments that invoke filters (`-y` and `-P`).

The contents of the file (specified by the `-F` option) and the input stream from standard input (specified by `-`) must consist of a series of lines, such that each line conforms to the syntax specified by one of the seven lines below. All lists are comma or space separated. Each item contains a description.

Input types: *content-type-list*
Output types: *content-type-list*
Printer types: *printer-type-list*
Printers: *printer-list*
Filter type: *filter-type*
Command: *shell-command*
Options: *template-list*

Input types	This gives the content types that can be accepted by the filter. The default is any. The document content type must be a member of this list for the initial filter in the sequence.
Output types	This gives the content types that the filter can produce from any of the input (content) types. The default is any. The intersection of the output types of this list and the content types acceptable to the printer (from <code>lpadmin -I</code> and <code>lpadmin -T</code>) must be non-null for the last filter in the sequence. For adjacent filters in the sequence, the intersection of output types of one and the input types of the next must be non-null.
Printer types	This gives the printer types for which this printer can be used. The LP print service will restrict the use of the filter to these printer types (from <code>lpadmin -T</code>). The default is any.
Printers	This gives the names of the printers for which the filter can be used. The LP print service will restrict the use of the filter to just the printers named. The default is any.

Filter type	This marks the filter as a <code>slow</code> filter or a <code>fast</code> filter. Slow filters are generally those that take a long time to convert their input (that is, minutes or hours). They are run before the job is scheduled for a printer, to keep the printers from being tied up while the filter is running. If a listed printer is on a remote system, the filter type for it must have the value <code>slow</code>. That is, if a client defines a filter, it must be a slow filter. Fast filters are generally those that convert their input quickly (that is, faster than the printer can process the data), or those that must be connected to the printer when run. Fast filters will be given to the interface program to run while connected to the physical printer.
Command	This specifies which program to run to invoke the filter. The full program pathname as well as fixed options must be included in the <i>shell-command</i>; additional options are constructed, based on the characteristics of each print request and on the <code>Options</code> field. A command must be given for each filter. The command must accept a data stream as standard input and produce the converted data stream on its standard output. This allows filter pipelines to be constructed to convert data not handled by a single filter.
Options	This is a comma-separated list of templates used by the LP print service to construct options to the filter from the characteristics of each print request listed in the table later. The <code>-y</code> and <code>-P</code> arguments to the <code>lp</code> command cause a filter sequence to be built even if there is no need for a conversion of content types. In general, each template is of the following form: <i>keyword pattern = replacement</i> The <i>keyword</i> names the characteristic that the template attempts to map into a filter-specific option; each valid <i>keyword</i> is listed in the table below. A <i>pattern</i> is one of the following: a literal pattern of one of the forms listed in the table, a single asterisk (*), or a regular expression. If <i>pattern</i> matches the value of the characteristic, the template fits and is used to generate a filter-specific option. The <i>replacement</i> is what will be used as the option. Regular expressions are the same as those found on the <code>regex(5)</code> manual page. This includes the <code>\(...\)</code> and <code>\n</code> constructions, which can be used to extract portions of the <i>pattern</i> for copying into the <i>replacement</i>, and the <code>&</code>, which can be used to copy the entire <i>pattern</i> into the <i>replacement</i>.

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The *replacement* can also contain a ***; it too, is replaced with the entire *pattern*, just like the *&* of regexp(5).

The keywords are:

lp Option	Characteristic	<i>keyword</i>	Possible <i>patterns</i>
-T	Content type (input)	INPUT	content-type
Not applicable	Content type (output)	OUTPUT	content-type
not applicable	Printer type	TERM	printer-type
-d	Printer name	PRINTER	<i>printer-name</i>
-f, -o cpi=	Character pitch	CPI	integer
-f, -o lpi=	Line pitch	LPI	integer
-f, -o length=	Page length	LENGTH	integer
-f, -o width=	Page width	WIDTH	integer
-P	Pages to print	PAGES	page-list
-S	Character set Print wheel	CHARSET CHARSET	character-set-name print-wheel-name
-f	Form name	FORM	form-name
-y	Modes	MODES	mode
-n	Number of copies	COPIES	<i>integer</i>

Resetting a Filter to Defaults

If the filter named is one originally delivered with the LP print service, the *-i* option restores the original filter description.

Deleting a Filter

The *-x* option is used to delete the filter specified in filter-name from the LP filter table.

Listing a Filter Description

The *-l* option is used to list the description of the filter named in filter-name. If the command is successful, the following message is sent to standard output:

```
Input types: content-type-list
Output types: content-type-list
Printer types: printer-type-list
```

	Printers: <i>printer-list</i> Filter type: <i>filter-type</i> Command: <i>shell-command</i> Options: <i>template-list</i> If the command fails, an error message is sent to standard error.		
Large File Behavior	See <code>largefile(5)</code> for the description of the behavior of <code>lpfilter</code> when encountering files greater than or equal to 2 Gbyte (2³¹ bytes).		
EXAMPLES	EXAMPLE 1 Printing with the landscape option For example, the template <pre>MODES landscape = -l</pre> shows that if a print request is submitted with the <code>-y landscape</code> option, the filter will be given the option <code>-l</code>. EXAMPLE 2 Selecting the printer type As another example, the template <pre>TERM * = -T *</pre> shows that the filter will be given the option <code>-T printer-type</code> for whichever <i>printer-type</i> is associated with a print request using the filter. EXAMPLE 3 Using the keywords table Consider the template <pre>MODES prwidth\=\.*) = -w\1</pre> Suppose a user gives the command <pre>lp -y prwidth=10</pre> From the table above, the LP print service determines that the <code>-y</code> option is handled by a <code>MODES</code> template. The <code>MODES</code> template here works because the pattern <code>prwidth=)</code> matches the <code>prwidth=10</code> given by the user. The replacement <code>-w1</code> causes the LP print service to generate the filter option <code>-w10</code>. If necessary, the LP print service will construct a filter pipeline by concatenating several filters to handle the user's file and all the print options. See <code>sh(1)</code> for a description of a pipeline. If the print service constructs a filter pipeline, the <code>INPUT</code> and <code>OUTPUT</code> values used for each filter in the pipeline are the types of input and output for that filter, not for the entire pipeline.		
EXIT STATUS	The following exit values are returned: <table> <tr> <td>0</td><td>Successful completion.</td></tr> </table>	0	Successful completion.
0	Successful completion.		

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non-zero An error occurred.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpsu

SEE ALSO lp(1), sh(1), lpadmin(1M), attributes(5), largefile(5), regexp(5)

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NOTES If the lp command specifies more than one document, the filtering chain is determined by the first document. Other documents may have a different format, but they will print correctly only if the filter chain is able to handle their format.

NAME	lpforms – administer forms used with the LP print service
SYNOPSIS	lpforms -f <i>form-name</i> option lpforms -f <i>form-name</i> -A <i>alert-type</i> [-P <i>paper-name</i> [-d]] [-Q <i>requests</i>] [-W <i>minutes</i>]
DESCRIPTION	The lpforms command administers the use of preprinted forms, such as company letterhead paper, with the LP print service. A form is specified by its <i>form-name</i>. Users may specify a form when submitting a print request (see lp(1)). The argument all can be used instead of <i>form-name</i> with either of the command lines shown above. The first command line allows the administrator to add, change, and delete forms, to list the attributes of an existing form, and to allow and deny users access to particular forms. The second command line is used to establish the method by which the administrator is alerted that the form <i>form-name</i> must be mounted on a printer.
OPTIONS	The following options are supported: -f <i>form-name</i> Specify a form. The first form of lpforms requires that one of the following <i>options</i> (-, -l, -F, -x) must be used: -F <i>pathname</i> To add or change form <i>form-name</i>, as specified by the information in <i>pathname</i>. - To add or change form <i>form-name</i>, as specified by the information from standard input. -l To list the attributes of form <i>form-name</i>. -x To delete form <i>form-name</i> (this option must be used separately; it may not be used with any other option). The second form of the lpforms command requires the -A <i>alert-type</i> option. The other options are optional. -A <i>alert-type</i> Defines an alert to mount the form when there are queued jobs which need it. -P <i>paper-name</i> [-d] Specify the paper name when creating the form. If -d is specified, this paper is the default. -Q <i>requests</i> An alert will be sent when a certain number of print requests that need the form are waiting. -W <i>minutes</i> An alert will be sent at intervals specified by minutes.
USAGE	Adding or Changing a Form The -F <i>pathname</i> option is used to add a new form, <i>form-name</i>, to the LP print service, or to change the attributes of an existing form. The form description is taken from <i>pathname</i> if the -F option is given, or from the standard input if the - option is used. One of these two options must be used to define or change a form.

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pathname is the path name of a file that contains all or any subset of the following information about the form.

```
Page length: scaled-decimal-number1
Page width: scaled-decimal-number2
Number of pages: integer
Line pitch: scaled-decimal-number3
Character pitch: scaled-decimal-number4
Character set choice: character-set/print-wheel [mandatory]
Ribbon color: ribbon-color
Comment:
comment
Alignment pattern: [content-type]
content
```

The term “scaled-decimal-number” refers to a non-negative number used to indicate a unit of size. The type of unit is shown by a “trailing” letter attached to the number. Three types of scaled decimal numbers can be used with the LP print service: numbers that show sizes in centimeters (marked with a trailing *c*); numbers that show sizes in inches (marked with a trailing *i*); and numbers that show sizes in units appropriate to use (without a trailing letter); lines, characters, lines per inch, or characters per inch.

Except for the last two lines, the above lines may appear in any order. The *Comment* : and *comment* items must appear in consecutive order but may appear before the other items, and the *Alignment pattern*: and the *content* items must appear in consecutive order at the end of the file. Also, the *comment* item may not contain a line that begins with any of the key phrases above, unless the key phrase is preceded with a > sign. Any leading > sign found in the *comment* will be removed when the comment is displayed. There is no case distinction among the key phrases.

When this command is issued, the form specified by *form-name* is added to the list of forms. If the form already exists, its description is changed to reflect the new information. Once added, a form is available for use in a print request, except where access to the form has been restricted, as described under the *-u* option. A form may also be allowed to be used on certain printers only.

A description of each form attribute is below:

Page length and Page Width

Before printing the content of a print request needing this form, the generic interface program provided with the LP print service will initialize the physical printer to handle pages *scaled-decimal-number1* long, and *scaled-decimal-number2* wide using the printer type as a key into the *terminfo*(4) database. The page length and page width will also be passed, if possible, to each filter used in a request needing this form.

Number of pages

Each time the alignment pattern is printed, the LP print service will attempt to truncate the *content* to a single form by, if possible, passing to each filter the page subset of 1-*integer*.

Line pitch and Character pitch

Before printing the content of a print request needing this form, the interface program provided with the LP print service will initialize the physical printer to handle these pitches, using the printer type as a key into the `terminfo(4)` database. Also, the pitches will be passed, if possible, to each filter used in a request needing this form. *scaled-decimal-number3* is in lines-per-centimeter if a *c* is appended, and lines-per-inch otherwise; similarly, *scaled-decimal-number4* is in characters-per-centimeter if a *c* is appended, and characters-per-inch otherwise. The character pitch can also be given as *elite* (12 characters-per-inch), *pica* (10 characters-per-inch), or *compressed* (as many characters-per-inch as possible).

Character set choice

When the LP print service alerts an administrator to mount this form, it will also mention that the print wheel *print-wheel* should be used on those printers that take print wheels. If printing with this form is to be done on a printer that has selectable or loadable character sets instead of print wheels, the interface programs provided with the LP print service will automatically select or load the correct character set. If *mandatory* is appended, a user is not allowed to select a different character set for use with the form; otherwise, the character set or print wheel named is a suggestion and a default only.

Ribbon color

When the LP print service alerts an administrator to mount this form, it will also mention that the color of the ribbon should be *ribbon-color*.

Comment

The LP print service will display the *comment* unaltered when a user asks about this form (see `lpstat(1)`).

Alignment pattern

When mounting this form, an administrator can ask for the *content* to be printed repeatedly, as an aid in correctly positioning the preprinted form. The optional *content-type* defines the type of printer for which *content* had been generated. If *content-type* is not given, *simple* is assumed. Note that the *content* is stored as given, and will be readable only by the user `lp`.

When an existing form is changed with this command, items missing in the new information are left as they were. When a new form is added with this command, missing items will get the following defaults:

```
Page Length: 66
Page Width: 80
Number of Pages: 1
Line Pitch: 6
Character Pitch: 10
Character Set Choice: any
Ribbon Color: any
```

Deleting a Form

LP print service" The `-x` option is used to delete the form *form-name* from the LP print service.

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Listing Form Attributes	The <code>-l</code> option is used to list the attributes of the existing form <i>form-name</i>. The attributes listed are those described under Adding and Changing a Form, above. Because of the potentially sensitive nature of the alignment pattern, only the administrator can examine the form with this command. Other people may use the <code>lpstat(1)</code> command to examine the non-sensitive part of the form description.										
Allowing and Denying Access to a Form	The <code>-u</code> option, followed by the argument <code>allow:login-ID-list</code> or <code>-u deny:login-ID-list</code> lets you determine which users will be allowed to specify a particular form with a print request. This option can be used with the <code>-F</code> or <code>-</code> option, each of which is described above under Adding or Changing a Form. The <i>login-ID-list</i> argument may include any or all of the following constructs: <table> <tr> <td><i>login-ID</i></td><td>A user on any system</td></tr> <tr> <td><i>system_name</i>!<i>login-ID</i></td><td>A user on system <i>system_name</i></td></tr> <tr> <td><i>system_name</i>!all</td><td>All users on system <i>system_name</i></td></tr> <tr> <td>all!<i>login-ID</i></td><td>A user on all systems</td></tr> <tr> <td>all</td><td>All users on all systems</td></tr> </table> The LP print service keeps two lists of users for each form: an “allow-list” of people allowed to use the form, and a “deny-list” of people that may not use the form. With the <code>-u allow</code> option, the users listed are added to the allow-list and removed from the deny-list. With the <code>-u deny</code> option, the users listed are added to the deny-list and removed from the allow-list. (Both forms of the <code>-u</code> option can be run together with the <code>-F</code> or the <code>-</code> option.) If the allow-list is not empty, only the users in the list are allowed access to the form, regardless of the content of the deny-list. If the allow-list is empty but the deny-list is not, the users in the deny-list may not use the form, (but all others may use it). All users can be denied access to a form by specifying <code>-f deny:all</code>. All users can be allowed access to a form by specifying <code>-f allow:all</code>. (This is the default.)	<i>login-ID</i>	A user on any system	<i>system_name</i> ! <i>login-ID</i>	A user on system <i>system_name</i>	<i>system_name</i> !all	All users on system <i>system_name</i>	all! <i>login-ID</i>	A user on all systems	all	All users on all systems
<i>login-ID</i>	A user on any system										
<i>system_name</i> ! <i>login-ID</i>	A user on system <i>system_name</i>										
<i>system_name</i> !all	All users on system <i>system_name</i>										
all! <i>login-ID</i>	A user on all systems										
all	All users on all systems										
Setting an Alert to Mount a Form	The <code>-f form-name</code> option is used with the <code>-A alert-type</code> option to define an alert to mount the form when there are queued jobs which need it. If this option is not used to arrange alerting for a form, no alert will be sent for that form. The method by which the alert is sent depends on the value of the <i>alert-type</i> argument specified with the <code>-A</code> option. The <i>alert-types</i> are: <table> <tr> <td>mail</td><td>Send the alert message using the <code>mail</code> command to the administrator.</td></tr> <tr> <td>write</td><td>Write the message, using the <code>write</code> command, to the terminal on which the administrator is logged in. If the administrator is logged in on several terminals, one is arbitrarily chosen.</td></tr> <tr> <td>quiet</td><td>Do not send messages for the current condition. An administrator can use this option to temporarily stop receiving further messages</td></tr> </table>	mail	Send the alert message using the <code>mail</code> command to the administrator.	write	Write the message, using the <code>write</code> command, to the terminal on which the administrator is logged in. If the administrator is logged in on several terminals, one is arbitrarily chosen.	quiet	Do not send messages for the current condition. An administrator can use this option to temporarily stop receiving further messages				
mail	Send the alert message using the <code>mail</code> command to the administrator.										
write	Write the message, using the <code>write</code> command, to the terminal on which the administrator is logged in. If the administrator is logged in on several terminals, one is arbitrarily chosen.										
quiet	Do not send messages for the current condition. An administrator can use this option to temporarily stop receiving further messages										

	about a known problem. Once the form <i>form-name</i> has been mounted and subsequently unmounted, messages will again be sent when the number of print requests reaches the threshold specified by the <i>-Q</i> option.
<i>showfault</i>	Attempt to execute a form alert handler on each system that has a print job for that form in the queue. The fault handler is <i>/etc/lp/alerts/form</i> . It is invoked with three parameters: <i>form_name</i> , <i>date</i> , <i>file_name</i> . <i>file_name</i> is the name of a file containing the form alert message.
<i>none</i>	Do not send messages until the <i>-A</i> option is given again with a different <i>alert-type</i> (other than <i>quiet</i>).
<i>shell-command</i>	Run the <i>shell-command</i> each time the alert needs to be sent. The shell command should expect the message in standard input. If there are blank spaces embedded in the command, enclose the command in quotes. Note that the <i>mail</i> and <i>write</i> values for this option are equivalent to the values <i>mail login-ID</i> and <i>write login-ID</i> respectively, where <i>login-ID</i> is the current name for the administrator. This will be the login name of the person submitting this command unless he or she has used the <i>su</i> command to change to another login-ID. If the <i>su</i> command has been used to change the user ID, then the <i>user-name</i> for the new ID is used.
<i>list</i>	Display the type of the alert for the form on standard output. No change is made to the alert.

The message sent appears as follows:

```
The form form-name needs to be mounted
on the printer(s):printer (integer1 requests).
integer2 print requests await this form.
Use the ribbon-color ribbon.
Use the print-wheel print wheel, if appropriate.
```

The printers listed are those that the administrator has specified as candidates for this form. The number *integer1* listed next to each printer is the number of requests eligible for the printer. The number *integer2* shown after the list of printers is the total number of requests awaiting the form. It will be less than the sum of the other numbers if some requests can be handled by more than one printer. The *ribbon-color* and *print-wheel* are those specified in the form description. The last line in the message is always sent, even if none of the printers listed use print wheels, because the administrator may choose to mount the form on a printer that does use a print wheel.

Where any color ribbon or any print wheel can be used, the statements above will read:

```
Use any ribbon.
Use any print-wheel.
```

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	If <i>form-name</i> is any, the <i>alert-type</i> defined in this command applies to any form for which an alert has not yet been defined. If <i>form-name</i> is <code>all</code>, the <i>alert-type</i> defined in this command applies to all forms. If the <code>-W minutes</code> option is not given, the default procedure is that only one message will be sent per need to mount the form. Not specifying the <code>-W</code> option is equivalent to specifying <code>-W once</code> or <code>-W 0</code>. If <i>minutes</i> is a number greater than 0, an alert will be sent at intervals specified by <i>minutes</i>. If the <code>-Q requests</code> option is also given, the alert will be sent when a certain number (specified by the argument <i>requests</i>) of print requests that need the form are waiting. If the <code>-Q</code> option is not given, or the value of <i>requests</i> is 1 or any (which are both the default), a message is sent as soon as anyone submits a print request for the form when it is not mounted.
Listing the Current Alert	The <code>-f</code> option, followed by the <code>-A</code> option and the argument <i>list</i> is used to list the <i>alert-type</i> that has been defined for the specified form <i>form-name</i>. No change is made to the alert. If <i>form-name</i> is recognized by the LP print service, one of the following lines is sent to the standard output, depending on the type of alert for the form. - When <i>requests</i> requests are queued: alert with <i>shell-command</i> every <i>minutes</i> minutes - When <i>requests</i> requests are queued: write to <i>user-name</i> every <i>minutes</i> minutes - When <i>requests</i> requests are queued: mail to <i>user-name</i> every <i>minutes</i> minutes - No alert The phrase every <i>minutes</i> minutes is replaced with <code>once</code> if <i>minutes</i> (<code>-Wminutes</code>) is 0.
Terminating an Active Alert	The <code>-A quiet</code> option is used to stop messages for the current condition. An administrator can use this option to temporarily stop receiving further messages about a known problem. Once the form has been mounted and then unmounted, messages will again be sent when the number of print requests reaches the threshold <i>requests</i>.
Removing an Alert Definition	No messages will be sent after the <code>-A none</code> option is used until the <code>-A</code> option is given again with a different <i>alert-type</i>. This can be used to permanently stop further messages from being sent as any existing alert definition for the form will be removed.
Large File Behavior	See <code>largefile(5)</code> for the description of the behavior of <code>lpforms</code> when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).
EXIT STATUS	The following exit values are returned: 0 Successful completion. - non-zero An error occurred.
FILES	<code>/etc/lp/alerts/form</code> Fault handler for <code>lpform</code>.

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ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpsu

SEE ALSO lp(1), lpstat(1), lpadmin(1M), terminfo(4), attributes(5), largefile(5)

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lpget(1M)

NAME	lpget – get printing configuration
SYNOPSIS	lpget [-k <i>key</i>] [<i>destination...</i> <i>list</i>]
DESCRIPTION	The lpget utility reads printing configuration information from the configuration databases in <code>\$HOME/.printers</code>, <code>/etc/printers.conf</code>, <code>printers.conf.byname</code>, <code>printers.org_dir</code>, and FNS printer contexts. This information, called a <i>configuration report</i>, is displayed to the standard output. See <code>printers(4)</code> and <code>printers.conf(4)</code> for information about the printer configuration databases. lpget displays a configuration report for all keys for the specified destination or destinations by default. Use the <code>-k</code> option to display a configuration report for specific keys. Use the <code>list</code> operand to display a configuration report for all configured destinations.
OPTIONS	The following option is supported: <code>-k <i>key</i></code> Displays a configuration report for <i>key</i>. See <code>printers.conf(4)</code> for information about specifying <i>key</i>.
OPERANDS	The following operands are supported: <i>destination</i> Displays a configuration report for <i>destination</i>. Destination can be either a printer of a class of printers, (see <code>lpadmin(1M)</code>). Specify <i>destination</i> using atomic, POSIX-style (<code>server:destination</code>), or Federated Naming Service (FNS) (<code>.../service/printer/...</code>) names. See <code>printers.conf(4)</code> for information regarding the naming conventions for atomic and FNS names, and <code>standards(5)</code> for information concerning POSIX. <i>list</i> Displays a configuration report for all configured destinations.
EXAMPLES	EXAMPLE 1 Displaying a Configuration Report for the <code>bsdaddr</code> Key The following example displays a configuration report for the <code>bsdaddr</code> key for printer <code>catalpa</code>. <pre>example% lpget -k bsdaddr catalpa</pre> EXAMPLE 2 A Configuration Report for all Keys for all Configured Destinations The following example displays a configuration report for all keys for all configured destinations. <pre>example% lpget list</pre>
EXIT STATUS	The following exit values are returned: 0 Successful completion. non-zero An error occurred.

FILES /etc/printers.conf
System printer configuration database.

\$HOME/.printers
User-configurable printer database.

printers.conf.byname
NIS version of /etc/printers.conf.

printers.org_dir
NIS+ version of /etc/printers.conf.

fns.ctx_dir.domain
FNS version of /etc/printers.conf.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpcu
Stability Level	Stable

SEE ALSO ldap(1), lp(1), lpc(1B), lpq(1B), lpr(1B), lpstat(1), lpadmin (1M), lpset(1M), printers(4), printers.conf(4), attributes(5), standards(5)

System Administration Guide: Naming and Directory Services

NOTES Be mindful of the following if the LDAP database is used as the name service. If the ldapclient(1M) server is a replica LDAP server, LDAP printer database updates may not appear immediately, as the replica server may not have been updated by the master server and can be out of sync. For example, a printer that you deleted by using lpset(1M) may still appear in the printer list you display with lpget until the replica is updated from the master. Replica servers vary as to how often they are updated from the master. Refer to the *System Administration Guide: Naming and Directory Services* for more information on LDAP replication.

lpmove(1M)

NAME	lpmove – move print requests								
SYNOPSIS	lpmove [<i>request-ID</i>] <i>destination</i> lpmove <i>destination1 destination2</i>								
DESCRIPTION	The lpmove command moves print requests queued by lp(1) or lpr(1B) between destinations. The first form of lpmove moves specific print requests (<i>request-ID</i>) to a specific <i>destination</i>. The second form of the lpmove command moves all print requests from one destination (<i>destination1</i>) to another (<i>destination2</i>). This form of lpmove also rejects new print requests for <i>destination1</i>. lpmove moves individual requests or entire queues only between local printers or between remote printers, not between a local and a remote printer. You can move only requests that were not previously transferred to the server. When moving requests, lpmove does not check the acceptance status of the destination to which the print requests are being moved (see accept(1M)). lpmove does not move requests that have options (for example, content type or requiring a special form) that cannot be handled by the new destination.								
OPERANDS	The following operands are supported: <table> <tr> <td><i>request-ID</i></td><td>The specific print request to be moved. Specify <i>request-ID</i> as the identifier associated with a print request as reported by lpstat. See lpstat(1).</td></tr> <tr> <td><i>destination</i></td><td>The name of the printer or class of printers (see lpadmin(1M)) to which lpmove moves a <i>specified</i> print request. Specify <i>destination</i> using atomic, POSIX-style (<i>server:destination</i>) syntax.</td></tr> <tr> <td><i>destination1</i></td><td>The name of the destination from which lpmove moves <i>all</i> print requests. Specify <i>destination</i> using atomic, POSIX-style (<i>server:destination</i>) syntax.</td></tr> <tr> <td><i>destination2</i></td><td>The name of the destination to which lpmove moves all print requests. Specify <i>destination</i> using atomic, POSIX-style (<i>server:destination</i>) syntax.</td></tr> </table> See printers.conf(4) for information regarding the naming conventions for atomic names and standards(5) for information regarding POSIX.	<i>request-ID</i>	The specific print request to be moved. Specify <i>request-ID</i> as the identifier associated with a print request as reported by lpstat . See lpstat(1) .	<i>destination</i>	The name of the printer or class of printers (see lpadmin(1M)) to which lpmove moves a <i>specified</i> print request. Specify <i>destination</i> using atomic, POSIX-style (<i>server:destination</i>) syntax.	<i>destination1</i>	The name of the destination from which lpmove moves <i>all</i> print requests. Specify <i>destination</i> using atomic, POSIX-style (<i>server:destination</i>) syntax.	<i>destination2</i>	The name of the destination to which lpmove moves all print requests. Specify <i>destination</i> using atomic, POSIX-style (<i>server:destination</i>) syntax.
<i>request-ID</i>	The specific print request to be moved. Specify <i>request-ID</i> as the identifier associated with a print request as reported by lpstat . See lpstat(1) .								
<i>destination</i>	The name of the printer or class of printers (see lpadmin(1M)) to which lpmove moves a <i>specified</i> print request. Specify <i>destination</i> using atomic, POSIX-style (<i>server:destination</i>) syntax.								
<i>destination1</i>	The name of the destination from which lpmove moves <i>all</i> print requests. Specify <i>destination</i> using atomic, POSIX-style (<i>server:destination</i>) syntax.								
<i>destination2</i>	The name of the destination to which lpmove moves all print requests. Specify <i>destination</i> using atomic, POSIX-style (<i>server:destination</i>) syntax.								
EXIT STATUS	The following exit values are returned: <table> <tr> <td>0</td><td>Successful completion.</td></tr> <tr> <td>non-zero</td><td>An error occurred.</td></tr> </table>	0	Successful completion.	non-zero	An error occurred.				
0	Successful completion.								
non-zero	An error occurred.								
FILES	<table> <tr> <td>/var/spool/print/*</td><td>LP print queue.</td></tr> </table>	/var/spool/print/*	LP print queue.						
/var/spool/print/*	LP print queue.								

lpmove(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpcu

SEE ALSO lp(1), lpr(1B), lpstat(1), accept(1M), lpadmin(1M), lpsched(1M),
printers.conf(4), attributes(5), standards(5)

System Administration Guide: Advanced Administration

lpsched(1M)

NAME	lpsched – start the LP print service										
SYNOPSIS	lpsched [-f num_filters] [-n num_notifiers] [-p fd_limit] [-r reserved_fds]										
DESCRIPTION	The lpsched command starts or restarts the LP print service. The lpshut command stops the LP print service. Printers that are restarted using lpsched reprint (in their entirety) print requests that were stopped by lpshut. See lpshut(1M).										
OPTIONS	The following options are supported: <table><tr><td>-f num_filters</td><td>Specifies the number of concurrent slow filters that may be run on a print server. A default value of 1 is used if none is specified. Depending on server configuration, a value of 1 may cause printers to remain idle while there are jobs queued to them.</td></tr><tr><td>-n num_notifiers</td><td>Specifies the number of concurrent notification processes that can run on a print server. A default value of 1 is used when none is specified.</td></tr><tr><td>-p fd_limit</td><td>Specifies the file descriptor resource limit for the lpsched process. A default value of 4096 is used if none is specified. On extremely large and active print servers, it may be necessary to increase this value.</td></tr><tr><td>-r reserved_fds</td><td>Specifies the number of file descriptors that the scheduler reserves for internal communications under heavy load. A default value of 2 is used when none is specified. It should not be necessary to modify this value unless instructed to do so when troubleshooting problems under high load.</td></tr></table>			-f num_filters	Specifies the number of concurrent slow filters that may be run on a print server. A default value of 1 is used if none is specified. Depending on server configuration, a value of 1 may cause printers to remain idle while there are jobs queued to them.	-n num_notifiers	Specifies the number of concurrent notification processes that can run on a print server. A default value of 1 is used when none is specified.	-p fd_limit	Specifies the file descriptor resource limit for the lpsched process. A default value of 4096 is used if none is specified. On extremely large and active print servers, it may be necessary to increase this value.	-r reserved_fds	Specifies the number of file descriptors that the scheduler reserves for internal communications under heavy load. A default value of 2 is used when none is specified. It should not be necessary to modify this value unless instructed to do so when troubleshooting problems under high load.
-f num_filters	Specifies the number of concurrent slow filters that may be run on a print server. A default value of 1 is used if none is specified. Depending on server configuration, a value of 1 may cause printers to remain idle while there are jobs queued to them.										
-n num_notifiers	Specifies the number of concurrent notification processes that can run on a print server. A default value of 1 is used when none is specified.										
-p fd_limit	Specifies the file descriptor resource limit for the lpsched process. A default value of 4096 is used if none is specified. On extremely large and active print servers, it may be necessary to increase this value.										
-r reserved_fds	Specifies the number of file descriptors that the scheduler reserves for internal communications under heavy load. A default value of 2 is used when none is specified. It should not be necessary to modify this value unless instructed to do so when troubleshooting problems under high load.										
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>non-zero</td><td>An error occurred.</td></tr></table>			0	Successful completion.	non-zero	An error occurred.				
0	Successful completion.										
non-zero	An error occurred.										
FILES	/var/spool/lp/*	LP print queue.									
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:										
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWpsu</td></tr></table>			ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWpsu				
ATTRIBUTE TYPE	ATTRIBUTE VALUE										
Availability	SUNWpsu										
SEE ALSO	lp(1), lpstat(1), lpadmin(1M), lpmove(1M), lpshut(1M), attributes(5)										
	System Administration Guide: Basic Administration										

NAME	lpset – set printing configuration in /etc/printers.conf or other supported databases
SYNOPSIS	lpset [-n system nisplus fns ldap] [-x] [[-D binddn] [-w passwd] [-h ldaphost]] [-a key=value] [-d key] <i>destination</i>
DESCRIPTION	The lpset utility sets printing configuration information in the system configuration databases. Use lpset to create and update printing configuration in /etc/printers.conf, printers.org_dir (NIS+), or Federated Naming System (FNS). See nsswitch.conf(4), printers.conf(4), and fns(5). Only a superuser or a member of Group 14 may execute lpset.
OPTIONS	The following options are supported: -n system nisplus fns ldap Create or update the configuration information for the <i>destination</i> entry in /etc/printers.conf, printers.org_dir (NIS+), LDAP or FNS printer contexts. <i>system</i> specifies that the information is created or updated in /etc/printers.conf. <i>nisplus</i> specifies that the information is created or updated in the printers.org_dir NIS+ table. <i>ldap</i> specifies that the information is written to an LDAP server. See NOTES. <i>fns</i> specifies that the information is written using federated naming context. If -n is not specified, <i>system</i> is the default. -x Remove all configuration for the <i>destination</i> entry from the database specified by the -n option. -a key=value Configure the specified <i>key=value</i> pair for the <i>destination</i>. See printers.conf(4) for information regarding the specification of <i>key=value</i> pairs. -d key Delete the configuration option specified by <i>key</i> for the <i>destination</i> entry. See printers.conf(4) for information regarding the specification of <i>key</i> and <i>key=value</i> pairs. -D binddn Use the distinguished name (DN) <i>binddn</i> to bind to the LDAP directory server. -w passwd Use <i>passwd</i> as the password for authentication to the LDAP directory server. -h ldaphost Specify an alternate host on which the LDAP server is running. This option is only used when <i>ldap</i> is specified as the naming service. If this option is not specified, the default is the current host system.
OPERANDS	The following operand is supported: <i>destination</i> Specifies the entry in /etc/printers.conf, printers.org_dir, LDAP, or FNS, in which to create or modify

information. *destination* names a printer of class of printers. See `lpadmin(1M)`. Each entry in `printers.conf` describes one destination. Specify *destination* using atomic or Federated Naming Service (FNS) (`.../service/printer/...`) names. POSIX-style destination names are not acceptable. See `printers.conf(4)` for information regarding the naming conventions for atomic and FNS names and `standards(5)` for information regarding POSIX.

EXAMPLES**EXAMPLE 1** Removing All Existing Printing Configuration Information

The following example removes all existing printing configuration information for destination `dogs` from `/etc/printers.conf`:

```
example% lpset -x dogs
```

EXAMPLE 2 Setting a key=value Pair

The following example sets the user-equivalence =true *key=value* pair for destination `tabloid` in FNS context:

```
example% lpset -n fns -a user-equivalence=true tabloid
```

EXAMPLE 3 Setting a key=value Pair in LDAP

```
example% lpset -n ldap -h ldap1.xyz.com -D "cn=Directory Manager" \
-w passwd -a key1=value1 printer1
```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
non-zero	An error occurred.

FILES

`/etc/printers.conf`
System configuration database.

`printer.org_dir(NIS+)`
NIS+ version of `/etc/printers.conf`.

`fns.ctx_dir.domain`
FNS version of `/etc/printers.conf`.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpcu
Stability Level	Stable

lpset(1M)

SEE ALSO ldap(1), lp(1), lpc(1B), lpq(1B), lpr(1B), lpstat(1), ldapclient(1M), lpadmin(1M), lpget(1M), nsswitch.conf(4), printers(4), printers.conf(4), attributes(5), fns(5), standards(5)

System Administration Guide: Naming and Directory Services

- NOTES** If the ldap database is used, the printer administrator should be mindful of the following when updating printer information.
1. Because the domain information for the printer being updated is extracted from the ldapclient(1M) configuration, the LDAP server being updated must host the same domain that is used by the current ldapclient(1M) server.
 2. If the LDAP server being updated is a replica LDAP server, the updates will be referred to the master LDAP server and completed there. The updates might be out of sync and not appear immediately, as the replica server may not have been updated by the master server. For example, a printer that you deleted by using lpset may still appear in the printer list you display with lpget until the replica is updated from the master. Replica servers vary as to how often they are updated from the master. See *System Administration Guide: Advanced Administration* for information on LDAP server replication.
 3. Although users can use the LDAP command line utilities ldapadd(1) and ldapmodify(1) to update printer entries in the directory, the preferred method is to use lpset. Otherwise, if the ldapadd and ldapmodify utilities are used, the administrator must ensure that the printer-name attribute value is unique within the ou=printers container on the LDAP server. If the value is not unique, the result of modifications done using lpset or the Solaris Print Manager, printmgr(1M) may be unpredictable.

lpshut(1M)

NAME	lpshut – stop the LP print service				
SYNOPSIS	lpshut				
DESCRIPTION	The lpshut command stops the LP print service. Printers that are printing when lpshut is invoked stop printing. Start or restart printers using lpsched(1M).				
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>non-zero</td><td>An error occurred.</td></tr></table>	0	Successful completion.	non-zero	An error occurred.
0	Successful completion.				
non-zero	An error occurred.				
FILES	/var/spool/lp/* LP print queue.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpsu

SEE ALSO lp(1), lpstat(1), lpadmin(1M), lpmove(1M), lpsched(1M), attributes(5)
System Administration Guide: Basic Administration

NAME	lpsystem – register remote systems with the print service
DESCRIPTION	The lpsystem command is obsolete, and could be removed at any time. The print system no longer uses the information generated by lpsystem. See lpadmin(1M), lpusers(1M) or printers.conf(4) for equivalent functionality.
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpcu
Stability Level	Obsolete*

* This command could be removed at any time.

SEE ALSO lpadmin(1M), lpusers(1M), printers.conf(4), attributes(5)

lpusers(1M)

NAME	lpusers – set printing queue priorities										
SYNOPSIS	lpusers -d <i>priority-level</i> lpusers -q <i>priority-level</i> -u <i>login-ID-list</i> lpusers -u <i>login-ID-list</i> lpusers -q <i>priority-level</i> lpusers -l										
DESCRIPTION	The lpusers command sets limits to the queue priority level that can be assigned to jobs submitted by users of the LP print service. The first form of the command (with -d) sets the system-wide priority default to <i>priority-level</i>, where <i>priority-level</i> is a value of 0 to 39, with 0 being the highest priority. If a user does not specify a priority level with a print request (see lp(1)), the default priority level is used. Initially, the default priority level is 20. The second form of the command (with -q and -u) sets the default highest <i>priority-level</i> (0-39) that the users in <i>login-ID-list</i> can request when submitting a print request. The <i>login-ID-list</i> argument may include any or all of the following constructs: <table> <tr> <td><i>login-ID</i></td><td>A user on any system</td></tr> <tr> <td><i>system_name</i>!<i>login-ID</i></td><td>A user on the system <i>system_name</i></td></tr> <tr> <td><i>system_name</i>!all</td><td>All users on system <i>system_name</i></td></tr> <tr> <td>all!<i>login-ID</i></td><td>A user on all systems</td></tr> <tr> <td>all</td><td>All users on all systems</td></tr> </table> Users that have been given a limit cannot submit a print request with a higher priority level than the one assigned, nor can they change a request that has already been submitted to have a higher priority. Any print requests submitted with priority levels higher than allowed will be given the highest priority allowed. The third form of the command (with -u) removes any explicit priority level for the specified users. The fourth form of the command (with -q) sets the default highest priority level for all users not explicitly covered by the use of the second form of this command. The last form of the command (with -l) lists the default priority level and the priority limits assigned to users.	<i>login-ID</i>	A user on any system	<i>system_name</i> ! <i>login-ID</i>	A user on the system <i>system_name</i>	<i>system_name</i> !all	All users on system <i>system_name</i>	all! <i>login-ID</i>	A user on all systems	all	All users on all systems
<i>login-ID</i>	A user on any system										
<i>system_name</i> ! <i>login-ID</i>	A user on the system <i>system_name</i>										
<i>system_name</i> !all	All users on system <i>system_name</i>										
all! <i>login-ID</i>	A user on all systems										
all	All users on all systems										
OPTIONS	The following options are supported: -d <i>priority-level</i> Set the system-wide priority default to <i>priority-level</i>. -l List the default priority level and the priority limits assigned to users.										

-q *priority-level*

Set the default highest priority level for all users not explicitly covered.

-q *priority-level* -u *login-ID-list*

Set the default highest *priority-level* that the users in *login-ID-list* can request when submitting a print request.

-u *login-ID-list*

Remove any explicit priority level for the specified users.

EXIT STATUS The following exit values are returned:

0 Successful completion.

non-zero An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpsu

SEE ALSO `lp(1)`, `attributes(5)`

lu(1M)

NAME	lu – FMLI-based interface to Live Upgrade functions
SYNOPSIS	/usr/sbin/lu
DESCRIPTION	The lu program is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See live_upgrade(5) for a description of the Live Upgrade feature. The lu program is a Forms and Menu Language Interpreter-based user interface. (See fmli(1) for a description of the Forms and Menu Language Interpreter.) lu enables you to create and upgrade boot environments (BEs) and perform other administrative tasks on BEs. The lu program performs a subset of the functions provided by the Live Upgrade command-line utilities. The output of the lu command is not internationalizable. The command and its FMLI-based interface is subject to change in a future release. Invocation of the lu command requires root privileges. The lu command accepts no arguments. After invoking lu, you receive a display with the following options: Activate Activate a boot environment. This option designates that the system boot from the specified BE upon next reboot. This option is equivalent to the command-line luactivate(1M) utility. Cancel Cancel a copy job. Live Upgrade allows you to schedule the copy, upgrade, and flash functions (all described below) at a later time. The cancel function enables you to cancel a scheduled job. This function is equivalent to the command-line lucancel(1M) utility. Compare Compare the contents of BEs. Enables you to obtain a detailed comparison of two BEs. Equivalent to the command-line lucompare(1M) utility. Copy Start/schedule a copy. Copies the contents of one BE to another. Equivalent of the command-line lumake(1M) utility. At any time, you can have only one Live Upgrade operation scheduled. Create Create a boot environment. Implements a subset of the functions performed by the command-line lucreate(1M) utility. Current Display the name of the current boot environment. Equivalent of the command-line lucurr(1M) utility. Delete Delete a boot environment. Equivalent of the command-line ludelete(1M) utility.

	List List the file systems of a boot environment. Equivalent of the command-line <code>luflslist(1M)</code> utility. Rename Change the name of a boot environment. Equivalent of the command-line <code>lurename(1M)</code> utility. Status List the status of all boot environments. Equivalent of the command-line <code>lustatus(1M)</code> utility. Upgrade Upgrade a boot environment or upgrade the OS on an inactive BE. This option enables you to upgrade to a new operating system or install new packages or patches on a specified BE. Implements a subset of the functions performed by the command-line <code>luupgrade(1M)</code> utility. Note that if you are performing an upgrade that requires more than one CD, you must use the <code>-i</code> option of <code>luupgrade</code>. Flash Flash a boot environment. This option enables you to install an operating system on a BE from a flash archive. You can perform the same function with <code>luupgrade(1M)</code>. Help Displays help information. There are also context-specific help screens for many of the options. Exit Exit <code>lu</code>.
Navigation	You navigate through <code>lu</code>'s various screens using arrow keys and function keys (usually F2 through F9 on the keyboard of a Sun desktop system). Available key functions are displayed at the base of the <code>lu</code> screen. You can use Ctrl-F, plus a number key, to duplicate a function key. For example, press Ctrl-F and the number key 2 to duplicate the F2 key. In a screen for a given option, you can press Esc to obtain context-specific help.
Display Issues	When viewing the FMLI interface remotely, such as over a <code>tip</code> line, you might need to set the <code>TERM</code> environment variable to <code>VT220</code>. When using the FMLI interface in a CDE environment use <code>dtterm</code>, rather than <code>xterm</code>, as the value of the <code>TERM</code> variable. The <code>lu</code> command supports only single-byte environments.
Common Functions	Most of the options listed above offer the following functions. These functions are accessible through function keys indicated at the base of the screen. Choice Available to you whenever you have a field that can be filled in. Pressing the Choice function key gives you a popup screen displaying a list of alternatives. For example, for options involving copying or upgrading BEs, you receive a list of

lu(1M)

available BEs. You can then use arrow and function keys to make a selection from this popup. The choice function is useful because it prevents you from selecting an invalid alternative. In our example, it prevents you from choosing a BE that is not available for a copy or upgrade operation. Such non-availability might occur when a BE is in the midst of an upgrade.

Cancel

Cancel an operation.

Save

Proceed with an operation.

Other Functions

The “Create” option, described above, offers the following functions:

Split

Split a file system. For example, you can split a / file system into /, /usr, and /var. To split a file system, you must have disk slices available on which to mount the separated file system(s). If you do not, lu invokes the format(1M) utility, in which you can use the partition option to create a new disk slice.

Merge

Join one or more file systems with its (or their) parent file system. For example, using a source BE that has separate /, /usr, and /var file systems, you can merge these file systems under / on a target BE.

FILES

/etc/lutab

list of BEs on the system

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluu

SEE ALSO

luactivate(1M), lucancel(1M), lucompare(1M), lucreate(1M), lucurr(1M), ludelete(1M), ludesc(1M), lufslis(1M), lumake(1M), lumount(1M), lurename(1M), lustatus(1M), luupgrade(1M), lutab(4), attributes(5), live_upgrade(5)

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NAME	luactivate – activate a boot environment
SYNOPSIS	/usr/sbin/luactivate [-l <i>error_log</i>] [-o <i>outfile</i>] [-s] [<i>BE_name</i>] [-X]
DESCRIPTION	The <code>luactivate</code> command is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See <code>live_upgrade(5)</code> for a description of the Live Upgrade feature. The <code>luactivate</code> command, with no arguments, displays the name of the boot environment (BE) that will be active upon the next reboot of the system. When an argument (a BE) is specified, <code>luactivate</code> activates the specified BE. <code>luactivate</code> activates a BE by making the BE's root partition bootable. On an x86 machine, this might require that you take steps following the completion of <code>luactivate</code>. If so, <code>luactivate</code> displays the correct steps to take. To successfully activate a BE, that BE must meet the following conditions: ■ The BE must have a status of "complete," as reported by <code>lustatus(1M)</code>. ■ If the BE is not the current BE, you cannot have mounted the partitions of that BE (using <code>lumount(1M)</code> or <code>mount(1M)</code>). ■ The BE you want to activate cannot be involved in an <code>lucompare(1M)</code> operation. After activating a specified BE, <code>luactivate</code> displays the steps to be taken for fallback in case of any problem on the next reboot. Make note of these instructions and follow them exactly, if necessary. The first time you boot from a newly created BE, Live Upgrade software synchronizes this BE with the BE that was last active. (This is not necessarily the BE that was the source for the newly created BE.) "Synchronize" here means that certain system files and directories are copied from the last-active BE to the BE being booted. Live Upgrade software does not perform this synchronization after a BE's initial boot, unless you use the <code>-s</code> option, described below. If <code>luactivate</code> detects conflicts between files that are subject to synchronization, it issues a warning and does not perform the synchronization for those files. Activation can complete successfully, in spite of such a conflict. A conflict can occur if you upgrade one BE or another to a new operating system version or if you modify system files (for example, <code>/etc/passwd</code>) on one of the BEs. The <code>luactivate</code> command requires root privileges.
OPTIONS	The <code>luactivate</code> command has the following options: <code>-l error_log</code> Error and status messages are sent to <i>error_log</i>, in addition to where they are sent in your current environment. <code>-o outfile</code> All command output is sent to <i>outfile</i>, in addition to where it is sent in your current environment.

luactivate(1M)

-s

Causes synchronization to occur (see DESCRIPTION) even if next boot of a specified BE is not the first boot of that BE. Use this option with great caution, because you might not be aware or in control of changes that might have occurred in the last-active BE.

If using -s, take special care when booting to an earlier release of Solaris than what is installed on the last-active BE. For example, consider that the last-active BE contains Solaris 9 and you want to activate a BE that contains Solaris 2.6. If you forced synchronization with the -s option, the BE containing Solaris 2.6 might be synchronized with files that, while compatible with Solaris 9, might not work under Solaris 2.6.

-X

Enable XML output. Characteristics of XML are defined in DTD, in `/usr/share/lib/xml/dtd/lu_cli.dtd.<num>`, where `<num>` is the version number of the DTD file.

OPERANDS

BE_name

Name of the BE to be activated.

EXIT STATUS

The following exit values are returned:

0 Successful completion.

>0 An error occurred.

FILES

`/etc/lutab`

list of BEs on the system

`/usr/share/lib/xml/dtd/lu_cli.dtd.<num>`

Live Upgrade DTD (see -X option)

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluu

SEE ALSO

`lu(1M)`, `lucancel(1M)`, `lucompare(1M)`, `lucreate(1M)`, `lucurr(1M)`, `ludelete(1M)`, `ludesc(1M)`, `lufslis(1M)`, `lumake(1M)`, `lumount(1M)`, `lurename(1M)`, `lustatus(1M)`, `luupgrade(1M)`, `lutab(4)`, `attributes(5)`, `live_upgrade(5)`

NAME	lucancel – cancel a scheduled Live Upgrade copy/create procedure				
SYNOPSIS	/usr/sbin/lucancel [-l <i>error_log</i>] [-o <i>outfile</i>] [-X]				
DESCRIPTION	The lucancel command is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See live_upgrade(5) for a description of the Live Upgrade feature. The lucancel command cancels a boot environment (BE) creation or upgrade that was scheduled in the FMLI-based interface, lu(1M), or the repopulation of a BE, scheduled with lumake(1M). lucancel does not cancel a job that is active (that is, is in the process of creation or repopulation). The lucancel command requires root privileges.				
OPTIONS	The lucancel command has the following options: -l <i>error_log</i> Error and status messages are sent to <i>error_log</i>, in addition to where they are sent in your current environment. -o <i>outfile</i> All command output is sent to <i>outfile</i>, in addition to where it is sent in your current environment. -X Enable XML output. Characteristics of XML are defined in DTD, in <i>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></i>, where <i><num></i> is the version number of the DTD file.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.				
FILES	<i>/etc/lutab</i> list of BEs on the system				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWluu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWluu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWluu				
SEE ALSO	lu(1M), luactivate(1M), lucompare(1M), lucreate(1M), lucurr(1M), ludelete(1M), ludesc(1M), lufslis(1M), lumake(1M), lumount(1M), lurename(1M), lustatus(1M), luupgrade(1M), lutab(4), attributes(5), live_upgrade(5)				

lucompare(1M)

NAME	lucompare – compare boot environments				
SYNOPSIS	<pre>/usr/sbin/lucompare [-i infile -t] [-o outfile] BE_name [-X] /usr/sbin/lucompare [-C file [-o outfile]] [-X]</pre>				
DESCRIPTION	The <code>lucompare</code> command is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See <code>live_upgrade(5)</code> for a description of the Live Upgrade feature. The <code>lucompare</code> command compares the contents of the current boot environment (BE) with the contents of another BE. With the <code>-C</code> option, <code>lucompare</code> compares file statistics so that you can determine which files have changed on a BE since a specified time, such as the creation time of a BE. A specified BE must be inactive and in the complete state, as reported by the <code>lustatus(1M)</code> command. Also, a BE cannot have a copy job scheduled, which is also reported by <code>lustatus(1M)</code>. A specified BE cannot have any partitions mounted with <code>lumount(1M)</code> or <code>mount(1M)</code>. For each file system defined for a specified BE, <code>lucompare</code> compares all files with the files with the same pathnames in the current BE. The files present in the active BE, but not in the specified BE, and vice-versa, are reported. You also have the option to specify a list of files to be compared. If you specify the <code>-C</code> option, instead of doing an absolute comparison of the current BE with a target BE, <code>lucompare</code> compares the files in a specified BE with the list of files recorded in a file. When a BE is created, <code>lucreate(1M)</code> creates a file named <code>:<BE_name></code> in <code>/etc/lu/compare</code>. You can use the <code>-C</code> option to compare the files in a specified BE to this snapshot in <code>/etc/lu/compare</code> or you can compare the BE to a file previously created with the <code>-o</code> option. Comparing a BE to its own snapshot in <code>/etc/lu/compare</code> enables you to determine which files have changed on the BE since its creation. By default, the output of <code>lucompare</code> is written to stdout. With the <code>-C</code> option, you must use the <code>-o</code> option to specify an output file. The output for <code>lucompare</code> is a list of files that differ in permissions, owner, group, or sum, along with the reason for difference. The output format is shown below: <pre>> active BE < BE_name reason > file_name:owner:group:number_of_links:mode:type: size or major_minor number:checksum < file_name:owner:group:number_of_links:mode:type: size or major_minor number:checksum</pre> The above fields are obtained from the <code>stat(2)</code> structure of the file. The <code>type</code> field can be one of the following: <table><tr><td>SYMLINK</td><td>symbolic link</td></tr><tr><td>FIFO</td><td>FIFO file</td></tr></table>	SYMLINK	symbolic link	FIFO	FIFO file
SYMLINK	symbolic link				
FIFO	FIFO file				

CHRSPC	character special
BLKSPC	block special
DIR	directory
REGFIL	regular file
UNKNOWN	unknown file type

lucompare computes checksums only if the file on the specified BE matches its counterpart on the active BE in all of the fields described above. If the checksums differ, lucompare appends the differing checksums to the entries for the compared files.

The lucompare command requires root privileges.

OPTIONS

The lucompare command has the following options:

-C <i>file</i>	Compare file statistics of BE with those recorded in <i>file</i> . <i>file</i> can be the snapshot created at BE creation time, <code>/etc/lu/compare/:<BE_name></code> , or a file previously created with the <code>-o</code> option. You must use the <code>-o</code> option with this option.
-i <i>infile</i>	Compare files listed in <i>infile</i> . The files to be compared should be an absolute filename. If the entry in the file is a directory, then comparison is recursive with respect to the directory. Mutually exclusive of <code>-t</code> .
-o <i>outfile</i>	Send output of differences to <i>outfile</i> . You must use this option if you use <code>-C</code> .
-t	Compare only nonbinary files. This is achieved by performing a <code>file(1)</code> command on each file in the tree walk and only comparing text files. Mutually exclusive of <code>-i</code> .
-X	Enable XML output. Characteristics of XML are defined in DTD, in <code>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></code> , where <code><num></code> is the version number of the DTD file.

OPERANDS

BE_name

Name of the BE to which the active BE will be compared. You cannot specify a BE that is involved in another Live Upgrade operation, or specify a BE for which you have mounted partitions (using `lumount(1M)` or `mount(1M)`).

EXAMPLES**EXAMPLE 1** Checking Differences Since BE Creation

The following command lists the differences in the BE `s8u5` between its creation time and the present.

```
# lucompare -C /etc/lu/compare/:s8u5 -o /var/tmp/compare.out s8u5
```

lucompare(1M)

EXAMPLE 1 Checking Differences Since BE Creation *(Continued)*

Note that `/etc/lu/compare/:s8u5` is the file created by `lucreate` upon creation of a BE. The list of differences is sent to `/var/tmp/compare.out`.

EXIT STATUS The following exit values are returned:

0 Successful completion.
>0 An error occurred.

FILES `/etc/lutab`
 list of BEs on the system

`/usr/share/lib/xml/dtd/lu_cli.dtd.<num>`
 Live Upgrade DTD (see `-X` option)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluu

SEE ALSO `lu(1M)`, `luactivate(1M)`, `lucancel(1M)`, `lucreate(1M)`, `lucurr(1M)`, `ludelete(1M)`, `ludesc(1M)`, `lufslist(1M)`, `lumake(1M)`, `lumount(1M)`, `lurename(1M)`, `lustatus(1M)`, `luupgrade(1M)`, `lutab(4)`, `attributes(5)`, `live_upgrade(5)`

NOTES The `lucompare` command makes no attempt to reconcile any differences it detects between BEs.

NAME	lucreate – create a new boot environment
SYNOPSIS	<pre> /usr/sbin/lucreate [-A BE_description] [-c BE_name] [-C (boot_device -)] -n BE_name [-f exclude_list_file] [-I] [-l error_log] [-o outfile] [-s (- source_BE_name)] [[-M slice_list_file [-M...]] [-m mount_point:device [, volume] :fs_options [-m...]] [-x exclude [-x...]] [-X] [-y include [-y...]] [-Y include_list_file] [-z filter_list] </pre>
DESCRIPTION	The <code>lucreate</code> command is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See <code>live_upgrade(5)</code> for a description of the Live Upgrade feature and its associated terminology. The <code>lucreate</code> command offers a set of command line options that enable you to perform the following functions: ■ Create a new boot environment (BE), based on the current BE. ■ Create a new BE, based on a BE other than the current BE. ■ Join or separate the file systems of a BE onto a new BE. For example, join <code>/var</code> and <code>/opt</code> under <code>/</code>, or separate these directories to be mounted under different disk slices. ■ Create the file systems for a BE, but leave those file systems unpopulated. You can perform the preceding functions using only <code>lucreate</code> command-line options or you can omit the <code>-m</code> and <code>-M</code> options (described below), which automatically invokes an FMLI-based interface that provides curses-based screens for Live Upgrade administration. Note that the FMLI-based interface does not support all of the Live Upgrade features supported by <code>lucreate</code>. Also, Sun is not committed to ongoing development of the FMLI-based interface. The creation of a BE includes selecting the disk or device slices for all the mount points of the BE. Slices can be physical disks or logical devices, such as Solaris Volume Manager volumes. You can also change the mount points of the BE using the <code>SPLIT</code> and <code>MERGE</code> functions of the FMLI-based configuration screen. Upon successful creation of a BE, you can use <code>lustatus(1M)</code> to view the state of that BE and <code>lufslst(1M)</code> to view the BE's file systems. You can use <code>luupgrade(1M)</code> to upgrade the OS on that BE and <code>luactivate(1M)</code> to make a BE active, that is, designate it as the BE to boot from at the next reboot of the system. The <code>lucreate</code> command makes a distinction between the file systems that contain the OS—<code>/</code>, <code>/usr</code>, <code>/var</code>, and <code>/opt</code>—and those that do not, such as <code>/export</code>, <code>/home</code>, and other, user-defined file systems. The file systems in the first category cannot be shared between the source BE and the BE being created; they are always copied from the source BE to the target BE. By contrast, the user-defined file systems are shared by default. For Live Upgrade purposes, the file systems that contain the OS are referred to as non-shareable (or <i>critical</i>) file systems; other file systems are referred to as

lucreate(1M)

shareable. A non-shareable file system listed in the source BE's `vfstab` is copied to a new BE. For a shareable file system, if you specify a destination slice, the file system is copied. If you do not, the file system is shared.

The `lucreate` command supports a limited subset of Solaris Volume Manager functions. In particular, using `lucreate` with the `-m` option, you can:

- Create a mirror.
- Detach existing SVM concatenations from mirrors. Similarly, you can attach existing Solaris Volume Manager concatenations to mirrors. These can be mirrors that were created in Solaris Volume Manager or those created by `lucreate`.
- Create a single-slice concatenation and attach a single disk slice to it.
- Detach a single disk slice from a single-slice concatenation.
- Attach multiple single-slice concatenations to a mirror. `lucreate` can attach as many of these concatenations as are allowed by Solaris Volume Manager.

`lucreate` does not allow you to attach multiple disk slices or multiple storage devices to a concatenation. Similarly, it does not allow you to detach multiple slices or devices from a concatenation.

If you use Solaris Volume Manager volumes for boot environments, it is recommended that you use `lucreate` rather than Solaris Volume Manager commands to manipulate these volumes. The Solaris Volume Manager software has no knowledge of boot environments, whereas the `lucreate` command contains checks that prevent you from inadvertently destroying a boot environment by, for example, overwriting or deleting a Solaris Volume Manager volume.

If you have already used Solaris Volume Manager software to create complex Solaris Volume Manager volumes (for example, RAID-5 volumes), Live Upgrade will support the use of these. However, to create and manipulate these complex objects, you must use Solaris Volume Manager software. As described above, the use of Solaris Volume Manager software, rather than the `lucreate` command, entails the risk of destroying a boot environment. If you do use Solaris Volume Manager software, use `lufslis(1M)` to determine which devices are in use for boot environments.

Except for a special use of the `-s` option, described below, you must have a source BE for the creation of a new BE. By default, it is the current BE. You can use the `-s` option to specify a BE other than the current BE.

When creating a new BE, `lucreate` enables you to exclude and include certain files from the source BE. You perform this inclusion or exclusion with the `-f`, `-x`, `-y`, `-Y`, and `-z` options, described below. See the subsection on combining these options, following `OPTIONS`, below.

By default, all swap partitions on a source BE are shared between the source and target BE. You can use the `-m` option (see below) to specify an additional or new set of swap partitions on a source BE for sharing with a target BE.

The `lucreate` command allows you to assign a description to a BE. A description is an optional attribute of a BE that can be of any format or length. It might be, for example, a text string or binary data. After you create a BE, you can change a BE description with the `ludes`(1M) utility.

The `lucreate` command requires root privileges.

OPTIONS

The `lucreate` command has the options listed below. Note that a BE name must not exceed 30 characters in length and must consist only of alphanumeric characters and other ASCII characters that are not special to the Unix shell. See the “Quoting” section of `sh`(1). The BE name can contain only single-byte, 8-bit characters; it cannot contain whitespace characters.

Omission of `-m` or `-M` options (described below) in an `lucreate` command line invokes the FMLI-based interface, which allows you to select disk or device slices for a BE.

`-A BE_description`

Assigns the *BE_description* to a BE. *BE_description* can be a text string or other characters that can be entered on a Unix command line. See `ludes`(1M) for additional information on BE descriptions.

`-c BE_name`

Assigns the name *BE_name* to the current BE. This option is not required and can be used only when the first BE is created. For the first time you run `lucreate`, if you omit `-c`, `lucreate` supplies a default name according to the following rules:

1. If the physical boot device can be determined, the base name of that device is used to name the new boot environment. For example, if the physical boot device is `/dev/dsk/c0t0d0s0`, `lucreate` names the new boot environment `c0t0d0s0`.
2. If the physical boot device cannot be determined, the operating system name (from `uname -s`) and operating system release level (from `uname -r`) are combined to produce the name of the new boot environment. For example, if `uname -s` returns `SunOS` and `uname -r` returns `5.9`, then `lucreate` assigns the name `SunOS5.9` to the new boot environment.
3. If `lucreate` can determine neither boot device nor operating system name, it assigns the name `current` to the new boot environment.

If you use the `-c` option after the first boot environment is created, the option is ignored if the name specified is the same as the current boot environment name. If the name is different, `lucreate` displays an error message and exits.

`-C (boot_device | -)`

Provided for occasions when `lucreate` cannot figure out which physical storage device is your boot device. This might occur, for example, when you have a mirrored root device on the source BE on an x86 machine. The `-C` specifies the physical boot device from which the source BE is booted. Without this option, `lucreate` attempts to determine the physical device from which a BE boots. If the device on which the root file system is located is not a physical disk (for example, if

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root is on a Solaris Volume Manager volume) and `lucreate` is able to make a reasonable guess as to the physical device, you receive the query:

```
Is the physical device devname the boot device for
the logical device devname?
```

If you respond `y`, the command proceeds.

If you specify `-C boot_device`, `lucreate` skips the search for a physical device and uses the device you specify. The `-` (hyphen) with the `-C` option tells `lucreate` to proceed with whatever it determines is the boot device. If the command cannot find the device, you are prompted to enter it.

If you omit `-C` or specify `-C boot_device` and `lucreate` cannot find a boot device, you receive an error message.

Use of the `-C -` form is a safe choice, because `lucreate` either finds the correct boot device or gives you the opportunity to specify that device in response to a subsequent query.

`-f exclude_list_file`

Use the contents of *exclude_list_file* to exclude specific files (including directories) from the newly created BE. *exclude_list_file* contains a list of files and directories, one per line. If a line item is a file, only that file is excluded; if a directory, that directory and all files beneath that directory, including subdirectories, are excluded.

`-I`

Ignore integrity check. Prior to creating a new BE, `lucreate` performs an integrity check, to prevent you from excluding important system files from the BE. Use this option to override this integrity check. The trade-off in use of this option is faster BE creation (with `-I`) versus the risk of a BE that does not function as you expect.

`-l error_log`

Error messages and other status messages are sent to *error_log*, in addition to where they are sent in your current environment.

`-m mount_point:device[,volume]:fs_option`

`[-m mount_point:device:fs_option] ...`

Specifies the `vfstab(4)` information for the new BE. The file systems specified as arguments to `-m` can be on the same disk or can be spread across multiple disks.

mount_point can be any valid mount point or `-` (hyphen), indicating a swap partition. The *device* field can be one of the following:

- The name of a disk slice, of the form `/dev/dsk/cnumtnumdnumsnun.`
- The name of a Solaris Volume Manager volume, of the form `/dev/md/dsk/dnum.`
- The name of a Veritas filesystem, of the form `/dev/md/vxfs/dnum.`
- The keyword `merged`, indicating that the file system at the specified mount point is to be merged with its parent.
- The keyword `shared`, indicating that all of the swap partitions in the source BE are to be shared with the new BE.

You can abbreviate the names of physical disk devices and Solaris Volume Manager volumes to the shortest name that uniquely identifies a device. For example, if a machine has only one disk controller and one disk drive, for the device `/dev/dsk/c0t0d0s0`, you can omit the `/dev/dsk/c0t0d0` and use the name `s0`. If a machine has a single controller and multiple disks, you might use `t0d0s0`; with multiple controllers, `c0t0d0s0`. A Solaris Volume Manager volume can be identified by its *dnum* designation, so that, for example, `/dev/md/dsk/d10` becomes simply `d10`.

The `-m` option enables you to attach a physical disk device to a Solaris Volume Manager single-slice concatenation or attach a Solaris Volume Manager volume to a mirror. Both operations are accomplished with the `attach` keyword, described below. With this option, you have the choice of specifying a concatenation or mirror or allowing `lucreate` to select one for you. To specify a concatenation or mirror, append a comma and the name of the Solaris Volume Manager logical device to the device name to which the logical device is being attached. If you omit this specification, `lucreate` selects a concatenation or mirror from a list of free devices. See EXAMPLES.

The *fs_option* field can be one or more of the keywords listed below. The first two keywords specify types of file systems. The remaining keywords specify actions to be taken on a file system. When you specify multiple keywords, separate these with a comma.

ufs

Create the file system as a UFS volume.

vxfs

Create the file system as a Veritas device.

preserve

Preserve the file system contents of the specified physical storage device. Use of this keyword presumes that the device's file system and its contents are appropriate for the specified mount point. For a given mount point, you can use `preserve` with only one device. This keyword enables you to bypass the default steps of creating a new file system on the specified storage device, then copying the file system contents from the source BE to the specified device. When you use `preserve`, `lucreate` checks that the storage device's contents is suitable for a specified file system. This check is limited and cannot guarantee suitability.

mirror

Create a mirror on the specified storage device. The specified storage device must be a correctly named (for example, `/dev/md/dsk/d10` or `d10`) logical device that can serve as a mirror. In subsequent `-m` options, you must specify `attach` (see below) to attach at least one physical device to the new mirror.

attach

Attach a physical storage device, contained by a volume, to the mirror or single-slice concatenation associated with a specified mount point. When using `attach`, if you want to attach a disk to a specific mirror or concatenation, you append a comma and the name of that logical device to the device name. If you

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omit the comma and the concatenation name, `lucreate` selects a free mirror or single-slice concatenation as the container volume for the storage device. See EXAMPLES.

`lucreate` allows you to create only concatenations that contain a single physical drive and allows you to attach up to four such concatenations to a mirror.

`detach`

Detach a physical storage device from the mirror or concatenation associated with a specified mount point.

At minimum, you must specify one disk or device slice, for root. You can do this with `-m`, `-M` (described below), or in the FMLI-based interface. You must specify an `-m` argument for each file system you want to create on a new BE. For example, if you have three file systems on a source BE (say, `/`, `/usr`, and `/var`) and want these three entities as separate file systems on a new BE, you must specify three `-m` arguments. If you were to specify only one, in our example, `/`, `/usr`, and `/var` would be merged on the new BE into a single file system, under `/`.

When using the `-m` option to specify swap partition(s), you can designate device(s) currently used for swap on any BE and any unused devices. Regarding swap assignments, you have the following choices:

- Omit any specification of swap devices, in which case all swap devices associated with the source BE will be used by the new BE.
- Specify one or more swap devices, in which case the new BE will use only the specified swap devices and not automatically share the swap devices associated with the source BE.
- Specify one or more swap devices and use the syntax `-m - :shared:swap`, in which case the new BE will use the specified swap devices and will share swap devices with the source BE.

See EXAMPLES, below.

`-M slice_list`

List of `-m` options, collected in the file `slice_list`. Specify these arguments in the format specified for `-m`. Comment lines, beginning with a hash mark (`#`), are ignored. The `-M` option is useful where you have a long list of file systems for a BE. Note that you can combine `-m` and `-M` options. For example, you can store swap partitions in `slice_list` and specify `/` and `/usr` slices with `-m`.

The `-m` and `-M` options support the listing of multiple slices for a given mount point. In processing these slices, `lucreate` skips any unavailable slices and selects the first available slice. See EXAMPLES.

`-n BE_name`

The name of the BE to be created. `BE_name` must be unique on a given system.

- o *outfile*
All command output is sent to *outfile*, in addition to where it is sent in your current environment.
- s (- | *BE_name*)
Source for the creation of the new BE. This option enables you to use a BE other than the current BE as the source for creation of a new BE. If you specify a hyphen (-) as an argument to -s, lucreate creates the new BE, but does not populate it. You must then either populate the BE using lumake(1M) or install a flash archive on the BE using luupgrade(1M). This option is especially useful for installing a flash archive. See flar(1M).
- x *exclude*
Exclude the file or directory *exclude* from the newly created BE. If *exclude* is a directory, lucreate excludes that directory and all files beneath that directory, including subdirectories.
- X
Enable XML output. Characteristics of XML are defined in DTD, in /usr/share/lib/xml/dtd/lu_cli.dtd.<num>, where <num> is the version number of the DTD file.
- y *include*
Include the file or directory *include* in the newly created BE. If *include* is a directory, lucreate includes that directory and all files beneath that directory, including subdirectories.
- Y *include_list_file*
Use the contents of *include_list_file* to include specific files (including directories) from the newly created BE. *include_list_file* contains a list of files and directories, one per line. If a line item is a file, only that file is included; if a directory, that directory and all files beneath that directory, including subdirectories, are included.
- z *filter_list_file*
filter_list_file contains a list of items, files and directories, one per line. Each item is preceded by either a +, indicating the item is to be included in the new BE, or -, indicating the item is to be excluded from the new BE.

Combining File Inclusion and Exclusion Options

The lucreate command allows you to include or exclude specific files and directories when creating a new BE. You can include files and directories with:

- the -y *include* option
- the -Y *include_list_file* option
- items with a leading + in the file used with the -z *filter_list* option

You can exclude files and directories with:

- the -x *exclude* option
- the -f *exclude_list_file* option
- items with a leading - in the file used with the -z *filter_list* option

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If the parent directory of an excluded item is included with include options (for example, *-y include*), then only the specific file or directory specified by *exclude* is excluded. Conversely, if the parent directory of an included file is specified for exclusion, then only the file *include* is included. For example, if you specify:

```
-x /a -y /a/b
```

all of /a except for /a/b is excluded. If you specify:

```
-y /a -x /a/b
```

all of /a except for /a/b is included.

EXAMPLES

The `lucreate` command produces copious output. In the following examples, this output is not reproduced, except where it is needed for clarity.

EXAMPLE 1 Creating a New Boot Environment for the First Time

The following command sequence creates a new boot environment on a machine on which a BE has never been created. All non-shareable (critical) file systems are mounted under /.

```
# lucreate -c first_disk -m /:/dev/dsk/c0t4d0s0:ufs -n second_disk
many lines of output
lucreate: Creation of Boot Environment <second_disk> successful.
```

The following command, like the preceding, creates a new boot environment on a machine on which a BE has never been created. However, the following command differs in two respects: the `-c` option is omitted and the `/usr` file system is mounted on its own disk slice, separate from /.

```
# lucreate -m /:/dev/dsk/c0t4d0s0:ufs -m /usr:/dev/dsk/c0t4d0s1:ufs \
-n second_disk
lucreate: Please wait while your system configuration is determined.
many lines of output
lucreate: Creation of Boot Environment c0t4d0s0 successful.
```

In the absence of the `-c` option, `lucreate` assigns the name `c0t4d0s0`, the base name of the root device, to the new boot environment.

The same command is entered, with the addition of `-c`:

```
# lucreate -c first_disk -m /:/dev/dsk/c0t4d0s0:ufs \
-m /usr:/dev/dsk/c0t4d0s1:ufs -n second_disk
many lines of output
lucreate: Creation of Boot Environment <second_disk> successful.
```

Following creation of a BE, you use `luupgrade(1M)` to upgrade the OS on the new BE and `luactivate(1M)` to make that BE the BE you will boot from upon the next reboot of your machine. Note that the swap partition and all shareable file systems for `first_disk` will be available to (shared with) `second_disk`.

```
# luupgrade -u -n second_disk \
-s /net/installmachine/export/solarisX/OS_image
many lines of output
```

EXAMPLE 1 Creating a New Boot Environment for the First Time (Continued)

```
luupgrade: Upgrade of Boot Environment <second_disk> successful.
# luactivate second_disk
```

See `luupgrade(1M)` and `luactivate(1M)` for descriptions of those commands.

EXAMPLE 2 Creating a BE using a Source Other than the Current BE

The following command uses the `-s` option to specify a source BE other than the current BE.

```
# lucreate -s third_disk -m /:/dev/dsk/c0t4d0s0:ufs \
-m /usr:/dev/dsk/c0t4d0s1:ufs -n second_disk
many lines of output
lucreate: Creation of Boot Environment <second_disk> successful.
```

EXAMPLE 3 Creating a BE from a Flash Archive

Performing this task involves use of `lucreate` with the `-s -` option and `luupgrade`.

```
# lucreate -s - -m /:/dev/dsk/c0t4d0s0:ufs -m /usr:/dev/dsk/c0t4d0s1:ufs \
-n second_disk
brief messages
lucreate: Creation of Boot Environment <second_disk> successful.
```

With the `-s` option, the `lucreate` command completes its work within seconds. At this point, you can use `luupgrade` to install the flash archive:

```
# luupgrade -f -n second_disk \
-s /net/installmachine/export/solarisX/OS_image \
-J "archive_location http://example.com/myflash.flar"
```

See `luupgrade(1M)` for a description of that command.

EXAMPLE 4 Sharing and Adding Swap Partitions

In the simplest case, if you do not specify any swap partitions in an `lucreate` command, all swap partitions in the source BE are shared with the new BE. For example, assume that the current BE uses `/dev/dsk/c0t4d0s7` as its swap partition. You enter the command:

```
# lucreate -n second_disk -m /:/dev/dsk/c0t4d0s0:ufs
many lines of output
lucreate: Creation of Boot Environment <second_disk> successful.
```

Upon conclusion of the preceding command, the partition `/dev/dsk/c0t4d0s7` will be used by the BE `second_disk` when that BE is activated and booted.

If you want a new BE to use a different swap partition from that used by the source BE, enter one or more `-m` options to specify a new partition or new partitions. Assume, once again, that the current BE uses `/dev/dsk/c0t4d0s7` as its swap partition. You enter the command:

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EXAMPLE 4 Sharing and Adding Swap Partitions (Continued)

```
# lucreate -m /:/dev/dsk/c0t0d0s0:ufs -m -:/dev/dsk/c0t4d0s1:swap \
-m -:/dev/dsk/c0t4d0s2:swap -n second_disk
many lines of output
lucreate: Creation of Boot Environment <second_disk> successful.
```

Upon activation and boot, the new BE `second_disk` will use `/dev/dsk/c0t4d0s1` and `/dev/dsk/c0t4d0s2` and will not use `/dev/dsk/c0t4d0s7`, the swap partition used by the source BE.

Assume you want the new BE `second_disk` to share the source BE's swap partition and have an additional swap partition. You enter:

```
# lucreate -m /:/dev/dsk/c0t0d0s0:ufs -m -:/dev/dsk/c0t4d0s1:swap \
-m -:/dev/dsk/c0t4d0s7:swap -n second_disk
many lines of output
lucreate: Creation of Boot Environment <second_disk> successful.
```

Upon activation and boot, the new BE `second_disk` will use for swapping `/dev/dsk/c0t4d0s7`, shared with the source BE, and, in addition, `/dev/dsk/c0t4d0s1`.

EXAMPLE 5 Using Swap Partitions on Multiple Disks

The command below creates a BE on a second disk and specifies swap partitions on both the first and second disks.

```
# lucreate -m /:/dev/dsk/c0t4d0s0:ufs -m -:/dev/dsk/c0t4d0s1:swap \
-m -:/dev/dsk/c0t0d0s1:swap -n second_disk
many lines of output
lucreate: Creation of Boot Environment <second_disk> successful.
```

Following completion of the preceding command, the BE `second_disk` will use both `/dev/dsk/c0t0d0s1` and `/dev/dsk/c0t4d0s1` as swap partitions. These swap assignments take effect only after booting from `second_disk`. If you have a long list of swap partitions, it is useful to use the `-M` option, as shown below.

EXAMPLE 6 Using a Combination of -m and -M Options

In this example, a list of swap partitions is collected in the file `/etc/lu/swapslices`. The location and name of this file is user-defined. The contents of `/etc/lu/swapslices`:

```
-:/dev/dsk/c0t3d0s2:swap
-/dev/dsk/c0t3d0s2:swap
-/dev/dsk/c0t4d0s2:swap
-/dev/dsk/c0t5d0s2:swap
-/dev/dsk/c1t3d0s2:swap
-/dev/dsk/c1t4d0s2:swap
-/dev/dsk/c1t5d0s2:swap
```

This file is specified in the following command:

EXAMPLE 6 Using a Combination of -m and -M Options (Continued)

```
# lucreate -m /:/dev/dsk/c0t4d0s0:ufs -m /usr:/dev/dsk/c0t4d0s1:ufs \
-M /etc/lu/swapslices -n second_disk
many lines of output
lucreate: Creation of Boot Environment <second_disk> successful.
```

The BE `second_disk` will swap onto the partitions specified in `/etc/lu/swapslices`.

EXAMPLE 7 Copying Versus Sharing

The following command copies the user file system `/home` (in addition to the non-shareable file systems `/` and `/usr`) from the current BE to the new BE:

```
# lucreate /:/dev/dsk/c0t4d0s0:ufs -m /usr:/dev/dsk/c0t4d0s1:ufs \
-m /home:/dev/dsk/c0t4d0s4:ufs -n second_disk
```

The following command differs from the preceding in that the `-m` option specifying a destination for `/home` is omitted. The result of this is that `/home` will be shared between the current BE and the BE `second_disk`.

```
# lucreate /:/dev/dsk/c0t4d0s0:ufs -m /usr:/dev/dsk/c0t4d0s1:ufs \
-n second_disk
```

EXAMPLE 8 Using Solaris Volume Manager Volumes

The command shown below does the following:

1. Creates the mirror `d10` and establishes this mirror as the receptacle for the root file system.
2. Attaches `c0t0d0s0` and `c0t1d0s0` to single-slice concatenations `d1` and `d2`, respectively. Note that the specification of these volumes is optional.
3. Attaches the concatenations associated with `c0t0d0s0` and `c0t1d0s0` to mirror `d10`.
4. Copies the current BE's root file system to mirror `d10`, overwriting any `d10` contents.

```
# lucreate -m /:/dev/md/dsk/d10:ufs,mirror \
-m /:/dev/dsk/c0t0d0s0,d1:attach \
-m /:/dev/dsk/c0t1d0s0,d2:attach -n newBE
```

The following command differs from the preceding only in that concatenations for the physical storage devices are not specified. In this example, `lucreate` chooses concatenation names from a list of free names and attaches these volumes to the mirror specified in the first `-m` option.

```
# lucreate -m /:/dev/md/dsk/d10:ufs,mirror \
-m /:/dev/dsk/c0t0d0s0:attach \
-m /:/dev/dsk/c0t1d0s0:attach -n newBE
```

EXAMPLE 8 Using Solaris Volume Manager Volumes (Continued)

The following command differs from the preceding commands in that one of the physical disks is detached from a mirror before being attached to the mirror you create. Also, the contents of one of the physical disks is preserved. The command does the following:

1. Creates the mirror `d10` and establishes this mirror as the receptacle for the root file system.
2. Detaches `c0t0d0s0` from the mirror to which it is currently attached.
3. Attaches `c0t0d0s0` and `c0t1d0s0` to concatenations `d1` and `d2`, respectively. Note that the specification of these concatenations is optional.
4. Preserves the contents of `c0t0d0s0`, which presumes that `c0t0d0s0` contains a valid copy of the current BE's root file system.
5. Attaches the concatenations associated with `c0t0d0s0` and `c0t1d0s0` (`d1` and `d2`) to mirror `d10`.

```
# lucreate -m /:/dev/md/dsk/d10:ufs,mirror \
-m /:/dev/dsk/c0t0d0s0,d1:detach,attach,preserve \
-m /:/dev/dsk/c0t1d0s0,d2:attach -n newBE
```

The preceding command can be abbreviated as follows:

```
# lucreate -m /:d10:ufs,mirror \
-m /:c0t0d0s0:detach,attach,preserve \
-m /:c0t1d0s0:attach -n newBE
```

In the preceding, note that the device names (both physical and logical) are shortened and that the specifiers for the concatenations (`d1` and `d2`) are omitted.

The following command is a follow-on to the first command in this set of examples. This command detaches a concatenation (containing `c0t0d0s0`) from one mirror (`d10`, in the first command) and attaches it to another (`d20`), preserving its contents.

```
# lucreate -m /:/dev/md/dsk/d20:ufs,mirror \
-m /:/dev/dsk/c0t0d0s0:detach,attach,preserve -n nextBE
```

The following command creates two mirrors, placing the `/` file system of the new BE on one mirror and the `/opt` file system on the other.

```
# lucreate -m /:/dev/md/dsk/d10:ufs,mirror \
-m /:/dev/dsk/c0t0d0s0,d1:attach \
-m /:/dev/dsk/c1t0d0s0,d2:attach \
-m /opt:/dev/md/dsk/d11:ufs,mirror \
-m /opt:/dev/dsk/c2t0d0s1,d3:attach \
-m /opt:/dev/dsk/c3t1d0s1,d4:attach -n anotherBE
```

EXAMPLE 9 Invoking FMLI-based Interface

The command below, by omitting `-m` or `-M` options, invokes the FMLI-based interface for Live Upgrade operations. See `lu(1M)` for a description of this interface.

EXAMPLE 9 Invoking FMLI-based Interface (Continued)

```
# lucreate -n second_disk
```

The preceding command uses the current BE as the source for the target BE `second_disk`. In the FMLI interface, you can specify the target disk slices for `second_disk`. The following command is a variation on the preceding:

```
# lucreate -n second_disk -s third_disk
```

In the preceding command, a source for the target BE is specified. As before, the FMLI interface comes up, enabling you to specify target disk slices for the new BE.

EXAMPLE 10 Merging File Systems

The command below merges the `/usr/opt` file system into the `/usr` file system. First, here are the disk slices in the BE `first_disk`, expressed in the format used for arguments to the `-m` option:

```
:/dev/dsk/c0t4d0s0:ufs
/usr:/dev/dsk/c0t4d0s1:ufs
/usr/opt:/dev/dsk/c0t4d0s3:ufs
```

The following command creates a BE `second_disk` and performs the merge operation, merging `/usr/opt` with its parent, `/usr`.

```
# lucreate -m /dev/dsk/c0t4d0s0:ufs -m /usr:/dev/dsk/c0t4d0s1:ufs \
-m /usr/opt:merged:ufs -n second_disk
```

EXAMPLE 11 Splitting a File System

Assume a source BE with `/`, `/usr`, and `/var` all mounted on the same disk slice. The following command creates a BE `second_disk` that has `/`, `/usr`, and `/var` all mounted on different disk slices.

```
# lucreate -m /dev/dsk/c0t4d0s0:ufs -m /usr:/dev/dsk/c0t4d0s1:ufs \
/var:/dev/dsk/c0t4d0s3:ufs -n second_disk
```

This separation of a file system's (such as root's) components onto different disk slices is referred to as splitting a file system.

EXAMPLE 12 Specifying Alternative Slices

The following command uses multiple `-m` options as alternative disk slices for the new BE `second_disk`.

```
# lucreate -m /dev/dsk/c0t4d0s0:ufs -m /dev/dsk/c0t4d0s1:ufs \
-m /dev/dsk/c0t4d0s5:ufs -n second_disk
many lines of output
lucreate: Creation of Boot Environment <second_disk> successful.
```

The preceding command specifies three possible disk slices, `s0`, `s1`, and `s5` for the `/` file system. `lucreate` selects the first one of these slices that is not being used by another BE. Note that the `-s` option is omitted, meaning that the current BE is the source BE for the creation of the new BE.

lucreate(1M)

EXIT STATUS The following exit values are returned:

0 Successful completion.
>0 An error occurred.

FILES /etc/lutab
list of BEs on the system

/usr/share/lib/xml/dtd/lu_cli.dtd.<num>
Live Upgrade DTD (see -X option)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluu

SEE ALSO lu(1M), luactivate(1M), lucancel(1M), lucompare(1M), lucurr(1M),
ludelete(1M), ludesc(1M), lufslis(1M), lumake(1M), lumount(1M),
lurename(1M), lustatus(1M), luupgrade(1M), lutab(4), attributes(5),
live_upgrade(5)

NOTES As is true for any Solaris OE upgrade (and not a feature of Live Upgrade), when splitting a directory into multiple mount points, hard links are not maintained across file systems. For example, if /usr/test1/buglist is hard linked to /usr/test2/buglist, and /usr/test1 and /usr/test2 are split into separate file systems, the link between the files will no longer exist. If lucreate encounters a hard link across file systems, the command issues a warning message and creates a symbolic link to replace the lost hard link.

lucreate cannot prevent you from making invalid configurations with respect to non-shareable file systems. For example, you could enter an lucreate command that would create separate file systems for / and /kernel—an invalid division of /. The resulting BE would be unbootable. When creating file systems for a boot environment, the rules are identical to the rules for creating file systems for the Solaris operating environment.

Mindful of the principle described in the preceding paragraph, consider the following:

- In a source BE, you must have valid vfstab entries for every file system you want to copy to or share with a new BE.
- You cannot create a new BE on a disk with overlapping partitions (that is, partitions that share the same physical disk space). The lucreate command that specifies such a disk might complete, but the resulting BE would be unbootable.

Note – As stated in the description of the -m option, if you use Solaris Volume Manager volumes for boot environments, use lucreate rather than Solaris Volume Manager commands to manipulate these volumes. The Solaris Volume Manager

software has no knowledge of boot environments; the `lucreate` command contains checks that prevent you from inadvertently destroying a boot environment by, for example, overwriting or deleting a Solaris Volume Manager volume.

Live Upgrade supports the release it is distributed on and up to three marketing releases back. For example, if you obtained Live Upgrade with Solaris 9 (including a Solaris 9 upgrade), that version of Live Upgrade supports Solaris versions 2.6, Solaris 7, and Solaris 8, in addition to Solaris 9. No version of Live Upgrade supports a Solaris version prior to Solaris 2.6.

lucurr(1M)

NAME	<code>lucurr</code> – display the name of the active boot environment
SYNOPSIS	<code>/usr/sbin/lucurr</code> [-l <i>error_log</i>] [-m <i>mount_point</i>] [-o <i>outfile</i>] [-X]
DESCRIPTION	The <code>lucurr</code> command is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See <code>live_upgrade(5)</code> for a description of the Live Upgrade feature. The <code>lucurr</code> command displays the name of the currently running boot environment (BE). If no BEs are configured on the system, <code>lucurr</code> displays the message "No Boot Environments are defined". Note that <code>lucurr</code> reports only the name of the current BE, not the BE that will be active upon the next reboot. Use <code>lustatus(1M)</code> or <code>luactivate(1M)</code> for this information. The <code>lucurr</code> command requires root privileges.
OPTIONS	The <code>lucurr</code> command has the following options: -l <i>error_log</i> Error and status messages are sent to <i>error_log</i>, in addition to where they are sent in your current environment. -m <i>mount_point</i> Returns the name of the BE that owns <i>mount_point</i>, where <i>mount_point</i> is the mount point of a BE's root file system. This can be a mount point of the current BE or the mount point of a BE other than the current BE. If the latter, the file system of the BE must have been mounted with <code>lumount(1M)</code> or <code>mount(1M)</code> before entering this option. -o <i>outfile</i> All command output is sent to <i>outfile</i>, in addition to where it is sent in your current environment. -X Enable XML output. Characteristics of XML are defined in DTD, in <code>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></code>, where <i><num></i> is the version number of the DTD file.
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.
FILES	<code>/etc/lutab</code> list of BEs on the system <code>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></code> Live Upgrade DTD (see -X option)

lucurr(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluu

SEE ALSO lu(1M), luactivate(1M), lucancel(1M), lucompare(1M), lucreate(1M),
ludelete(1M), ludesc(1M), lufslis(1M), lumake(1M), lumount(1M),
lurename(1M), lustatus(1M), luupgrade(1M), lutab(4), attributes(5),
live_upgrade(5)

ludelete(1M)

NAME	ludelete – delete a boot environment
SYNOPSIS	/usr/sbin/ludelete [-l <i>error_log</i>] [-o <i>outfile</i>] <i>BE_name</i> [-X]
DESCRIPTION	The ludelete command is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See live_upgrade(5) for a description of the Live Upgrade feature. The ludelete command deletes all records associated with a boot environment (BE) on all defined complete BEs. A complete BE is one that is not participating in an lucreate(1M), luupgrade(1M), or lucompare(1M) operation. Use lustatus(1M) to determine a BE's status. You can delete neither the current BE, nor the BE that will become current upon the next reboot. Also, you cannot delete a BE that has file systems mounted with lumount(1M) or mount(1M). ludelete does not alter any files on the BE being deleted. The ludelete command requires root privileges.
OPTIONS	The ludelete command has the following options: -l <i>error_log</i> Error and status messages are sent to <i>error_log</i>, in addition to where they are sent in your current environment. -o <i>outfile</i> All command output is sent to <i>outfile</i>, in addition to where it is sent in your current environment. -X Enable XML output. Characteristics of XML are defined in DTD, in /usr/share/lib/xml/dtd/lu_cli.dtd.<num>, where <num> is the version number of the DTD file.
OPERANDS	<i>BE_name</i> Name of the BE to be deleted.
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.
FILES	/etc/lutab list of BEs on the system /usr/share/lib/xml/dtd/lu_cli.dtd.<num> Live Upgrade DTD (see -X option)
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

ludelete(1M)

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluu

SEE ALSO lu(1M), luactivate(1M), lucancel(1M), lucompare(1M), lucreate(1M), lucurr(1M), ludesc(1M), lufslist(1M), lumake(1M), lumount(1M), lurename(1M), lustatus(1M), luupgrade(1M), lutab(4), attributes(5), live_upgrade(5)

ludesc(1M)

NAME	<code>ludesc</code> – display or set boot environment description
SYNOPSIS	<pre> /usr/sbin/ludesc {-A BE_description} {-f {filename -}} [-l error_log] [-o outfile] [-X] /usr/sbin/ludesc -n BE_name [-f filename -] [-l error_log] [-o outfile] [-X] /usr/sbin/ludesc -n BE_name [-l error_log] [-o outfile] [-X] BE_description </pre>
DESCRIPTION	The <code>ludesc</code> command is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See <code>live_upgrade(5)</code> for a description of the Live Upgrade feature. The <code>ludesc</code> command allows you to manipulate boot environment (BE) descriptions. A BE description is an optional attribute of a BE. It can be text or binary data. For example, it might be a string such as “S9 beta test BE” or it be a file that contains 8-bit multi-byte characters. The <code>ludesc</code> command in general and the options to manipulate binary-format descriptions in particular are suitable for use in programs. You create a BE description using <code>ludesc</code> or <code>lucreate(1M)</code>. Only <code>ludesc</code> allows you to change a BE description or add a description following BE creation. While a BE description is associated with a BE name, it is not interchangeable with that name. No Live Upgrade command allows you to specify a BE description instead of a BE name when performing an operation on a BE. A shell might restrict what you enter for a BE description (in both <code>ludesc</code> and <code>lucreate(1M)</code>). In entering a description, use the following guidelines: ■ Always enclose a description in single quotes (<code>'</code>), unless the description includes a single quote. ■ If your description includes a single quote, enclose the description in double quotes (<code>"</code>). You then must use an escape sequence (usually a backslash [<code>\</code>]) to enter a character that is special to the shell. See <code>sh(1)</code> for a list of special characters and a description of the escape sequence mechanism. Descriptions that include many special characters might be more conveniently inserted in a file (<code>-f</code> option) than entered on a command line (<code>-A</code> option). When <code>ludesc</code> outputs a BE description, it does so exactly as the description was entered. Because of this feature, a description that is a text string does not have a concluding newline, which means the system prompt immediately follows the last character of the description. The <code>ludesc</code> command requires root privileges.
OPTIONS	The <code>ludesc</code> command has the following options: <code>-A BE_description</code> Displays the BE name associated with <i>BE_description</i>.

	-f <i>{filename -}</i> Specify the BE description contained in <i>filename</i> or read from <code>stdin</code>. When used without <code>-n</code>, displays the BE name associated with the specified BE description. Used with <code>-n</code>, changes the description for the specified BE to the description specified with <code>-f</code>. -l <i>error_log</i> Error and status messages are sent to <i>error_log</i>, in addition to where they are sent in your current environment. -n <i>BE_name</i> With no other arguments, displays the BE description for the specified BE. With the <code>-f</code> option or the <i>BE_description</i> operand, changes the description for the specified BE to that specified with <code>-f</code> or <i>BE_description</i>. -o <i>outfile</i> All command output is sent to <i>outfile</i>, in addition to where it is sent in your current environment. -X Enable XML output. Characteristics of XML are defined in DTD, in <code>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></code>, where <code><num></code> is the version number of the DTD file.
OPERANDS	<i>BE_description</i> Used only with the <code>-n</code> option. <i>BE_description</i> replaces the current BE description for the specified BE.
EXAMPLES	The following are examples of the use of <code>ludesc</code>. EXAMPLE 1 Basic Use The first command, below, assigns a description to a BE. The second command returns the name of the BE associated with the specified description. The last command returns the description associated with a specified BE. <pre># ludesc -n first_disk 'Test disk' Setting description for boot environment <first_disk>. Propagating the change of BE description to all BEs. # ludesc -A 'Test disk' first_disk # # ludesc -n first_disk Test disk#</pre> As seen above and noted in the DESCRIPTION, <code>ludesc</code> does not append a newline to the display of BE description that is a text string.

ludesc(1M)

EXAMPLE 2 Using Binary Files

The following commands are analogs of the preceding examples, substituting a binary file—here, a file containing a description in Russian, using the Cyrillic alphabet—for a text string. In the third command, note the use of a file to capture output. Sending output of a binary file to the console can produce erratic results.

```
# ludesc -n first_disk -f arrayBE.ru
Setting description for boot environment <first_disk>.
Propagating the change of BE description to all BEs.

# ludesc -f arrayBE.ru
first_disk

# ludesc -n first_disk > /tmp/arrayBE.out
```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
>0	An error occurred.

FILES

/etc/lutab
list of BEs on the system

/usr/share/lib/xml/dtd/lu_cli.dtd.<num>
Live Upgrade DTD (see -X option)

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluu

SEE ALSO

lu(1M), luactivate(1M), lucancel(1M), lucompare(1M), lucreate(1M),
ludelete(1M), lufslis(1M), lumake(1M), lumount(1M), lurename(1M),
lustatus(1M), luupgrade(1M), lutab(4), attributes(5), live_upgrade(5)

NAME	lufslst – list configuration of a boot environment
SYNOPSIS	/usr/sbin/lufslst [-l <i>error_log</i>] [-o <i>outfile</i>] <i>BE_name</i> [-X]
DESCRIPTION	The lufslst command is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See live_upgrade(5) for a description of the Live Upgrade feature. The lufslst command lists the configuration of a boot environment (BE). The output contains the disk slice (file system), file system type, and file system size for each BE mount point. The following is an example of lufslst output. <pre># lufslst BE_name Filesystem fstype size(Mb) Mounted on ----- /dev/dsk/c0t0d0s1 swap 512.11 - /dev/dsk/c0t4d0s3 ufs 3738.29 / /dev/dsk/c0t4d0s4 ufs 510.24 /opt</pre> File system type can be ufs, swap, or vxfs, for a Veritas file system. Under the Filesystem heading can be a disk slice or a logical device, such as a disk metadvice used by volume management software. The lufslst command requires root privileges.
OPTIONS	The lufslst command has the following options: -l <i>error_log</i> Error and status messages are sent to <i>error_log</i>, in addition to where they are sent in your current environment. -o <i>outfile</i> All command output is sent to <i>outfile</i>, in addition to where it is sent in your current environment. -X Enable XML output. Characteristics of XML are defined in DTD, in /usr/share/lib/xml/dtd/lu_cli.dtd.<num>, where <num> is the version number of the DTD file.
OPERANDS	<i>BE_name</i> Name of the BE for which file systems are to be reported. You cannot specify a BE that is involved in another Live Upgrade operation.
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.
FILES	/etc/lutab list of BEs on the system

lufslst(1M)

/usr/share/lib/xml/dtd/lu_cli.dtd.<num>
Live Upgrade DTD (see -X option)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluu

SEE ALSO lu(1M), luactivate(1M), lucancel(1M), lucompare(1M), lucreate(1M), lucurr(1M), ludelete(1M), ludesc(1M), lumake(1M), lumount(1M), lurename(1M), lustatus(1M), luupgrade(1M), lutab(4), attributes(5), live_upgrade(5)

NAME	lumake – populate a boot environment														
SYNOPSIS	<pre> /usr/sbin/lumake [-l error_log] [-o outfile] [-s source_BE] -n BE_name [-X] /usr/sbin/lumake [-l error_log] -t time [-o outfile] [-s source_BE] -n BE_name [-m email_address] [-X] </pre>														
DESCRIPTION	The lumake command is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See <code>live_upgrade(5)</code> for a description of the Live Upgrade feature. The lumake command populates (that is, copies files to) the file systems of a specified boot environment (BE) by copying files from the corresponding file systems of the active or a source (-s) BE. Any existing data on the target BE are destroyed. All file systems on the target BE are re-created. The target BE must already exist. Use <code>lucreate(1M)</code> to create a new BE. The lumake command requires root privileges.														
OPTIONS	The lumake command has the following options: <table> <tr> <td>-n <i>BE_name</i></td><td>Name of the BE to be populated.</td></tr> <tr> <td>-s <i>source_BE</i></td><td>The optional name of a source BE. If you omit this option, lumake uses the current BE as the source. A BE must have the status "complete" before you can copy from it. Use <code>lustatus(1M)</code> to determine a BE's status.</td></tr> <tr> <td>-l <i>error_log</i></td><td>Error and status messages are sent to <i>error_log</i>, in addition to where they are sent in your current environment.</td></tr> <tr> <td>-o <i>outfile</i></td><td>All command output is sent to <i>outfile</i>, in addition to where it is sent in your current environment.</td></tr> <tr> <td>-t <i>time</i></td><td>Setup a batch job to populate the specified BE at a specified time. The time is given in the format specified by the <code>at(1)</code> man page. At any time, you can have only one Live Upgrade operation scheduled. You can use <code>lucancel(1M)</code> to cancel a scheduled lumake operation.</td></tr> <tr> <td>-m <i>email_address</i></td><td>Allows you to email lumake output to a specified address upon command completion. There is no checking of <i>email_address</i>. You can use this option only in conjunction with -t.</td></tr> <tr> <td>-X</td><td>Enable XML output. Characteristics of XML are defined in DTD, in <code>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></code>, where <i><num></i> is the version number of the DTD file.</td></tr> </table>	-n <i>BE_name</i>	Name of the BE to be populated.	-s <i>source_BE</i>	The optional name of a source BE. If you omit this option, lumake uses the current BE as the source. A BE must have the status "complete" before you can copy from it. Use <code>lustatus(1M)</code> to determine a BE's status.	-l <i>error_log</i>	Error and status messages are sent to <i>error_log</i> , in addition to where they are sent in your current environment.	-o <i>outfile</i>	All command output is sent to <i>outfile</i> , in addition to where it is sent in your current environment.	-t <i>time</i>	Setup a batch job to populate the specified BE at a specified time. The time is given in the format specified by the <code>at(1)</code> man page. At any time, you can have only one Live Upgrade operation scheduled. You can use <code>lucancel(1M)</code> to cancel a scheduled lumake operation.	-m <i>email_address</i>	Allows you to email lumake output to a specified address upon command completion. There is no checking of <i>email_address</i> . You can use this option only in conjunction with -t.	-X	Enable XML output. Characteristics of XML are defined in DTD, in <code>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></code> , where <i><num></i> is the version number of the DTD file.
-n <i>BE_name</i>	Name of the BE to be populated.														
-s <i>source_BE</i>	The optional name of a source BE. If you omit this option, lumake uses the current BE as the source. A BE must have the status "complete" before you can copy from it. Use <code>lustatus(1M)</code> to determine a BE's status.														
-l <i>error_log</i>	Error and status messages are sent to <i>error_log</i> , in addition to where they are sent in your current environment.														
-o <i>outfile</i>	All command output is sent to <i>outfile</i> , in addition to where it is sent in your current environment.														
-t <i>time</i>	Setup a batch job to populate the specified BE at a specified time. The time is given in the format specified by the <code>at(1)</code> man page. At any time, you can have only one Live Upgrade operation scheduled. You can use <code>lucancel(1M)</code> to cancel a scheduled lumake operation.														
-m <i>email_address</i>	Allows you to email lumake output to a specified address upon command completion. There is no checking of <i>email_address</i> . You can use this option only in conjunction with -t.														
-X	Enable XML output. Characteristics of XML are defined in DTD, in <code>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></code> , where <i><num></i> is the version number of the DTD file.														

lumake(1M)

EXIT STATUS The following exit values are returned:

0 Successful completion.
>0 An error occurred.

FILES /etc/lutab
 list of BEs on the system

/usr/share/lib/xml/dtd/lu_cli.dtd.<num>
 Live Upgrade DTD (see -x option)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluu

SEE ALSO lu(1M), luactivate(1M), lucancel(1M), lucompare(1M), lucreate(1M),
lucurr(1M), ludelete(1M), ludesc(1M), lufslist(1M), lumount(1M),
lurename(1M), lustatus(1M), luupgrade(1M), lutab(4), attributes(5),
live_upgrade(5)

NAME	lumount, luumount – mount or unmount all file systems in a boot environment
SYNOPSIS	<pre> /usr/sbin/lumount [-l error_log] [-o outfile] BE_name [mount_point] [-X] /usr/sbin/luumount [-f] { [-n] BE_name [-m] mount_point block_device } [-l error_log] [-o outfile] [-X] </pre>
DESCRIPTION	The lumount and luumount commands are part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See live_upgrade(5) for a description of the Live Upgrade feature. The lumount and luumount commands enable you to mount or unmount all of the filesystems in a boot environment (BE). This allows you to inspect or modify the files in a BE while that BE is not active. By default, lumount mounts the file systems on a mount point of the form <code>/ .alt .BE_name</code>, where <i>BE_name</i> is the name of the BE whose file systems are being mounted. See NOTES. The lumount and luumount commands require root privileges.
OPTIONS	The lumount and luumount commands have the following options: -f For luumount only, forcibly unmount a BE's file systems after attempting (and failing) an unforced unmount. This option is analogous to the umount(1M) -f option. -l <i>error_log</i> Error and status messages are sent to <i>error_log</i>, in addition to where they are sent in your current environment. -m <i>mount_point</i> luumount unmounts the file systems of the BE that owns <i>mount_point</i>. See description of <i>mount_point</i> under OPERANDS, below. The use of -m is optional when specifying a mount point for luumount. -n <i>BE_name</i> Name of the BE whose file systems will be unmounted. See description of <i>BE_name</i> under OPERANDS, below. The use of -n is optional when specifying a BE name for luumount. -o <i>outfile</i> All command output is sent to <i>outfile</i>, in addition to where it is sent in your current environment. -X Enable XML output. Characteristics of XML are defined in DTD, in <code>/usr/share/lib/xml/dtd/lu_cli.dtd</code>. <code><num></code>, where <code><num></code> is the version number of the DTD file.

lumount(1M)

	For <code>lumount</code>, if you supply an argument and specify neither <code>-m</code> nor <code>-n</code>, the command determines whether your argument is a BE name, a mount point, or a block device. If it is one of these three and the argument is associated with a BE that has mounted file systems, <code>lumount</code> unmounts the file systems of that BE. Otherwise, <code>lumount</code> returns an error.
OPERANDS	<i>BE_name</i> Name of the BE whose file systems will be mounted or unmounted. This is a BE on the current system other than the active BE. Note that, for successful completion of an <code>lumount</code> or <code>luumount</code> command, the status of a BE must be complete, as reported by <code>lustatus(1M)</code>. Also, none of the BE's disk slices can be mounted (through use of <code>mount(1M)</code>). <i>mount_point</i> For <code>lumount</code>, a mount point to use instead of the default <code>/alt.BE_name</code>. If <i>mount_point</i> does not exist, <code>lumount</code> creates it. For <code>luumount</code>, the BE associated with <i>mount_point</i> will have its file systems unmounted. Note that default mount points are automatically deleted upon unmounting with <code>lumount</code>. Mount points that you specify are not deleted. <i>block_device</i> For <code>lumount</code> only, <i>block_device</i> is the root slice of a BE, such as <code>/dev/dsk/c0t4d0s0</code>. <code>lumount</code> unmounts the file systems of the BE associated with <i>block_device</i>.
EXAMPLES	EXAMPLE 1 Specifying a Mount Point The following command creates the mount point <code>/test</code> and mounts the file systems of the BE <code>second_disk</code> on <code>/test</code>. <pre># lumount second_disk /test /test</pre> You can then <code>cd</code> to <code>/test</code> to view the file systems of <code>second_disk</code>. If you did not specify <code>/test</code> as a mount point, <code>lumount</code> would create a default mount point named <code>/alt.second_disk</code>. EXAMPLE 2 Unmounting File Systems The following command unmounts the file systems of the BE <code>second_disk</code>. In this example, we <code>cd</code> to <code>/</code> to ensure we are not in any of the file systems in <code>second_disk</code>. <pre># cd / # luumount second_disk #</pre> If <code>/dev/dsk/c0t4d0s0</code> were the root slice for <code>second_disk</code>, you could enter the following command to match the effect of the preceding command. <pre># cd / # luumount /dev/dsk/c0t4d0s0 #</pre>
EXIT STATUS	The following exit values are returned:

0 Successful completion.
 >0 An error occurred.

FILES

/etc/lutab
 list of BEs on the system
 /usr/share/lib/xml/dtd/lu_cli.dtd.<num>
 Live Upgrade DTD (see -x option)

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluu

SEE ALSO

lu(1M), luactivate(1M), lucancel(1M), lucompare(1M), lucreate(1M),
 lucurr(1M), ludelete(1M), ludesc(1M), lufslis(1M), lumake(1M),
 lurename(1M), lustatus(1M), luupgrade(1M), lutab(4), attributes(5),
 live_upgrade(5)

NOTES

If a BE name contains slashes (/), lumount replaces those slashes with colons in a default mount point name. For example:

```
# lumount 'first/disk'
/.alt.first:disk
```

lurename(1M)

NAME	lurename – change the name of a boot environment										
SYNOPSIS	/usr/sbin/lurename -e <i>BE_name</i> -n <i>new_name</i> [-l <i>error_log</i>] [-o <i>outfile</i>] [-X]										
DESCRIPTION	The lurename command is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See <code>live_upgrade(5)</code> for a description of the Live Upgrade feature. The lurename command renames the boot environment (BE) <i>BE_name</i> to <i>new_name</i>. The string <i>new_name</i> must not exceed 30 characters in length and must consist only of alphanumeric characters and other ASCII characters that are not special to the Unix shell. See the “Quoting” section of <code>sh(1)</code>. The BE name can contain only single-byte, 8-bit characters. It cannot contain whitespace characters. Also, <i>new_name</i> must be unique on the system. A BE must have the status “complete” before you rename it. Use <code>lustatus(1M)</code> to determine a BE’s status. Also, you cannot rename a BE that has file systems mounted with <code>lumount(1M)</code> or <code>mount(1M)</code>. Renaming a BE is often useful when you upgrade the BE from one Solaris release to another. For example, following an operating system upgrade, you might rename the BE <code>solaris7</code> to <code>solaris8</code>. The lurename command requires root privileges.										
OPTIONS	The lurename command has the options listed below. <table><tr><td>-e <i>BE_name</i></td><td>Name of the BE whose name you want to change.</td></tr><tr><td>-l <i>error_log</i></td><td>Error and status messages are sent to <i>error_log</i>, in addition to where they are sent in your current environment.</td></tr><tr><td>-n <i>new_name</i></td><td>New name of the BE. <i>new_name</i> must be unique on a given system.</td></tr><tr><td>-o <i>outfile</i></td><td>All command output is sent to <i>outfile</i>, in addition to where it is sent in your current environment.</td></tr><tr><td>-X</td><td>Enable XML output. Characteristics of XML are defined in DTD, in <code>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></code>, where <code><num></code> is the version number of the DTD file.</td></tr></table>	-e <i>BE_name</i>	Name of the BE whose name you want to change.	-l <i>error_log</i>	Error and status messages are sent to <i>error_log</i> , in addition to where they are sent in your current environment.	-n <i>new_name</i>	New name of the BE. <i>new_name</i> must be unique on a given system.	-o <i>outfile</i>	All command output is sent to <i>outfile</i> , in addition to where it is sent in your current environment.	-X	Enable XML output. Characteristics of XML are defined in DTD, in <code>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></code> , where <code><num></code> is the version number of the DTD file.
-e <i>BE_name</i>	Name of the BE whose name you want to change.										
-l <i>error_log</i>	Error and status messages are sent to <i>error_log</i> , in addition to where they are sent in your current environment.										
-n <i>new_name</i>	New name of the BE. <i>new_name</i> must be unique on a given system.										
-o <i>outfile</i>	All command output is sent to <i>outfile</i> , in addition to where it is sent in your current environment.										
-X	Enable XML output. Characteristics of XML are defined in DTD, in <code>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></code> , where <code><num></code> is the version number of the DTD file.										
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>>0</td><td>An error occurred.</td></tr></table>	0	Successful completion.	>0	An error occurred.						
0	Successful completion.										
>0	An error occurred.										

lurename(1M)

FILES /etc/lutab
list of BEs on the system

/usr/share/lib/xml/dtd/lu_cli.dtd.<num>
Live Upgrade DTD (see -X option)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluu

SEE ALSO lu(1M), luactivate(1M), lucancel(1M), lucompare(1M), lucreate(1M),
lucurr(1M), ludelete(1M), ludesc(1M), lufslis(1M), lumake(1M),
lumount(1M), lustatus(1M), luupgrade(1M), lutab(4), attributes(5),
live_upgrade(5)

lustatus(1M)

NAME

SYNOPSIS

DESCRIPTION

lustatus – display status of boot environments

/usr/sbin/lustatus

[-l error_log]

[-o outfile]

[BE_name]

[-X]

The lustatus command is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See live_upgrade(5) for a description of the Live Upgrade feature.

The lustatus command displays the status information of the boot environment (BE) BE_name. If no BE is specified, the status information for all BEs on the system is displayed.

The headings in the lustatus information display are described as follows:

Boot Environment Name

Name of the BE.

Is Complete

Indicates whether a BE is able to be booted. Any current activity or failure in an lucreate() or luupgrade(1M) operation causes a BE to be incomplete. For example, if there is a copy operation proceeding on or scheduled for a BE, that BE is considered incomplete.

Active Now

Indicates whether the BE is currently active. The “active” BE is the one currently booted.

Active On Reboot

Indicates whether the BE becomes active upon next reboot of the system.

Can Delete

Indicates that no copy, compare, or upgrade operations are being performed on a BE. Also, none of that BE’s file systems are currently mounted. With all of these conditions in place, the BE can be deleted.

Copy Status

Indicates whether the creation or repopulation of a BE is scheduled or active (that is, in progress). A status of ACTIVE, COMPARING (from lucompare(1M)), UPGRADING, or SCHEDULED prevents you performing Live Upgrade copy, rename, or upgrade operations.

The following is an example lustatus display:

Boot Environment Name

Is Complete

Active Now

Active On Reboot

Can Delete

Copy Status

disk_a_S7

yes

yes

yes

no

-

disk_b_S7db

yes

no

no

no

UPGRADING

disk_b_S8

no

no

no

no

-

S9testbed

yes

no

no

yes

-

Note that you could not perform copy, rename, or upgrade operations on disk_b_S8, because it is not complete, nor on disk_b_S7db, because a Live Upgrade operation is pending.

	The <code>lustatus</code> command requires root privileges.				
OPTIONS	The <code>lustatus</code> command has the following options: -l <i>error_log</i> Error and status messages are sent to <i>error_log</i>, in addition to where they are sent in your current environment. -o <i>outfile</i> All command output is sent to <i>outfile</i>, in addition to where it is sent in your current environment. -X Enable XML output. Characteristics of XML are defined in DTD, in <code>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></code>, where <i><num></i> is the version number of the DTD file.				
OPERANDS	<i>BE_name</i> Name of the BE for which to obtain status. If <i>BE_name</i> is omitted, <code>lustatus</code> displays status for all BEs in the system.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.				
FILES	<code>/etc/lutab</code> list of BEs on the system <code>/usr/share/lib/xml/dtd/lu_cli.dtd.<num></code> Live Upgrade DTD (see -X option)				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWluu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWluu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWluu				
SEE ALSO	<code>lu(1M)</code>, <code>luactivate(1M)</code>, <code>lucancel(1M)</code>, <code>lucompare(1M)</code>, <code>lucreate(1M)</code>, <code>lucurr(1M)</code>, <code>ludesc(1M)</code>, <code>ludelete(1M)</code>, <code>lufsls(1M)</code>, <code>lumake(1M)</code>, <code>lumount(1M)</code>, <code>lurename(1M)</code>, <code>luupgrade(1M)</code>, <code>lutab(4)</code>, <code>attributes(5)</code>, <code>live_upgrade(5)</code>				

luupgrade(1M)

NAME	luupgrade – installs, upgrades, and performs other functions on software on a boot environment
SYNOPSIS	/usr/sbin/luupgrade [-iIufpPtTcC] [<i>options</i>]
DESCRIPTION	The luupgrade command is part of a suite of commands that make up the Live Upgrade feature of the Solaris operating environment. See live_upgrade(5) for a description of the Live Upgrade feature. The luupgrade command enables you to install software on a specified boot environment (BE). Specifically, luupgrade performs the following functions: ■ Upgrades an operating system image on a BE (-u option). The source for the image can be any valid Solaris installation medium, including a Solaris Flash archive. ■ Run an installer program to install software from an installation medium (-i option). ■ Extract a Solaris Flash archive onto a BE (-f option). (See flar(1M).) ■ Add a package to (-p) or remove a package from (-P) a BE. ■ Add a patch to (-t) or remove a patch from (-T) a BE. ■ Check (-C) or obtain information about (-I) packages. ■ Check an operating system installation medium (-c). Before using luupgrade, you must have created a BE, using either the lucreate(1M) command or lu(1M), the FMLI-based user interface. You can upgrade only BEs other than the current BE. The functions described in the preceding list each has its own set of options, which are described separately for each function. Note that, for successful completion of an luupgrade operation, the status of a BE must be complete, as reported by lustatus(1M). Also, the BE must not have any mounted disk slices, mounted either with lumount(1M) or mount(1M). luupgrade allows you to install an operating system image from a different marketing release of the Solaris operating system from the release running on the machine from which you invoke luupgrade. This feature has the following conditions: ■ You can install Live Upgrade packages (SUNWluu and SUNWlur) from a given release of the Solaris operating system on a machine running a previous release. You can install these packages on a machine running a version of Solaris that is up to three releases prior to the release of the Live Upgrade packages. Live Upgrade is not supported on Solaris releases prior to Solaris 2.6. Thus, you can, for example, install Solaris 2.9 packages on Solaris 2.8, 2.7, and 2.6 machines. ■ You can upgrade to a release of the Solaris operating system that is the same as the release of the Live Upgrade packages installed on a machine. This feature allows you to upgrade to Solaris upgrade releases within a marketing release. For example, if have the Solaris 9 FCS Live Upgrade packages installed on a machine,

**Options that
Apply to All Uses**

you can use `luupgrade` to upgrade a BE to the Solaris 9 update 3 release of the Solaris operating system.

See the *Solaris Installation Guide* for instructions on installing Live Upgrade packages.

The `luupgrade` command requires root privileges.

The following options are available for all uses of `luupgrade`:

`-l error_log`

Error and status messages are sent to *error_log*, in addition to where they are sent in your current environment.

`-o outfile`

All command output is sent to *outfile*, in addition to where it is sent in your current environment.

`-N`

Dry-run mode. Enables you to determine whether your command arguments are correctly formed. Does not apply to the `-c` (check medium) function.

`-X`

Enable XML output. Characteristics of XML are defined in DTD, in `/usr/share/lib/xml/dtd/lu_cli.dtd.<num>`, where *<num>* is the version number of the DTD file.

**Upgrading an
Operating System
Image**

The `luupgrade` command uses `-u` to upgrade an operating system image. The syntax is as follows:

```
luupgrade -u -n BE_name -s os_image_path [ -j profile_path [-D] ]
[ -l error_log ] [ -o outfile ] [-N]
```

The first option, `-u`, indicates the function to perform—to install an OS image. The remaining options for this use of `luupgrade`, shown above, are described as follows:

`-n BE_name`

Name of the BE to receive an OS upgrade.

`-s os_image_path`

Path name of a directory containing an OS image. This can be a directory on an installation medium such as a CD-ROM or can be an NFS or UFS directory.

`-j profile_path`

Path to a JumpStart profile. See the section “JumpStart Profile Keywords,” below, for a list of valid keywords for use in a profile invoked by `luupgrade`. See `pfinstall(1M)` and the Solaris installation documentation for information on the JumpStart software.

`-D`

Tests the profile values provided with `-j` against the disk configuration of the specified BE. The upgrade is not performed. The effect of this option is a dry run to test your profile. `luupgrade` creates log files, specified in its output, which allow you to examine the command’s results.

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Running an Installer Program

Note that if you are upgrading from a medium with multiple components, such as from multiple CDs, use `luupgrade` with the `-i` option, as described in the section below, to install software from the second and any following media.

The `luupgrade` command uses `-i` to run an installer program. The syntax is as follows:

```
luupgrade -i -n BE_name -s installation_medium [ -N ]  
[ -O "installer_options" ] [ -l error_log ] [ -o outfile ]
```

The first option, `-i`, indicates the function to perform—to run an installer program on the installation specified with `-s`. The remaining options for this use of `luupgrade`, shown above, are described as follows:

`-n BE_name`

Name of the BE on which software is to be installed.

`-O "installer_options"`

Options passed directly to the Solaris installer program. See `installer(1M)` for descriptions of the installer options.

`-s installation_medium`

Path name of an installation medium. This can be a CD, or an NFS or UFS directory.

With the `-i` option, `luupgrade` looks for an installation program on the specified medium and runs that program.

The `-i` option has a special use when you use the `-u` option, described above, to install software from a multiple-component medium, such as multiple CDs. See **EXAMPLES**.

Installing from a Solaris Flash Archive

The `luupgrade` command uses `-f` to install an operating system from a Solaris Flash archive. Note that installing an archive overwrites all files on the target BE. The syntax is as follows:

```
luupgrade -f -n BE_name -s os_image_path ( -a archive | -j profile_path  
| -J "profile" ) [ -l error_log ] [ -o outfile ] [-D] [ -N ]
```

The first option, `-f`, indicates the function to perform—to install an OS from a Solaris Flash archive. The remaining options for this use of `luupgrade`, shown above, are described as follows:

`-n BE_name`

Name of the BE to receive an OS installation.

`-s os_image_path`

Path name of a directory containing an OS image. This can be a directory on an installation medium, such as a CD-ROM, or can be an NFS or UFS directory.

`-a archive`

Path to the Solaris Flash archive when the archive is available on the local file system. You must specify one of `-a`, `-j`, or `-J`.

-j *profile_path*

Path to a JumpStart profile that is configured for a Solaris Flash installation. See the section "JumpStart Profile Keywords," below, for a list of valid keywords for use in a profile invoked by `luupgrade`. See `pfinstall(1M)` and the Solaris installation documentation for information on the JumpStart software. You must specify one of `-a`, `-j`, or `-J`.

-J "*profile*"

Entry from a JumpStart profile that is configured for a Solaris Flash installation. The only valid keyword for this option is `archive_location`. See `pfinstall(1M)` and the Solaris installation documentation for information on the JumpStart software. You must specify one of `-a`, `-j`, or `-J`.

-D

Tests the profile values provided with `-j` or `-J` against the disk configuration of the specified BE. The upgrade is not performed. The effect of this option is a dry run to test your profile. `luupgrade` creates log files, specified in its output, which allow you to examine the command's results.

Note that the version of the OS image specified with `-s` must be identical to the version of the OS contained in the Solaris Flash archive specified with the `-a`, `-j`, or `-J` options.

Add or Remove Packages

The `luupgrade` command uses `-p` to add a package and `-P` to remove a package. The syntax is as follows:

For adding packages:

```
luupgrade -p -n BE_name -s packages_path [ -l error_log ] [ -o outfile ]
[ -O "pkgadd_options" ] [ -a admin ] [ pkginst [ pkginst... ] ] [ -N ]
```

For removing packages:

```
luupgrade -P -n BE_name [ -l error_log ] [ -o outfile ]
[ -O "pkgrm_options" ] [ pkginst [ pkginst... ] ] [ -N ]
```

The first option, `-p`, to add packages, or `-P` to remove packages, indicates the function to perform. The remaining options for this use of `luupgrade`, shown above, are described as follows:

-n *BE_name*

Name of the BE to which packages will be added or from which packages will be removed.

-s *packages_path*

(For adding packages only.) Path name of a directory containing packages to add. You can substitute `-d` for `-s`. The `-d` support is for `pkgadd(1M)` compatibility.

-d *packages_path*

Identical to `-s`. Use of `-s` is recommended.

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Add or Remove Patches

`-O "pkgadd_options" or "pkgrm_options"`
Options passed directly to `pkgadd` (for `-p`) or `pkgrm` (for `-P`). See `pkgadd(1M)` and `pkgrm(1M)` for descriptions of the options for those commands.

`-a admin`
(For adding packages only.) Path to an admin file. Identical to the `pkgadd -a` option. Use of the `-a` option here is identical to `-O "-a admin"`

`pkginst [ pkginst... ]`
Zero or more packages to add or remove. For adding packages, the default is to add all of the packages specified with the `-s` option, above. Separate multiple package names with spaces.

It is critically important that any packages you add be compliant with the SVR4 Advanced Packaging Guidelines. See WARNINGS, below.

The `luupgrade` command uses `-t` to add a patch and `-T` to remove a patch. The syntax is as follows:

For adding patches:

```
luupgrade -t -n BE_name -s patch_path [ -l error_log ][ -o outfile ]  
[ -O "patchadd_options" ] [ patch_name [ patch_name... ] ] [ -N ]
```

For removing patches:

```
luupgrade -T -n BE_name [ -l error_log ][ -o outfile ]  
[ -O "patchrm_options" ] [ patch_name [ patch_name... ] ] [ -N ]
```

The first option, `-t`, to add patches, or `-T` to remove patches, indicates the function to perform. The remaining options for this use of `luupgrade`, shown above, are described as follows:

`-n BE_name`
Name of the BE to which patches will be added or from which patches will be removed.

`-s patch_path`
(For adding patches only.) Path name of a directory containing patches to add.

`-O "patchadd_options" or "patchrm_options"`
Options passed directly to `patchadd` (for `-p`) or `patchrm` (for `-P`). See `patchadd(1M)` or `patchrm(1M)` for a description of these options.

`patch_name [ patch_name... ]`
Zero or more patches to add or remove. For adding patches, the default is to add all of the patches specified with the `-s` option, above. Separate multiple patch names with spaces.

It is critically important that any patches you add be compliant with the SVR4 Advanced Packaging Guidelines. See WARNINGS, below.

Check or Return Information on Packages

Use the `-C` to perform a `pkgchk(1M)` on all or the specified packages on a BE. Use the `-I` option to perform a `pkginfo(1)`.

For performing a pkgchk:

```
luupgrade -C -n BE_name [ -l error_log ] [ -o outfile ]
[ -O "pkgchk_options" ] [ pkginst [ pkginst... ] ] [ -N ]
```

For performing a pkginfo:

```
luupgrade -I -n BE_name [ -l error_log ] [ -o outfile ]
[ -O "pkginfo_options" ] [ pkginst [ pkginst... ] ] [ -N ]
```

The first option, `-C`, for `pkgchk`, or `-I`, for `pkginfo`, indicates the function to perform. The remaining options for this use of `luupgrade`, shown above, are described as follows:

`-n BE_name`

Name of the BE on which packages will be checked or on whose packages information will be returned.

`-O "pkgchk_options" or "pkginfo_options"`

Options passed directly to `pkgchk` (for `-C`) or `pkginfo` (for `-I`). See `pkgchk(1M)` or `pkginfo(1)` for a description of these options.

`pkginst [ pkginst... ]`

Zero or more packages to check or for which to have information returned. If you omit package names, `luupgrade` returns information on all of the packages on the BE. Separate multiple package names with spaces.

Check an OS Installation Medium

With the `-c` option, `luupgrade` allows you to check that a local or remote medium, such as a CD, is a valid installation medium. The `-c` option returns useful information about the specified medium. The syntax for this use of `luupgrade` is as follows:

```
luupgrade -c -s path_to_medium [ -l error_log ] [ -o outfile ]
```

The first option, `-c`, indicates the function to perform—to check on an installation medium. The `-s` option, shown above, is described as follows:

`-s path_to_medium`

Path name to an installation medium such as a CD-ROM.

JumpStart Profile Keywords

This section specifies the Solaris JumpStart keywords that can be used in a profile with `luupgrade`, using the `-j` option in conjunction with the `-u` (upgrade) or `-f` (flash) options. For `-u`, there are no required keywords. For `-f`, you must specify a value for `install_type`: `flash_install` for a full flash archive or `flash_update` for a differential flash archive. Also for the `-f` option with the `-j` option, you must specify the `-a` (archive location) option or specify the `archive_location` keyword in your profile.

The `archive_location` keyword is the only valid argument for the `-J` option.

The following optional keywords are sometimes used in profiles used with the `-u` and `-f` options:

`cluster`

Designates the software group to add to the system.

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geo

Designates the regional locale or locales that you want to install on or add to a system. See the *Solaris Installation Guide* for a list of possible values.

isa_bits

Specifies whether 64-bit or 32-bit packages are to be installed. Valid values are 64 and 32.

locale

Designates the locale packages you want to install on or add to a system. See the *Solaris Installation Guide* for a list of possible values.

package

Specifies a package to be added to or deleted from a system.

The following keywords must not be used in a profile used with `luupgrade`:

- `boot_device`
- `dontuse`
- `fdisk`
- `filesys`
- `layout_constraint`
- `noreboot`
- `partitioning`
- `root_device`
- `usedisk`

See the *Solaris Installation Guide* for descriptions of all JumpStart profile keywords and instructions for creating a JumpStart profile.

EXAMPLES

EXAMPLE 1 Removing, then Adding Packages

The following example removes from then adds a set of packages to a boot environment.

```
# luupgrade -P -n second_disk SUNWabc SUNWdef SUNWghi
```

Now, to add the same packages:

```
# luupgrade -p -n second_disk -s /net/installmachine/export/packages \
SUNWabc SUNWdef SUNWghi
```

The following command adds the `-O` option to the preceding command. This option passes arguments directly to `pkgadd`.

```
# luupgrade -p -n second_disk -s /net/installmachine/export/packages \
-O "-r /net/testmachine/export/responses" SUNWabc SUNWdef SUNWghi
```

See `pkgadd(1M)` for a description of the options for that command.

EXAMPLE 2 Upgrading to a New OS from a Combined Image

The following example upgrades the operating environment on a boot environment. The source image is stored as a combined image on a remote disk or on a DVD.

EXAMPLE 2 Upgrading to a New OS from a Combined Image (Continued)

```
# luupgrade -u -n second_disk \
-s /net/installmachine/export/solarisX/OS_image
```

Following the command above you could enter the command below to activate the upgraded BE.

```
# luactivate second_disk
```

Then, upon the next reboot, `second_disk` would become the current boot environment. See `luactivate(1M)`.

EXAMPLE 3 Upgrading to a New OS from Multiple CDs

The following example is a variation on the preceding. The OS upgrade resides on two CDs. To begin the upgrade on a SPARC machine, you enter:

```
# luupgrade -u -n second_disk -s /cdrom/cdrom0/s0
```

On x86 machines, replace the `s0` in the argument to `-s` with `s2`.

When the installer is finished with the contents of the first CD, insert the next CD in the drive and enter the following:

```
# luupgrade -i -n second_disk -s /cdrom/cdrom0 \
-O "-nodisplay -noconsole"
```

Note the use of `-i` rather than `-u` in the preceding. Were there additional CDs, you would enter the same command as the one immediately above. The `-O` options, above, are passed to `installer(1M)`. If you omit these options, a graphical interface is invoked following the insertion and reading of the second CD. See `installer(1M)` for a description of the `-O` options.

Note that a multiple-CD upgrade is not complete until you have entered and completed `luupgrade` commands for all of the CDs in a set. Following installation of packages from a CD, you might receive a message such as:

```
WARNING: <num> packages must be installed on boot environment <disk_device>.
```

Such a message indicates the requirement that you install packages from one or more additional CDs, as in the example above. If you do not complete package installation, you will not be able to use `luactivate` to activate (designate for booting) the upgraded BE.

EXAMPLE 4 Upgrading Using a JumpStart Profile

The following example command uses the `-D` option to test the profile `/home2/profiles/test.profile`.

```
# luupgrade -u -n second_disk \
-s /net/installmachine/export/solarisX/OS_image \
-j /home2/profiles/test.profile -D
```

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EXAMPLE 4 Upgrading Using a JumpStart Profile *(Continued)*

Assuming the results of this command were acceptable, you could omit the `-D` in the preceding command to perform the upgrade.

EXAMPLE 5 Installing a New OS from a Solaris Flash Archive

The following example installs the operating environment on a boot environment, using a Solaris Flash archive. The file pointed to by `-J` is a JumpStart profile that specifies a flash installation.

```
# luupgrade -f -n second_disk \  
-s /net/installmachine/export/solarisX/OS_image \  
-J "archive_location http://example.com/myflash.flar"
```

The following command differs from the preceding only in that `-j` replaces `-J`. You could append the `-D` option to either of these commands to test the profile prior to actually performing the flash installation.

```
# luupgrade -f -n second_disk \  
-s /net/installmachine/export/solarisX/OS_image \  
-j /net/example/flash_archives/flash_gordon
```

Either of the preceding commands works for a full or differential flash installation. Whether a flash installation is differential or full is determined by the value of the `install_type` keyword in the profile. See “JumpStart Profile Keywords,” above.

EXAMPLE 6 Obtaining Information on Packages

The following example runs a `pkgchk` on the packages `SUNWluu` and `SUNWlur`, passing to `pkgchk` the `-v` option.

```
# luupgrade -C -n second_disk -O "-v" SUNWluu SUNWlur
```

The following command runs `pkginfo` on the same set of packages:

```
# luupgrade -I -n second_disk -O "-v" SUNWluu SUNWlur
```

For both commands, if the package names were omitted, `luupgrade` returns package information on all of the packages in the specified BE. See `pkgchk(1M)` and `pkginfo(1)` for a description of the options for those commands.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
>0	An error occurred.

FILES

`/etc/lutab`
list of BEs on the system

`/usr/share/lib/xml/dtd/lu_cli.dtd.<num>`
Live Upgrade DTD (see `-X` option in “Options that Apply to All Uses,” above)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluu

SEE ALSO installer(1M), lu(1M), luactivate(1M), lucancel(1M), lucompare(1M), lucreate(1M), lucurr(1M), ludelete(1M), ludescl(1M), lufslst(1M), lumake(1M), lumount(1M), lurename(1M), lustatus(1M), lutab(4), attributes(5), live_upgrade(5)

WARNINGS For adding packages or patches (-p, -P, -t, or -T), luupgrade requires packages or patches that comply with the SVR4 Advanced Packaging Guidelines and the guidelines spelled out in Appendix C of the *Solaris 9 Installation Guide*. This means that the package or patch is compliant with the pkgadd(1M) or patchadd(1M) -R option, described in the man pages for those utilities. While nearly all Sun packages and patches conform to these guidelines, Sun cannot guarantee the conformance of packages and patches from third-party vendors. Some older Sun packages and patches might not be -R compliant. If you encounter such a package or patch, please report it to Sun. A non-conformant package can cause the package- or patch-addition software in luupgrade to fail or, worse, alter the current BE.

NOTES Live Upgrade supports the release it is distributed on and up to three marketing releases back. For example, if you obtained Live Upgrade with Solaris 9 (including a Solaris 9 upgrade), that version of Live Upgrade supports Solaris versions 2.6, Solaris 7, and Solaris 8, in addition to Solaris 9. No version of Live Upgrade supports a Solaris version prior to Solaris 2.6.

luxadm(1M)

NAME	luxadm – administration program for the Sun Enterprise Network Array (SENA), RSM, SPARCstorage Array (SSA) subsystems, Sun Fire 880 internal storage subsystem, and individual Fiber Channel Arbitrated Loop (FC_AL) devices
SYNOPSIS	luxadm [<i>options...</i>] <i>subcommand</i> [<i>options...</i>] <i>enclosure</i> [, <i>dev</i>] <i>pathname...</i>
DESCRIPTION	The luxadm program is an administrative command that manages the SENA, RSM, SPARCstorage Array subsystems, Sun Fire 880 internal storage subsystem, and individual FC_AL devices. luxadm performs a variety of control and query tasks depending on the command line arguments and options used. The command line must contain a subcommand. The command line may also contain options, usually at least one enclosure name or pathname, and other parameters depending on the subcommand. You need specify only as many characters as are required to uniquely identify a subcommand. Specify the device that a subcommand interacts with by entering a pathname. For the SENA subsystem, a disk device or enclosure services controller may instead be specified by entering the World Wide Name (WWN) for the device or a port to the device. The device may also be specified by entering the name of the SENA enclosure, and an optional identifier for the particular device in the enclosure. The individual FC_AL devices may be specified by entering the WWN for the device or a port to the device. Pathname Specify the device or controller by either a complete physical pathname or a complete logical pathname. For SENA, a typical physical pathname for a device is: <pre>/devices/sbus@1f,0/SUNW,socal@1,0/sf@0,0/ssd@w2200002037000f96, 0:a,raw</pre> or <pre>/devices/io-unit@f,e0200000/sbi@0,0/SUNW,socal@2,0/sf@0,0/ssd@34, 0:a,raw</pre> For all SENA IBs (Interface Boards) and Sun Fire 880 SES device controllers on the system, a logical link to the physical paths is kept in the directory /dev/es. An example of a logical link is /dev/es. The WWN may be used in place of the pathname to select an FC_AL device, SENA subsystem IB, or Sun Fire 880 internal storage subsystem. The WWN is a unique 16 hexadecimal digit value that specifies either the port used to access the device or the device itself. A typical WWN value is: <pre>2200002037000f96</pre> See NOTES for more information on the WWN formats.

For the SPARCstorage Array controller, a typical physical pathname is:

```
/devices/. . . /. . . /SUNW,soc@3,0/SUNW,pln@
        axxxxxx,xxxxxxx:ctlr
```

whereas, a typical physical pathname for an RSM controller is:

```
/devices/sbus@1f,0/QLGC,isp@1,10000:devctl
```

In order to make it easier to address the SPARCstorage Array or RSM controller, a logical pathname of the form *cN* is supported, where *N* is the logical controller number. luxadm uses the *cN* name to find an entry in the `/dev/rdisk` directory of a disk that is attached to the SPARCstorage Array or RSM controller. The `/dev/rdisk` entry is then used to determine the physical name of the SPARCstorage Array or RSM controller.

For a SPARCstorage Array disk, a typical physical pathname is:

```
/devices/. . . /. . . /SUNW,soc@3,0/SUNW,
        pln@xxxxxxx,xxxxxxx/ssd@0,0:c,raw
```

and a typical logical pathname is:

```
/dev/rdisk/c1t0d0s2
```

For an RSM a typical physical pathname is:

```
/devices/sbus@1f,0/QLGC,isp@1,10000/sd@8,0:c,raw
```

and a typical logical pathname is:

```
/dev/rdisk/c2t8d0s2
```

For a disk in a Sun Fire 880 internal storage subsystem, a typical physical pathname is:

```
/devices/pci@8,600000/SUNW,qlc@2/fp@0,0/ssd@w2100002037a6303c,0:a
```

and a typical logical pathname is:

```
/dev/rdisk/c2t8d0s2
```

For individual FC_AL devices, a typical physical pathname is:

```
/devices/sbus@3.0/SUNW,socal@d,10000/sf@0,0/ssd@w2200002037049fc3,0:a,raw
```

and a typical logical pathname is:

```
/dev/rdisk/c1t0d0s2
```

luxadm(1M)

Enclosure

For SENA, a device may be identified by its enclosure name and slotname:

box_name[, *fslot_number*]
box_name[, *rslot_number*]

box_name is the name of the SENA enclosure, as specified by the *enclosure_name* subcommand. When used without the optional *slot_number* parameter, the *box_name* identifies the SENA subsystem IB.

f or *r* specifies the front or rear slots in the SENA enclosure.

slot_number specifies the slot number of the device in the SENA enclosure, 0-6 or 0-10.

For a Sun Fire 880 internal storage subsystem, a device may also be identified by its enclosure name and slot name. However, there is only one set of disks:

box_name [, *sslot_number*] *box_name* is the name of the Sun Fire 880 enclosure, as specified by the *enclosure_name* subcommand. When used without the optional *slot_number* parameter, *box_name* identifies the Sun Fire 880 internal storage subsystem enclosure services device. Use *s* to specify the disk slot number in the Sun Fire 880 internal storage subsystem, 0 - 11.

See *disks(1M)* and *devlinks(1M)* for additional information on logical names for disks and subsystems.

OPTIONS

The following options are supported by all subcommands:

- e Expert mode. This option is not recommended for the novice user.
- v Verbose mode.

Options that are specific to particular subcommands are described with the subcommand in the *USAGE* section.

OPERANDS

The following operands are supported:

enclosure

The *box_name* of the SENA. or Sun Fire 880 internal storage subsystem.

fibre_channel_HBA_port

The path to the host controller port. A typical path is:

```
/devices/pci@8,600000/pci@1/SUNW,qlc@4/fp@0,0:devctl
```

pathname

The logical or physical path of a SENA IB,, Sun Fire 880 internal storage subsystem, SPARCstorage Array or RSM controller (*cN* name) or disk device. *pathname* can also be the WWN of a SENA IB, SENA disk, or individual FC_AL device.

USAGE

Subcommands	<pre>display enclosure[,dev]... pathname...</pre> <pre>display -p pathname...</pre> <pre>display -r enclosure[,dev]... pathname...</pre> <pre>display -v enclosure[,dev]... pathname...</pre> Displays enclosure or device specific data. Subsystem data consists of enclosure environmental sense information and status for all subsystem devices, including disks. Disk data consists of inquiry, capacity, and configuration information. -p Displays performance information for the device or subsystem specified by <i>pathname</i>. This option only applies to subsystems that accumulate performance information. -r Displays error information for the FC_AL device specified by the <i>pathname</i>, or, if the path is a SENA, for all devices on the loop. The -r option only applies to SENA subsystems and individual FC_AL devices. -v Displays in verbose mode, including mode sense data. <pre>download [-s] [-w WWN] [-f filename_path] enclosure. . .</pre> Download the prom image pointed to by <i>filename_path</i> to the SENA subsystem Interface Board unit, the Sun Fire 880 internal storage subsystem, or the SPARCstorage Array controllers specified by the enclosure or <i>pathname</i>. The SPARCstorage Array must be reset in order to use the downloaded code. When the SENA's download is complete, the SENA will be reset and the downloaded code executed. If no filename is specified, the default prom image will be used. The default prom image for the SPARCstorage Array controller is in <code>usr/lib/firmware/ssa/ssafirmware</code>. The default prom image for the SENA is in the directory <code>usr/lib/locale/C/LC_MESSAGES</code> and is named <code>ibfirmware</code>. When the Sun Fire 880 internal storage subsystem's download is complete, the subsystem resets and the downloaded code begins execution. The default firmware image for the Sun Fire 880 internal storage subsystem is in: <code>/usr/platform/SUNW,Sun-Fire-880/lib/images/int_fcbpl_fw</code>. -s Save. The -s option is used to save the downloaded firmware in the FEPRM. If -s is not specified, the downloaded firmware will not be saved across power cycles. The -s option does not apply to the SPARCstorage Array controller as it <i>always</i> writes the downloaded firmware into the FEPRM.

The `-s` option does not apply to the Sun Fire 880 internal storage subsystem as it always stores downloaded firmware in the flash memory.

When using the `-s` option, the `download` subcommand modifies the FEPRM on the subsystem and should be used with *caution*.

`-w WWN`

Change the SPARCstorage Array controller's World Wide Name. *WWN* is a 12-digit hex number; leading zeros are required. The `-w` option applies only to the SPARCstorage Array. The new SPARCstorage Array controller's image will have the least significant 6 bytes of the 8-byte World Wide Name modified to *WWN*.

`enclosure_name new_name enclosure | pathname`

Change the enclosure name of the enclosure or enclosures specified by the `enclosure` or `pathname`. The new name (*new_name*) must be 16 or less characters. Only alphabetic or numeric characters are acceptable. This subcommand applies only to the SENA and the Sun Fire 880 internal storage subsystem.

`failover primary | secondary pathname`

Select which Sun Storage T3 storage array partner group controller accesses a given logical volume. If `primary` is specified, the logical volume is accessed through the primary controller. If `secondary` is specified, the logical volume is accessed through the secondary controller specified by *pathname*.

`fc_s_download [ -F ] [ -f fcode-file ]`

Download the fcode contained in the file *fcode-file* into *all* the FC/S Sbus Cards. This command is interactive and expects user confirmation before downloading the fcode.

Use `fc_s_download` *only* in single-user mode. Using `fc_s_download` to update a host adapter while there is I/O activity through that adapter *will* cause the adapter to reset. Newly updated FCode will not be executed or visible until a system reboot.

`-f fcode-file`

When invoked without the `-f fcode-file` option, the current version of the fcode in each FC/S Sbus card is printed.

`-F`

Forcibly downloads the fcode, but the command still expects user confirmation before the download. The version of the FC/S Sbus Cards fcode that was released with this version of the Operating System is kept in the directory `usr/lib/firmware/fc_s` and is named `fc_s_fcode`.

`fc100_s_download [ -f fcode-file ]`

Download the fcode contained in the file *fcode-file* into *all* the FC100/S Sbus Cards. This command is interactive and expects user confirmation before downloading the fcode.

Use `fcal_s_download` *only* in single-user mode. Using `fcal_s_download` to update a host adapter while there is I/O activity through that adapter *will* cause the adapter to reset. Newly updated FCode will not be executed or visible until a system reboot.

`-f fcode-file`

When invoked without the `-f` option, the current version of the fcode in each FC100/S Sbus card is printed.

`fcode_download -p`

`fcode_download -d dir-name`

Locate the installed FC/S, FC100/S, FC100/P, or FC100/2P host bus adapter cards and download the FCode files in *dir-name* to the appropriate cards. The command determines the correct card for each type of file, and is interactive. User confirmation is required before downloading the FCode to each device.

Use `fcode_download` to load FCode only in single-user mode. Using `fcode_download` to update a host adapter while there is I/O activity through that adapter causes the adapter to reset. Newly updated FCode will not be executed or visible until a system reboot.

`-d dir-name`

Download the FCode files contained in the directory *dir-name* to the appropriate adapter cards.

`-p`

Prints the current version of FCode loaded on each card. No download is performed.

`inquiry enclosure[,dev]... | pathname...`

Display the inquiry information for the selected device specified by the enclosure or pathname.

`insert_device [ enclosure,dev... ]`

Assist the user in the hot insertion of a new device or a chain of new devices. Refer to NOTES for limitations on hotplug operations. This subcommand applies only to the SENA, Sun Fire 880 internal storage subsystem, RSM, and individual FC_AL drives. RSM, and individual FC_AL drives. For the SENA, if more than one enclosure has been specified, concurrent hot insertions on multiple busses can be performed. With no arguments to the subcommand, entire enclosures or individual FC_AL drives can be inserted. For the RSM, only one controller can be specified. For the SENA or the Sun Fire 880 internal storage subsystem, this subcommand guides the this subcommand guides the user interactively through the hot insertion steps of a new device or chain of devices. If a list of disks was entered it will ask the user to verify the list of devices to be inserted is correct, at which point the user can continue or quit. It then interactively asks the user to insert the disk(s) or enclosure(s) and then creates and displays the logical pathnames for the devices.

For the RSM, the following steps are taken:

- Quiesce the bus or buses which support quiescing and unquiescing.
- Inform the user that the device can be safely inserted .

- Request confirmation from the user that the device has been inserted.
- Unquiesce the bus or buses which support quiescing and unquiescing.
- Create the logical device name for the new device.

`led enclosure,dev ... | pathname ...`

Display the current state of the LED associated with the disk specified by the enclosure or pathname. This subcommand only applies to subsystems that support this functionality.

`led_blink enclosure,dev ... | pathname ...`

Requests the subsystem to start blinking the LED associated with the disk specified by the enclosure or pathname. This subcommand only applies to subsystems that support this functionality.

`led_off enclosure,dev ... | pathname ...`

Requests the subsystem to disable (turn off) the LED associated with the disk specified by the enclosure or pathname. On a SENA subsystem, this may or may not cause the LED to turn off or stop blinking depending on the state of the SENA subsystem. Refer to the SENA Array Installation and Service Manual (p/n 802-7573). This subcommand only applies to subsystems that support this functionality.

`led_on pathname ...`

Requests the subsystem to enable (turn on) the LED associated with the disk specified by the pathname. This subcommand only applies to subsystems that support this functionality.

`power_off [ -F ] enclosure[,dev] ... | pathname ...`

`power_off pathname [ enclosure-port ] ... | controller tray-number`

When a SENA is addressed, this subcommand causes the SENA subsystem to go into the power-save mode. The SENA drives are not available when in the power-save mode. When an Enclosure Services card within the SPARCstorage Array is addressed, the RSM tray is powered down. When a drive in a SENA is addressed the drive is set to the drive off/unmated state. In the drive off/unmated state, the drive is spun down (stopped) and in bypass mode. This command does not apply to the Sun Fire 880 internal storage subsystem.

-F

The force option only applies to the SENA. Instructs luxadm to attempt to power off one or more devices even if those devices are being used by this host (and are, therefore, busy).

Warning: Powering off a device which has data that is currently being used will cause unpredictable results. Users should attempt to power off the device normally (without -F) first, only resorting to this option when sure of the consequences of overriding normal checks.

`power_on enclosure[,dev] ..`

Causes the SENA subsystem to go out of the power-save mode, when this subcommand is addressed to a SENA. There is no programmatic way to power on

the SPARCstorage Array RSM tray. When this subcommand is addressed to a drive the drive is set to its normal start-up state. This command does not apply to the Sun Fire 880 internal storage subsystem.

`probe [ -p ]`

Finds and displays information about all attached SENA subsystems, Sun Fire 880 internal storage subsystems, and individual FC_AL devices, including the logical pathname, the WWNs, and enclosure names. This subcommand warns the user if it finds different SENAs with the same enclosure names.

`-p`

Includes the physical pathname in the display.

`qlgc_s_download [ -f fcode-file ]`

Download the FCode contained in the file *fcode-file* into all the FC100/P, FC100/2P PCI host adapter cards. This command is interactive and expects user confirmation before downloading the FCode to each device. Only use `qlgc_s_download` in single-user mode. Using `qlgc_s_download` to update a host adapter while there is I/O activity through that adapter will cause the adapter to reset. Newly updated FCode will not be executed or visible until a system reboot.

`-f fcode-file`

When invoked without the `-f` option, the current version of the FCode in each FC100/P, FC100/2P PCI card is printed.

`release pathname`

Release a reservation held on the specified disk. The pathname should be the physical or logical pathname for the disk. If the pathname is of the SPARCstorage Array controller, then all of the disks in the SPARCstorage Array will be released.

This subcommand is included for historical and diagnostic purposes only.

`remove_device [ -F ] enclosure[,dev] ... | pathname ...`

Assists the user in hot removing a device or a chain of devices. This subcommand can also be used to remove entire enclosures. This subcommand applies to the SENA, Sun Fire 880 internal storage subsystem, RSM, and individual FC_AL drives. Refer to NOTES for limitations on hotplug operations. For the SENA, Sun Fire 880 internal storage subsystem, and individual FC_AL devices, this subcommand guides the user through the hot removal of a device or devices. During execution it will ask the user to verify the list of devices to be removed is correct, at which point the user can continue or quit. It then prepares the disk(s) or enclosure(s) for removal and interactively asks the user to remove the disk(s) or enclosure(s).

For the RSM, the steps taken are:

- Take the device offline.
- Quiesce the bus or buses which support quiescing and unquiescing.
- Inform user that the device can be safely removed.
- Request confirmation from the user that the device has been removed.
- Unquiesce the bus or buses which support quiescing and unquiescing.
- Bring the (now removed) device back online.

- Remove the logical device name for the removed device.

For Multi-Hosted disk, the steps taken are:

- Issue the `luxadm remove_device` command on the first host. When prompted to continue, wait.
- Issue the `luxadm remove_device` command on the secondary hosts. When prompted to continue, wait.
- Continue with the `remove_device` command on the first host. Remove the device when prompted to do so.
- Complete the `luxadm remove_device` command on the additional hosts.

-F

Instructs `luxadm` to attempt to hot plug one or more devices even if those devices are being used by this host (and are, therefore, *busy* or *reserved*), to *force* the hotplugging operation.

Warning: Removal of a device which has data that is currently being used will cause unpredictable results. Users should attempt to hotplug normally (without -F) first, only resorting to this option when sure of the consequences of overriding normal hotplugging checks.

`replace_device [ -F ] pathname`

This subcommand applies only to the RSM. Refer to NOTES for limitations on hotplug operations. This subcommand guides the user interactively through the hot replacement of a device.

For the RSM, the steps taken are:

- Take the device offline.
- Quiesce the bus or buses which support quiescing and unquiescing.
- Inform user that the device can be safely replaced.
- Request confirmation from the user that the device has been replaced.
- Unquiesce the bus or buses which support quiescing and unquiescing.
- Bring the device back online.

-F

Instructs `luxadm` to attempt to hot plug one or more devices even if those devices are *busy* or *reserved*, (that is, to *force* the hotplugging operation).

Warning: Removal of a device which has data that is currently being used will cause unpredictable results. Users should attempt to hotplug normally (without -F) first, only resorting to this option when sure of the consequences of overriding normal hotplugging checks.

`reserve pathname`

Reserve the specified disk for exclusive use by the issuing host. The pathname used should be the physical or logical pathname for the disk. If the pathname is of the SPARCstorage Array controller, then all of the disks in the SPARCstorage Array will be reserved.

This subcommand is included for historical and diagnostic purposes only.

SPARCstorage Array Subcommands

`set_boot_dev [ -y ] pathname`

Set the boot-device variable in the system PROM to the physical device name specified by *pathname*, which can be a block special device or the pathname of the directory on which the boot file system is mounted. The command normally runs interactively requesting confirmation for setting the default boot-device in the PROM. The -y option can be used to run it non-interactively, in which case no confirmation is requested or required.

`start [ -t tray-number ] pathname . . .`

Spin up the specified disk(s). If *pathname* specifies the SPARCstorage Array controller, this action applies to all disks in the SPARCstorage Array.

-t Spin up all disks in the tray specified by tray-number. *pathname* must specify the SPARCstorage Array controller.

`stop [ -t tray-number ] pathname . . .`

Spin down the specified disk(s). If *pathname* specifies the SPARCstorage Array controller, this action applies to all disks in the SPARCstorage Array.

-t Spin down all disks in the tray specified by tray-number. *pathname* must specify the SPARCstorage Array controller.

`fast_write [ -s ] -c pathname`

`fast_write [ -s ] -d pathname`

`fast_write [ -s ] -e pathname`

Enable or disable the use of the NVRAM to enhance the performance of writes in the SPARCstorage Array. *pathname* refers to the SPARCstorage Array controller or to an individual disk.

-s Cause the SPARCstorage Array to save the change so it will persist across power-cycles.

-c Enable fast writes for synchronous writes only.

-d Disable fast writes.

-e Enable fast writes.

`nvrw_data pathname`

Display the amount of fast write data in the NVRAM for the specified disk. This command can only be used for an individual disk.

`perf_statistics -d pathname`

`perf_statistics -e pathname`

Enable or disable the accumulation of performance statistics for the specified SPARCstorage Array controller. The accumulation of performance statistics must be enabled before using the display -p subcommand. This subcommand can be issued only to the SPARCstorage Array controller.

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	-d Disable the accumulation of performance statistics. -e Enable the accumulation of performance statistics. <i>purge pathname</i> Purge any fast write data from NVRAM for one disk, or all disks if the controller is specified. This option should be used with caution, usually only when a drive has failed. <i>sync_cache pathname</i> Flush all outstanding writes for the specified disk from NVRAM to the media. If <i>pathname</i> specifies the controller, this action applies to all disks in the SPARCstorage Array subsystem.
Enclosure Services Card Subcommands	The <i>env_display</i> and <i>alarm*</i> subcommands apply only to an Enclosure Services Card (SES) in a RSM tray in a SPARCstorage Array. The RSM tray is addressed by using the logical or physical path of the SES device or by specifying the controller followed by the tray number. The controller is addressed by <i>cN</i> or the physical path to the SSA's controller. <i>alarm pathname controller tray_number</i> Display the current state of audible alarm. <i>alarm_off pathname controller tray_number</i> Disable the audible alarm for this RSM tray. <i>alarm_on pathname controller tray_number</i> Enable the audible alarm for this RSM tray. <i>alarm_set controller-pathname controller tray_number [seconds]</i> Set the audible alarm setting to seconds. <i>env_display pathname controller tray_number</i> Display the environmental information for the specified unit.
SENA, Sun Fire 880 Internal Storage Subsystem, and Individual FC_AL Drive Expert Mode Subcommands	The following subcommands are for expert use only, and are applicable only to the SENA, Sun Fire 880 internal storage subsystem, and fiber channel loops. They should only be used by users that are knowledgeable about the SENA subsystem and fiber channel loops. If you specify a disk to an expert subcommand that operates on a bus, the subcommand operates on the bus to which the specified disk is attached. -e bypass [-ab] <i>enclosure,dev</i> -e bypass -f <i>enclosure</i> Request the enclosure services controller to set the LRC (Loop Redundancy Circuit) to the bypassed state for the port and device specified. This subcommand supports the following options:

Other Expert Mode Subcommands	-a Bypass port a of the device specified. -b Bypass port b of the device specified. -e dump_map <i>fibre_channel_HBA_port</i> Display WWN data for a target device or host bus adapter on the specified fibre channel port. If there are no target devices on the specified port, an error is returned. -e enable [-ab] <i>enclosure,dev</i> -e enable -f <i>enclosure</i> Request the enclosure services controller to set the LRC (Loop Redundancy Circuit) to the enabled state for the port and device specified. This subcommand supports the following options: -a Enable port a of the device specified. -b Enable port b of the device specified. -e forcelp <i>enclosure[,dev] ... pathname ...</i> Force the link to reinitialize, using the Loop Initialization Primitive (LIP) sequence. The enclosure or pathname can specify any device on the loop. Use the pathname to specify a specific path for multiple loop configurations. This is an expert only command and should be used with caution. It will reset all ports on the loop. -e rdls <i>enclosure[,dev] ... pathname ...</i> Read and display the link error status information for all available devices on the loop that contains the device specified by the enclosure or pathname.
	See NOTES for limitations of these subcommands. They should only be used by users that are knowledgeable about the systems they are managing. These commands do not apply to the Sun Fire 880 internal storage subsystem. -e bus_getstate <i>pathname</i> Get and display the state of the specified bus. -e bus_quiesce <i>pathname</i> Quiesce the specified bus. -e bus_reset <i>pathname</i> Reset the specified bus only. -e bus_resetall <i>pathname</i> Reset the specified bus and all devices.

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```
-e bus_unquiesce pathname
    Unquiesce the specified bus. the specified device.

-e dev_getstate pathname
    Get and display the state of the specified device.

-e dev_reset pathname
    Reset the specified device.

-e offline pathname
    Take the specified device offline.

-e online pathname
    Put the specified device online.
```

EXAMPLES

EXAMPLE 1 Displaying the SENAs and Individual FC_AL Devices on a System

The following example finds and displays all of the SENAs and individual FC_AL devices on a system:

```
example% luxadm probe
```

EXAMPLE 2 Displaying an SSA

The following example displays an SSA:

```
example% luxadm display c1
```

EXAMPLE 3 Displaying a SENA or Sun Fire 880 Internal Storage Subsystem

The following example displays a SENA or Sun Fire 880 internal storage subsystem:

```
example% luxadm display /dev/es/ses0
```

EXAMPLE 4 Displaying Two Subsystems

The following example displays two subsystems using the enclosure names:

```
example% luxadm display BOB system1
```

EXAMPLE 5 Displaying Information about the First Disk

The following example displays information about the first disk in the front of the enclosure named BOB . Use *f* to specify the front disks. Use *r* to specify the rear disks.

```
example% luxadm display BOB,f0
```

EXAMPLE 6 Displaying Information on a Sun Fire 880 Internal Storage Subsystem

The Sun Fire 880 internal storage subsystem has only one set of disks. In this case, use *s* to specify the slot:

```
example% luxadm display BOB,s0
```

EXAMPLE 6 Displaying Information on a Sun Fire 880 Internal Storage Subsystem
(Continued)

EXAMPLE 7 Displaying Information about a SENA disk, an Enclosure, or an Individual FC_AL Drive

The following example displays information about a SENA disk, an enclosure, or an individual FC_AL drive with the port WWN of 2200002037001246:

```
example% luxadm display 2200002037001246
```

EXAMPLE 8 Using Unique Characters to Issue a Subcommand

The following example uses only as many characters as are required to uniquely identify a subcommand:

```
example% luxadm disp BOB
```

EXAMPLE 9 Displaying Error Information

The following example displays error information about the loop that the enclosure BOB is on:

```
example% luxadm display -r BOB
```

EXAMPLE 10 Downloading New Firmware into the Interface Board

The following example downloads new firmware into the Interface Board in the enclosure named BOB (using the default path for the file to download):

```
example% luxadm download -s BOB
```

EXAMPLE 11 Displaying Information from the SCSI Inquiry Command

The following example displays information from the SCSI inquiry command from all individual disks on the system, using only as many characters as necessary to uniquely identify the inquiry subcommand:

```
example% luxadm inq /dev/rdisk/c?t?d?s2
```

EXAMPLE 12 Hotplugging

The following example hotplugs a new drive into the first slot in the front of the enclosure named BOB:

```
example% luxadm insert_device BOB,f0
```

The following example hotplugs a new drive into the first slot in the Sun Fire 880 internal storage subsystem named SF880-1:

```
example% luxadm insert_device SF880-1,s0
```

EXAMPLE 13 Running an Expert Subcommand

The following example runs an expert subcommand. The subcommand forces a loop initialization on the loop that the enclosure BOB is on:

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EXAMPLE 13 Running an Expert Subcommand *(Continued)*

```
example% luxadm -e forcelp BOB
```

EXAMPLE 14 Using the Expert Mode Hot Plugging Subcommands

An example of using the expert mode hot plugging subcommands to hot remove a disk on a SSA follows. See NOTES for hot plugging limitations.

The first step reserves the SCSI device so that it can't be accessed by way of its second SCSI bus:

```
example# luxadm reserve /dev/rdisk/c1t8d0s2
```

EXAMPLE 15 Taking the Disk to be Removed Offline

The next two steps take the disk to be removed offline then quiesce the bus:

```
example# luxadm -e offline /dev/rdisk/c1t8d0s2
example# luxadm -e bus_quiesce /dev/rdisk/c1t8d0s2
```

EXAMPLE 16 Unquiescing the Bus

The user then removes the disk and continues by unquiescing the bus, putting the disk back online, then unreserving it:

```
example# luxadm -e bus_unquiesce /dev/rdisk/c1t8d0s2
example# luxadm -e online /dev/rdisk/c1t8d0s2
example# luxadm release /dev/rdisk/c1t8d0s2
```

**ENVIRONMENT
VARIABLES**

See environ(5) for a description of the LANG environment variable that affects the execution of luxadm.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
-1	An error occurred.

FILES

```
usr/lib/firmware/fc_s/fc_s_fcode
usr/lib/firmware/ssa/ssafirmware
usr/lib/locale/C/LC_MESSAGES/ibfirmware
```

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

usr/sbin

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWluxop

SEE ALSO

devlinks(1M), disks(1M), ssaadm(1M), attributes(5), environ(5), ses(7D)

SENA Array Installation and Service Manual (p/n 802-7573).

RAID Manager 6.1 Installation and Support Guide Answerbook

RAID Manager 6.1 User's Guide Answerbook

NOTES See the *SENA Array Installation and Service Manual* for additional information on the SENA. Refer to *Tutorial for SCSI use of IEEE Company_ID*, R. Snively, for additional information regarding the IEEE extended WWN. See *SEE ALSO*. Currently, only some device drivers support hot plugging. If hot plugging is attempted on a disk or bus where it is not supported, an error message of the form:

```
luxadm: can't acquire "PATHNAME": No such file or directory
```

will be displayed.

You must be careful not to quiesce a bus that contains the root or the /usr filesystems or any swap data. If you do quiesce such a bus a deadlock can result, requiring a system reboot.

m64config(1M)

NAME	m64config, SUNWm64_config – configure the M64 Graphics Accelerator
SYNOPSIS	<pre>/usr/sbin/m64config [-defaults] [-depth 8 24 32] [-dev <i>device-filename</i>] [-file machine system] [-prconf] [-propt] [-res <i>video-mode</i> [now try] [noconfirm nocheck]]</pre> <pre>/usr/sbin/m64config [-prconf] [-propt]</pre> <pre>/usr/sbin/m64config [-help] [-res ?]</pre>
DESCRIPTION	m64config configures the M64 Graphics Accelerator and some of the X11 window system defaults for M64. The first form of m64config stores the specified options in the OWconfig file. These options will be used to initialize the M64 device the next time the window system is run on that device. Updating options in the OWconfig file provides persistence of these options across window system sessions and system reboots. The second and third forms which invoke only the -prconf, -propt, -help, and -res ? options do not update the OWconfig file. Additionally, for the third form all other options are ignored. Options may be specified for only one M64 device at a time. Specifying options for multiple M64 devices requires multiple invocations of m64config. Only M64-specific options can be specified through m64config. The normal window system options for specifying default depth, default visual class and so forth are still specified as device modifiers on the openwin command line. See the <i>OpenWindows Desktop Reference Manual</i> for details. The user can also specify the OWconfig file that is to be updated. By default, the machine-specific file in the /etc/openwin directory tree is updated. The -file option can be used to specify an alternate file to use. For example, the system-global OWconfig file in the /usr/openwin directory tree can be updated instead. Both of these standard OWconfig files can only be written by root. Consequently, the m64config program, which is owned by the root user, always runs with setuid root permission.
OPTIONS	-defaults Resets all option values to their default values. -depth 8 24 32 Sets the depth (bits per pixel) on the device. Possible values are 8, 24, or 32 (where 32 uses 24 bits per pixel). Log out of the current window system session and log back in for the change to take effect. 24 or 32 enables TrueColor graphics in the window system, at the expense of screen resolution.

The 32 setting enables simultaneous 8- and 24-bit color windows on m64 devices that support it. With setting 32, `-propt` shows depth 32 and `-prconf` shows depth 24. To check window depth, use the `xwininfo` utility. The `xwininfo` utility is usually shipped in the package containing frame buffer software (such as `SUNWxwplt`).

The maximum resolution that is available with 24 bits per pixel depends on the amount of memory installed on the PGX card. For 2-MB PGX cards, the maximum available resolution is 800x600. For 4-MB cards, it is 1152x900. For 8-MB cards, it is 1920x1080. If there is not enough memory for the specified combination of resolution and depth, `m64config` displays an error message and exits.

`-dev device-filename`

Specifies the M64 special file. If not specified, `m64config` will try `/dev/fbs/m640` through `/dev/fbs/m648` until one is found.

`-file machine|system`

Specifies which OWconfig file to update. If `machine`, the machine-specific OWconfig file in the `/etc/openwin` directory tree is used. If `system`, the global OWconfig file in the `/usr/openwin` directory tree is used. If the file does not exist, it is created.

`-help`

Prints a list of the `m64config` command line options, along with a brief explanation of each.

`-prconf`

Prints the M64 hardware configuration. The following is a typical display using the `-prconf` option:

```
--- Hardware Configuration for /dev/fbs/m640 ---
ASIC: version 0x41004754
DAC: version 0x0
PROM: version 0x0
Card possible resolutions: 640x480x60, 800x600x75, 1024x768x60
1024x768x70, 1024x768x75, 1280x1024x75, 1280x1024x76
1280x1024x60, 1152x900x66, 1152x900x76, 1280x1024x67
960x680x112S, 960x680x108S, 640x480x60i, 768x575x50i, 1280x800x76
1440x900x76, 1600x1000x66, 1600x1000x76, vga, svga, 1152, 1280
stereo, ntsc, pal
Monitor possible resolutions: 720x400x70, 720x400x85, 640x480x60
640x480x67, 640x480x72, 640x480x75, 800x600x56, 800x600x60
800x600x72, 800x600x75, 832x624x75, 1024x768x85, 1024x768x60
1024x768x70, 1024x768x75, 1280x1024x75, 1280x1024x76, 1152x900x66
1152x900x76, 1280x1024x67, 960x680x112S, vga, svga, 1152, 1280
stereo
Possible depths: 8, 24
Current resolution setting: 1280x1024x76
Current depth: 8
```

`-propt`

Prints the current values of all M64 options in the OWconfig file specified by the `-file` option for the device specified by the `-dev` option. Prints the values of

m64config(1M)

options as they will be in the OWconfig file after the call to m64config completes. The following is a typical display using the -propt option:

```
--- OpenWindows Configuration for /dev/fbs/m640 ---
OWconfig: machine
Video Mode: not set
Depth: 8
```

`-res video-mode [ now | try [ noconfirm | nocheck ] ]`

Specifies the video mode used to drive the monitor connected to the specified M64 device. Video modes are built-in. *video-mode* has the format of *widthxheightxrate*. *width* is the screen width in pixels, *height* is the screen height in pixels, and *rate* is the vertical frequency of the screen refresh. As a convenience, -res also accepts formats with @ preceding the refresh rate instead of x. For example, 1280x1024@76.

A list of valid video modes is obtained by issuing the following command: m64config -res '?'. Note that the ? must be quoted. Not all resolutions are supported by both the video board and by the monitor. m64config will not permit you to set a resolution the board does not support, and will request confirmation before setting a resolution the monitor does not support.

Symbolic names

For convenience, some video modes have symbolic names defined for them. Instead of the form *widthxheightxrate*, one of these names may be supplied as the argument to -res. The meaning of the symbolic name *none* is that when the window system is run the screen resolution will be the video mode that is currently programmed in the device.

Name	Corresponding Video Mode
svga	1024x768x60
1152	1152x900x76
1280	1280x1024x76
none	(video mode currently programmed in device)

The -res option also accepts additional sub-options immediately following the video mode specification. Any or all of these may be present.

nocheck	If present, the normal error checking based on the monitor sense code will be suspended. The video mode specified by the user will be accepted regardless of whether it is appropriate for the currently attached monitor. This option is useful if a different monitor is to be connected to the M64 device. <i>Use of this option implies noconfirm as well.</i>

noconfirm	Using the <code>-res</code> option, the user could potentially put the system into an unusable state, a state where there is no video output. This can happen if there is ambiguity in the monitor sense codes for the particular code read. To reduce the chance of this, the default behavior of <code>m64config</code> is to print a warning message to this effect and to prompt the user to find out if it is okay to continue. The <code>noconfirm</code> option instructs <code>m64config</code> to bypass this confirmation and to program the requested video mode anyway. This option is useful when <code>m64config</code> is being run from a shell script.
now	If present, not only will the video mode be updated in the <code>OWconfig</code> file, but the M64 device will be immediately programmed to display this video mode. (This is useful for changing the video mode before starting the window system). It is inadvisable to use this sub-option with <code>m64config</code> while the configured device is being used (for example, while running the window system); unpredictable results may occur. To run <code>m64config</code> with the <code>now</code> sub-option, first bring the window system down. If the <code>now</code> sub-option is used within a window system session, the video mode will be changed immediately, but the width and height of the affected screen won't change until the window system is exited and reentered again. Consequently, this usage is strongly discouraged.
try	If present, the specified video mode will be programmed on a trial basis. The user will be asked to confirm the video mode by typing <code>y</code> within 10 seconds. Or the user may terminate the trial before 10 seconds are up by typing any character. Any character other than <code>'y'</code> or carriage return is considered a no and the previous video mode will be restored and <code>m64config</code> will not change the video mode in the <code>OWconfig</code> file (other options specified will still take effect). If a carriage return is typed, the user is prompted for a yes or no answer on whether to keep the new video mode. This option implies the <code>now</code> sub-option. (See the warning note on the <code>now</code> sub-option).

DEFAULTS For a given invocation of `m64config` command line if an option does not appear on the command line, the corresponding `OWconfig` option is not updated; it retains its previous value.

When the window system is run, if an M64 option has never been specified by `m64config`, a default value is used. The option defaults are as follows:

Option	Default
<code>-dev</code>	<code>/dev/fbs/m640</code>

m64config(1M)

-file	machine
-res	none

The default for the `-res` option of `none` means that when the window system is run the screen resolution will be the video mode that is currently programmed in the device.

This provides compatibility for users who are used to specifying the device resolution through the PROM. On some devices (for example, GX) this is the only way of specifying the video mode. This means that the PROM ultimately determines the default M64 video mode.

EXAMPLES

EXAMPLE 1 Switching the Monitor Type

The following example switches the monitor type to the maximum resolution of 1280 x 1024 at 76 Hz:

```
example% /usr/sbin/m64config -res 1280x1024x76
```

FILES

- `/dev/fbs/m640`
device special file
- `/etc/openwin/server/etc/OWconfig`
system config file
- `/usr/lib/fbconfig/SUNWm64_config`
symbolic link to `/usr/sbin/m64config`

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWm64cf

SEE ALSO `attributes(5)`, `m64(7D)`
OpenWindows Desktop Reference Manual

NAME	mail.local – store mail in a mailbox
SYNOPSIS	/usr/lib/mail.local [-f <i>sender</i>] [-d] <i>recipient</i>
DESCRIPTION	mail.local reads the standard input up to an end-of-file and appends it to each user's mail file (mailbox). This program is intended to be used by sendmail(1M) as a mail delivery agent for local mail. It is not a user interface agent. Messages are appended to the user's mail file in the /var/mail directory. The user must be a valid user name. Each delivered mail message in the mailbox is preceded by a "Unix From line" with the following format: From <i>sender_address time_stamp</i> The <i>sender_address</i> is extracted from the SMTP envelope address (the envelope address is specified with the -f option). A trailing blank line is also added to the end of each message. The mail files are locked with a .lock file while mail is appended. The mail files are created with mode 660, owner is set to <i>recipient</i>, and group is set to mail. If the "biff" service is returned by getservbyname(3SOCKET), the biff server is notified of delivered mail. This program also computes the Content-Length: header which will be used by the mailbox reader to mark the message boundary.
OPTIONS	The following options are supported: -f <i>sender</i> Specifies the "envelope from address" of the message. This flag is technically optional, but should be used. -d Specifies the recipient of the message. This flag is also optional and is supported here for backward compatibility. That is, mail.local <i>recipient</i> is the same as mail.local -d <i>recipient</i>. -l Turn on LMTP mode. -r <i>from</i> Specify the sender's name (for backward compatibility). -7 Do not advertise 8BITMIME support in LMTP mode. -b Return a permanent error instead of a temporary error if a mailbox exceeds quota.
OPERANDS	The following operand is supported: <i>recipient</i> The recipient of the mail message.
ENVIRONMENT VARIABLES	TZ Used to set the appropriate time zone on the timestamp.
EXIT STATUS	The following exit values are returned:

mail.local(1M)

0 Successful operation.

>0 An error occurred.

FILES /tmp/local.XXXXXXX temporary files
/tmp/lochd.XXXXXXX temporary files
/var/mail/*user_name* user's mail file

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWsndmu

SEE ALSO mail(1), comsat(1M), sendmail(1M), getservbyname(3SOCKET), attributes(5)

NAME	makedbm – make a dbm file, or get a text file from a dbm file
SYNOPSIS	makedbm [-b] [-l] [-s] [-E] [-i <i>yp_input_file</i>] [-o <i>yp_output_name</i>] [-d <i>yp_domain_name</i>] [-m <i>yp_master_name</i>] [-S <i>delimiter</i>] [-D <i>number_of_delimiters</i>] <i>infile outfile</i> makedbm [-u <i>dbmfilename</i>]
DESCRIPTION	The makedbm utility takes the <i>infile</i> and converts it to a pair of files in ndbm format (see ndbm(3C)), namely <i>outfile.pag</i> and <i>outfile.dir</i>. Each line of the input file is converted to a single dbm record. All characters up to the first TAB or SPACE form the key, and the rest of the line is the data. If a line ends with ‘\’ (backslash), the data for that record is continued on to the next line. makedbm does not treat ‘#’ (pound-sign) as a special character. Because makedbm is mainly used in generating dbm files for the NIS name service, it generates a special entry with the key <i>yp_last_modified</i>, which is the date of <i>infile</i> (or the current time, if <i>infile</i> is ‘-’). The entries that have keys with the prefix <i>yp_</i> are interpreted by NIS server utilities.
OPTIONS	The following options are supported: -b Insert the YP_INTERDOMAIN into the output. This key causes ypserve(1M) to use DNS for host name and address lookups for hosts not found in the maps. -d <i>yp_domain_name</i> Create a special entry with the key <i>yp_domain_name</i>. -D <i>number_of_delimiters</i> Specify <i>number_of_delimiters</i> to skip before forming the key. -E Delimiters are escaped. -i <i>yp_input_file</i> Create a special entry with the key <i>yp_input_file</i>. -l Lower case. Convert the keys of the given map to lower case, so that, for example, host name matches succeed independent of upper or lower case distinctions. -m <i>yp_master_name</i> Create a special entry with the key <i>yp_master_name</i>. If no master host name is specified, <i>yp_master_name</i> is set to the local host name. -o <i>yp_output_name</i> Create a special entry with the key <i>yp_output_name</i>. -s Secure map. Accept connections from secure NIS networks only. -S <i>delimiter</i> Specify the <i>delimiter</i> to use instead of the default delimiter for forming the key. -u <i>dbmfilename</i> Undo a dbm file. Prints out the file in text format, one entry per line, with a single space separating keys from

makedbm(1M)

values.

OPERANDS

The following operands are supported:

infile Input file for makedbm. If *infile* is '-' (dash), the standard input is read.

outfile One of two output files in ndbm format: *outfile.pag* and *outfile.dir*.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

ypserv(1M), ndbm(3C), attributes(5)

NAME	<code>makemap</code> – create database maps for sendmail
SYNOPSIS	<code>makemap</code> [-N] [-d] [-f] [-o] [-r] [-s] [-v] [-C <i>file</i>] [-c <i>cache-size</i>] [-e] [-l] [-t <i>delim</i>] [-u] <i>maptype mapname</i>
DESCRIPTION	<code>makemap</code> creates the database maps used by the keyed map lookups in <code>sendmail(1M)</code>. <code>makemap</code> reads from the standard input and outputs to the specified <i>mapname</i>. In all cases, <code>makemap</code> reads lines from the standard input consisting of two words separated by white space. The first is the database key, the second is the value. The value may contain <i>%n</i> strings to indicated parameter substitution. Literal percents should be doubled (<i>%%</i>). Blank lines and lines beginning with <i>#</i> are ignored. <code>makemap</code> handles three different database formats. Database format is selected using the <i>maptype</i> parameter. See OPERANDS.
OPTIONS	The following options are supported: -c <i>cache-size</i> Use the specified hash and B-Tree cache size (<i>cache-size</i>). -C <i>file</i> Use the specified sendmail configuration file (<i>file</i>) for looking up the TrustedUser option. -d Allow duplicate keys in the map. This is only allowed on B-Tree format maps. If two identical keys are read, both be inserted into the map. -e Allow empty value (right hand side). -f Normally all upper case letters in the key are folded to lower case. This flag disables that behavior. This is intended to mesh with the -f flag in the K line in <code>sendmail.cf</code>. The value is never case folded. -l List supported map types. -N Include the null byte that terminates strings in the map. This must match the -N flag in the K line in <code>sendmail.cf</code> -o Append to an old file. This allows you to augment an existing file. -r Allow replacement of existing keys. Normally <code>makemap</code> complains if you repeat a key, and does not do the insert. -s Ignore safety checks on maps being created. This includes checking for hard or symbolic links in world writable directories. -t <i>delim</i> Use the specified delimiter (<i>delim</i>) instead of white space. -u Dump (unmap) the content of the database to standard output. -v Verbosely print what it is doing.
OPERANDS	The following operands are supported:

makemap(1M)

<i>mapname</i>	File name of the database map being created.
<i>maptype</i>	Specifies the database format. The following <i>maptype</i> parameters are available:
dbm	Specifies DBM format maps.
btree	Specifies B-Tree format maps.
hash	Specifies hash format maps.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWsndmu

SEE ALSO `editmap(1M)`, `sendmail(1M)`, `attributes(5)`

NAME	makeuuid – generate Universal Unique Identifiers
SYNOPSIS	makeuuid [-e <i>ether</i>] [-n <i>count</i>] [-R <i>root</i>]
DESCRIPTION	The makeuuid command generates UUIDs (Universal Unique Identifiers) conforming to the OSF DCE specification for UUIDs. The specification states: "A UUID is an identifier that is unique across both space and time, with respect to the space of all UUIDs. A UUID can be used for multiple purposes, from tagging objects with an extremely short lifetime, to reliably identifying very persistent objects across a network. "The generation of UUIDs does not require a registration authority for each single identifier. Instead, it requires a unique value over space for each UUID generator. This spatially unique value is [normally] specified as an IEEE 802 address, which is usually already applied to network-connected systems." The makeuuid command generates one or more UUIDs on the standard output.
OPTIONS	The makeuuid command supports the following options: -e <i>ether</i> Supplies an alternate address to be used in the generation of the UUIDs. Normally, the system's Ethernet address is acquired and used during the generation of a UUID. However, this requires root privileges to open and read the network devices. If this is not possible, you must supply an alternate Ethernet address. -n <i>count</i> Generate multiple UUIDs. This option generates the specified number of UUIDs, one per line. Using this form is more efficient than, and functionally equivalent to, calling the makeuuid command multiple times. This can be used, for example, when a large number of UUIDs need to be generated for a given application. -R <i>root</i> Use <i>root</i> as the root filesystem path when updating the shared state file (see FILES). The shared state file must be writable by the user running makeuuid, otherwise no UUIDs will be generated and the command will return in failure.
USAGE	Normally, you run the makeuuid command with root privileges, as the Ethernet address and state files can be easily accessed and updated. If this is not possible, you must use the -R and -e options to specify an alternate root and Ethernet address to use when calculating the UUIDs.
EXAMPLES	EXAMPLE 1 Generating Multiple UUIDs The following command generates 3000 UUIDs: <pre>example# makeuuid -n 3000</pre> EXAMPLE 2 Invoking Without Root Privileges If you cannot obtain root privileges, you must specify an alternate Ethernet address and state file location:

makeuuid(1M)

EXAMPLE 2 Invoking Without Root Privileges *(Continued)*

```
example% makeuuid -e 11:22:33:44:55:66 -R /export/root/example2
```

EXIT STATUS The following exit values are returned:

- 0 Successful completion.
- 1 Out of memory.
- 1 Invalid Ethernet address given or access denied.

FILES /var/sadm/system/uuid_state UUID state file. Use of time values is one way that UUID generators, such as makeuuid, guarantee uniqueness. A state file is a mechanism that allows makeuuid to "remember" the last time value it used so it can increment that value for use in a new UUID. See the Internet Draft "UUIDs and GUIDs," dated February 4, 1998, for details on the state file mechanism.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwsr2

SEE ALSO prodreg(1M), intro(3), libwsreg(3LIB), attributes(5)

NOTES The formal UUID specification is in the OSF DCE specification, available at www.opengroup.org. As of the date of publication of this man page, a copy of the specification is available at:

<http://www.opengroup.org/onlinepubs/9629399/apdxa.htm>

Sun has no control over the availability of documents on the www.opengroup.org web site.

NAME	mdmonitord – daemon to monitor metadevices				
SYNOPSIS	<code>/usr/sbin/mdmonitord [-t <i>time_interval</i>]</code>				
DESCRIPTION	The mdmonitord utility is part of Solaris Volume Manager. It checks the accessibility of the physical components of a metadevice. There are two methods for checking metadevices: ■ At fixed time intervals. ■ When a metadevice fails. Metadevice failure generates an error event which triggers a check of all metadevices.				
OPTIONS	The following options are supported: -t Time interval in seconds. The default value is 0, which causes probes to occur only upon an error. If you want to run mdmonitord at a regular interval, a value of 1800 (seconds, every half hour) is recommended as a starting point.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWmdu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWmdu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWmdu				
SEE ALSO	metaclear(1M), metadb(1M), metadetach(1M), metahs(1M), metainit(1M), metaoffline(1M), metaonline(1M), metaparam(1M), metareplace(1M), metaroot(1M), metaset(1M), metastat(1M), metattach(1M), md.tab(4), md.cf(4), mddb.cf(4), attributes(5) <i>Solaris Volume Manager Administration Guide</i>				
NOTES	Since frequent probes can affect performance, it is recommended that the intervals between probes be limited. This daemon is started at boot time by <code>S95svm.sync</code> in <code>/etc/rc2.d</code>.				

medstat(1M)

NAME	medstat – check the status of mediator hosts for a given diskset							
SYNOPSIS	/usr/sbin/medstat [-q] -s setname							
DESCRIPTION	If a specified diskset has been configured for mediators, medstat attempts to contact these hosts to see if they are accessible and returns the results of the communication.							
OPTIONS	-q	This optional argument disables the printing of informative text. When used with -q, medstat still prints error messages and returns a result code.						
	-s setname	Specifies the name of a diskset on which medstat will work.						
EXAMPLES	EXAMPLE 1 Checking diskset This example checks the mediator hosts for the selected diskset. <pre># medstat -s relo-red</pre> The name of the diskset is relo-red. The medstat command prints the status for each mediator host. Additionally, if the mediator quorum is met, either through a “golden” mediator host or because half+1 of the mediator hosts respond, the exit code is 0. If the quorum is not met, then the exit code is 1. If no mediator hosts have been configured for the named diskset, the exit code is 2. The status field will contain one of the following values: Unreachable, Bad, Fatal, or Ok, where Unreachable indicates an RPC/communication problem, Bad indicates an error in the mediator data, Fatal indicates any other error condition, and Ok indicates no error conditions.							
FILES	/etc/lvm/meddb	Contains the mediator data for a host that has been selected as a mediator host.						
EXIT STATUS	The following exit values are returned:							
	0	Successful completion.						
	>0	An error occurred.						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:							
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWmdu</td></tr><tr><td>Interface Stability</td><td>Evolving</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWmdu	Interface Stability	Evolving
ATTRIBUTE TYPE	ATTRIBUTE VALUE							
Availability	SUNWmdu							
Interface Stability	Evolving							
SEE ALSO	metaclear(1M), metadb(1M), metadetach(1M), metahs(1M), metainit(1M), metaoffline(1M), metaonline(1M), metaparam(1M), metareplace(1M), metaroot(1M), metaset(1M), metastat(1M), metasync(1M), metattach(1M), md.cf(4), md.tab(4), mddb.cf(4), meddb(4), mediator(7D)							

medstat(1M)

Sun Cluster documentation, *Solaris Volume Manager Administration Guide*

NOTES This command is designed for use in the high availability product.

metaclear(1M)

NAME	metaclear – delete active metadevices and hot spare pools												
SYNOPSIS	<pre> /usr/sbin/metaclear -h /usr/sbin/metaclear [-s setname] -a [-f] /usr/sbin/metaclear component /usr/sbin/metaclear [-s setname] [-f] metadvice... hot_spare_pool... /usr/sbin/metaclear [-s setname] -r [-f] metadvice... hot_spare_pool... /usr/sbin/metaclear [-s setname] -p component /usr/sbin/metaclear [-s setname] -p metadvice </pre>												
DESCRIPTION	The <code>metaclear</code> command deletes the specified metadvice or <i>hot_spare_pool</i>., or purges all soft partitions from the designated component. Once a metadvice or hot spare pool is deleted, it must be re-created using <code>metainit</code> before it can be used again. Any metadvice currently in use (open) cannot be deleted.												
OPTIONS	Root privileges are required for all of the following options except <code>-h</code>. <table> <tr> <td><code>-a</code></td><td>Deletes all metadevices and configured hot spare pools in the set named by <code>-s</code>, or the local set by default.</td></tr> <tr> <td><code>-f</code></td><td>Deletes (forcibly) a metadvice that contains a subcomponent in an error state.</td></tr> <tr> <td><code>-h</code></td><td>Displays usage message.</td></tr> <tr> <td><code>-p</code></td><td>Deletes (purges) all soft partitions from the specified metadvice or component.</td></tr> <tr> <td><code>-r</code></td><td>Recursively deletes specified metadevices and hot spare pools, but does not delete metadevices on which others depend.</td></tr> <tr> <td><code>-s setname</code></td><td>Specifies the name of the diskset on which <code>metaclear</code> will work. Using the <code>-s</code> option causes the command to perform its administrative function within the specified diskset. Without this option, the command performs its function on local metadevices and/or hot spare pools.</td></tr> </table>	<code>-a</code>	Deletes all metadevices and configured hot spare pools in the set named by <code>-s</code> , or the local set by default.	<code>-f</code>	Deletes (forcibly) a metadvice that contains a subcomponent in an error state.	<code>-h</code>	Displays usage message.	<code>-p</code>	Deletes (purges) all soft partitions from the specified metadvice or component.	<code>-r</code>	Recursively deletes specified metadevices and hot spare pools, but does not delete metadevices on which others depend.	<code>-s setname</code>	Specifies the name of the diskset on which <code>metaclear</code> will work. Using the <code>-s</code> option causes the command to perform its administrative function within the specified diskset. Without this option, the command performs its function on local metadevices and/or hot spare pools.
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OPERANDS	<table> <tr> <td><i>metadvice ...</i></td><td>Specifies the name(s) of the metadvice(s) to be deleted.</td></tr> <tr> <td><i>component</i></td><td>Specifies the <code>c*d*t*s*</code> name(s) of the components containing soft partitions to be deleted.</td></tr> <tr> <td><i>hot_spare_pool ...</i></td><td>Specifies the name(s) of the hot spare pools to be deleted in the form <code>hspnnn</code>, where <i>nnn</i> is a number in the range 000-999.</td></tr> </table>	<i>metadvice ...</i>	Specifies the name(s) of the metadvice(s) to be deleted.	<i>component</i>	Specifies the <code>c*d*t*s*</code> name(s) of the components containing soft partitions to be deleted.	<i>hot_spare_pool ...</i>	Specifies the name(s) of the hot spare pools to be deleted in the form <code>hspnnn</code> , where <i>nnn</i> is a number in the range 000-999.						
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<i>component</i>	Specifies the <code>c*d*t*s*</code> name(s) of the components containing soft partitions to be deleted.												
<i>hot_spare_pool ...</i>	Specifies the name(s) of the hot spare pools to be deleted in the form <code>hspnnn</code> , where <i>nnn</i> is a number in the range 000-999.												

EXAMPLES	EXAMPLE 1 Deleting Various Devices The following example deletes a metadvice named d10. <pre># metaclear /dev/md/dsk/d10</pre> The following example deletes all local metadevices and hot spare pools on the system. <pre># metaclear -a</pre> The following example deletes a mirror, d20, with an submirror in an error state. <pre># metaclear -f d20</pre> The following example deletes a hot spare pool, hsp001. <pre># metaclear hsp001</pre> The following example deletes a soft partition, d23. <pre># metaclear d23</pre> The following example purges all soft partitions on the slice c2t3d5s2 if those partitions are not being used by other metadevices or are not open. <pre># metaclear -p c2t3d5s2</pre> The following example purges soft partitions from a metadvice. <pre># metaclear -p d2 d3: Soft Partition is cleared d4: Soft Partition is cleared d5: Soft Partition is cleared</pre>				
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>>0</td><td>An error occurred.</td></tr></table>	0	Successful completion.	>0	An error occurred.
0	Successful completion.				
>0	An error occurred.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWmd</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWmd
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWmd				
SEE ALSO	metadb(1M), metadetach(1M), metahs(1M), metainit(1M), metaoffline(1M), metaonline(1M), metaparam(1M), metarecover(1M), metareplace(1M), metaroot(1M), metaset(1M), metastat(1M), metasync(1M), metattach(1M), md.tab(4), md.cf(4), mddb.cf(4), attributes(5)				

metaclear(1M)

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NAME	metadb – create and delete replicas of the metadb state database
SYNOPSIS	<pre> /sbin/metadb -h /sbin/metadb [-s setname] /sbin/metadb [-s setname] -a [-f] [-k system-file] mddb nnn /sbin/metadb [-s setname] -a [-f] [-k system-file] [-c number] [-l length] slice... /sbin/metadb [-s setname] -d [-f] [-k system-file] mddb nnn /sbin/metadb [-s setname] -d [-f] [-k system-file] slice... /sbin/metadb [-s setname] -i /sbin/metadb [-s setname] -p [-k system-file] [mddb.cf-file] </pre>
DESCRIPTION	The metadb command creates and deletes replicas of the metadb state database. State database replicas can be created on dedicated slices, or on slices that will later become part of a simple metadb (concatenation or stripe), RAID5 metadb, or trans metadb. Do not place state database replicas on fabric-attached storage, SANs, or other storage that is not directly attached to the system and available at the same point in the boot process as traditional SCSI or IDE drives. See NOTES. The metadb state database contains the configuration of all metadbs and hot spare pools in the system. Additionally, the metadb state database keeps track of the current state of metadbs and hot spare pools, and their components. Solaris Volume Manager automatically updates the metadb state database when a configuration or state change occurs. A submirror failure is an example of a state change. Creating a new metadb is an example of a configuration change. The metadb state database is actually a collection of multiple, replicated database copies. Each copy, referred to as a replica, is subject to strict consistency checking to ensure correctness. Replicated databases have an inherent problem in determining which database has valid and correct data. To solve this problem, Volume Manager uses a <i>majority consensus algorithm</i>. This algorithm requires that a majority of the database replicas be available before any of them are declared valid. This algorithm strongly encourages the presence of at least three initial replicas, which you create. A consensus can then be reached as long as at least two of the three replicas are available. If there is only one replica and the system crashes, it is possible that all metadb configuration data can be lost. The majority consensus algorithm is conservative in the sense that it will fail if a majority consensus cannot be reached, even if one replica actually does contain the most up-to-date data. This approach guarantees that stale data will not be accidentally used, regardless of the failure scenario. The majority consensus algorithm accounts for the following: the system will stay running with exactly half or more replicas; the system will panic when less than half the replicas are available; the system will not reboot without one more than half the total replicas.

metadb(1M)

When used with no options, the `metadb` command gives a short form of the status of the metadevice state database. Use `metadb -i` for an explanation of the flags field in the output.

The initial state database is created using the `metadb` command with both the `-a` and `-f` options, followed by the slice where the replica is to reside. The `-a` option specifies that a replica (in this case, the initial) state database should be created. The `-f` option forces the creation to occur, even though a state database does not exist. (The `-a` and `-f` options should be used together only when no state databases exist.)

Additional replicas beyond those initially created can be added to the system. They contain the same information as the existing replicas, and help to prevent the loss of the configuration information. Loss of the configuration makes operation of the metadevices impossible. To create additional replicas, use the `metadb -a` command, followed by the name of the new slice(s) where the replicas will reside. All replicas that are located on the same slice must be created at the same time.

To delete all replicas that are located on the same slice, the `metadb -d` command is used, followed by the slice name.

When used with the `-i` option, `metadb` displays the status of the metadevice state databases. The status can change if a hardware failure occurs or when state databases have been added or deleted.

To fix a replica in an error state, delete the replica and add it back again.

The metadevice state database (`mddb`) also contains a list of the replica locations for this set (local or shared diskset).

The local set `mddb` can also contain host and drive information for each of the shared disksets of which this node is a member. Other than the diskset host and drive information stored in the local set `mddb`, the local and shared diskset `mddb`s are functionality identical.

The `mddb`s are written to during the resync of a mirror or during a component failure or configuration change. A configuration change or failure can also occur on a single replica (removal of a `mddb` or a failed disk) and this causes the other replicas to be updated with this failure information.

OPTIONS

Root privileges are required for all of the following options except `-h` and `-i`.

The following options can be used with the `metadb` command. Not all the options are compatible on the same command line. Refer to the above synopsis line to see the supported use of the options.

<code>-a</code>	Attach a new database device. The <code>/kernel/drv/md.conf</code> file is automatically updated with the new information and the <code>/etc/lvm/mddb.cf</code> file is updated as well. An alternate way to create replicas is by defining them in the <code>/etc/lvm/md.tab</code> file and specifying the assigned name at the command line in the

form, `mddbnn`, where `nn` is a two-digit number given to the replica definitions. Refer to the `md.tab(4)` man page for instructions on setting up replicas in that file.

<code>-c number</code>	Specifies the number of replicas to be placed on each device. The default number of replicas is 1.
<code>-d</code>	Deletes all replicas that are located on the specified <i>slice</i> . The <code>/kernel/drv/md.conf</code> file is automatically updated with the new information and the <code>/etc/lvm/mddb.cf</code> file is updated as well.
<code>-f</code>	The <code>-f</code> option is used to create the initial state database. It is also used to force the deletion of replicas below the minimum of one. (The <code>-a</code> and <code>-f</code> options should be used together only when no state databases exist.)
<code>-h</code>	Displays a usage message.
<code>-i</code>	Inquire about the status of the replicas. The output of the <code>-i</code> option includes characters in front of the device name that represent the status of the state database. Explanations of the characters are displayed following the replica status and are as follows:
d	replica does not have an associated device ID.
o	replica active prior to last mddb configuration change
u	replica is up to date
l	locator for this replica was read successfully
c	replica's location was in <code>/etc/lvm/mddb.cf</code>
p	replica's location was patched in kernel
m	replica is master, this is replica selected as input
w	replica has device write errors
a	replica is active, commits are occurring to this
M	replica had problem with master blocks
D	replica had problem with data blocks

metadb(1M)

	F	replica had format problems
	S	replica is too small to hold current database
	R	replica had device read errors
<code>-k system-file</code>		Specifies the name of the kernel file where the replica information should be written. The default <i>system-file</i> is <code>/kernel/drv/md.conf</code> . This option is for use with the local diskset only.
<code>-l length</code>		Specifies the size of each replica. The default <i>length</i> is 8192 blocks, which should be appropriate for most configurations.
<code>-p</code>		Specifies updating the system file (<code>/kernel/drv/md.conf</code>) with entries from the <code>/etc/lvm/mddb.cf</code> file. This option is normally used to update a newly built system before it is booted for the first time. If the system has been built on a system other than the one where it will run, the location of the <code>mddb.cf</code> on the local machine can be passed as an argument. The system file to be updated can be changed using the <code>-k</code> option. This option is for use with the local diskset only.
<code>-s setname</code>		Specifies the name of the diskset on which the <code>metadb</code> command will work. Using the <code>-s</code> option will cause the command to perform its administrative function within the specified diskset. Without this option, the command will perform its function on local database replicas.
<code>slice</code>		Specifies the logical name of the physical slice (partition), such as <code>/dev/dsk/c0t0d0s2</code> .

EXAMPLES

EXAMPLE 1 Creating Initial State Database Replicas

The following example creates the initial state database replicas on a new system.

```
# metadb -a -f c0t0d0s7 c0t1d0s2 c1t0d0s7 c1t1d0s2
```

The `-a` and `-f` options force the creation of the initial database and replicas. You could then create metadevices with these same slices, making efficient use of the system.

EXAMPLE 2 Adding Two Replicas on Two New Disks

This example shows how to add two replicas on two new disks that have been connected to a system currently running Volume Manager.

```
# metadb -a c0t2d0s2 c1t1d0s2
```

EXAMPLE 3 Deleting Two Replicas

This example shows how to delete two replicas from the system. Assume that replicas have been set up on `/dev/dsk/c0t2d0s2` and `/dev/dsk/c1t1d0s2`.

```
# metadb -d c0t2d0s2 c1t1d0s2
```

Although you can delete all replicas, you should never do so while metadevices still exist. Removing all replicas causes existing metadevices to become inoperable.

FILES	<code>/etc/lvm/mddb.cf</code>	Contains the location of each copy of the metadevice state database.
	<code>/etc/lvm/md.tab</code>	Workspace file for metadevice database configuration.
	<code>/kernel/drv/md.conf</code>	Contains database replica information for all metadevices on a system. Also contains Solaris Volume Manager configuration information.

EXIT STATUS The following exit values are returned:

0	successful completion
>0	an error occurred

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdr

SEE ALSO `metaclear(1M)`, `metadetach(1M)`, `metahs(1M)`, `metainit(1M)`, `metaoffline(1M)`, `metaonline(1M)`, `metaparam(1M)`, `metareplace(1M)`, `metaroot(1M)`, `metaset(1M)`, `metastat(1M)`, `metasync(1M)`, `metattach(1M)`, `md.tab(4)`, `md.cf(4)`, `mddb.cf(4)`

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NOTES Replicas cannot be stored on fabric-attached storage, SANs, or other storage that is not directly attached to the system. Replicas must be on storage that is available at the same point in the boot process as traditional SCSI or IDE drives. A replica can be stored on:

- a dedicated local disk partition
- a local partition that will be part of a volume
- a local partition that will be part of a UFS logging device

metadevadm(1M)

NAME	metadevadm – update metadvice information												
SYNOPSIS	/usr/sbin/metadevadm [-h] [-n] [[-l] -r] [-u <i>disk_specifier</i>] [-v]												
DESCRIPTION	The metadevadm command facilitates the administration of device ID entries in Solaris Volume Manager. Use this command when the pathname stored in the metadvice state database no longer correctly addresses the device or when a disk drive has had its device ID changed.												
OPTIONS	Root privileges are required for all of the following options except -h. The following options are supported. <table><tr><td>-h</td><td>Provide a help display.</td></tr><tr><td>-l</td><td> Specify that metadevadm log to syslog(3C). metadevadm logs to the the DAEMON facility at the ERR level by default. See syslog.conf(4) for additional information on changing logging levels. Use this option anytime. It is most useful in startup scripts and less useful interactively. This option requires root privileges. </td></tr><tr><td>-n</td><td> Emulate the effect of a command, without making any changes to the system. This option requires root privileges. </td></tr><tr><td>-r</td><td> Recompute the pathname and disk specifier (including slice) associated with all devices in the metadvice state database if a device ID is present for the device. Use this option when the disk has been moved or readdressed. This option requires root privileges. </td></tr><tr><td>-u <i>disk_specifier</i></td><td> Obtain the device ID associated with the <i>disk_specifier</i> (for example, c1t2d0) of a device and update the metadvice state database. If the device ID has not changed this option does nothing. Use this option when a disk drive has had its device ID changed during a firmware upgrade or due to changing the controller of a storage subsystem. This option requires root privileges. </td></tr><tr><td>-v</td><td> Execute in verbose mode. This option has no effect when used with -u. Verbose is the default. This option requires root privileges. </td></tr></table>	-h	Provide a help display.	-l	Specify that metadevadm log to syslog(3C). metadevadm logs to the the DAEMON facility at the ERR level by default. See syslog.conf(4) for additional information on changing logging levels. Use this option anytime. It is most useful in startup scripts and less useful interactively. This option requires root privileges.	-n	Emulate the effect of a command, without making any changes to the system. This option requires root privileges.	-r	Recompute the pathname and disk specifier (including slice) associated with all devices in the metadvice state database if a device ID is present for the device. Use this option when the disk has been moved or readdressed. This option requires root privileges.	-u <i>disk_specifier</i>	Obtain the device ID associated with the <i>disk_specifier</i> (for example, c1t2d0) of a device and update the metadvice state database. If the device ID has not changed this option does nothing. Use this option when a disk drive has had its device ID changed during a firmware upgrade or due to changing the controller of a storage subsystem. This option requires root privileges.	-v	Execute in verbose mode. This option has no effect when used with -u. Verbose is the default. This option requires root privileges.
-h	Provide a help display.												
-l	Specify that metadevadm log to syslog(3C). metadevadm logs to the the DAEMON facility at the ERR level by default. See syslog.conf(4) for additional information on changing logging levels. Use this option anytime. It is most useful in startup scripts and less useful interactively. This option requires root privileges.												
-n	Emulate the effect of a command, without making any changes to the system. This option requires root privileges.												
-r	Recompute the pathname and disk specifier (including slice) associated with all devices in the metadvice state database if a device ID is present for the device. Use this option when the disk has been moved or readdressed. This option requires root privileges.												
-u <i>disk_specifier</i>	Obtain the device ID associated with the <i>disk_specifier</i> (for example, c1t2d0) of a device and update the metadvice state database. If the device ID has not changed this option does nothing. Use this option when a disk drive has had its device ID changed during a firmware upgrade or due to changing the controller of a storage subsystem. This option requires root privileges.												
-v	Execute in verbose mode. This option has no effect when used with -u. Verbose is the default. This option requires root privileges.												

EXAMPLES**EXAMPLE 1** Updating Device ID of Disk

The following example updates the device c2t3d0:

```
# metadevadm -u c2t3d0
Updating SLVM device relocation information for c2t3d0.
Old device reloc information: id19280192391293123012012010012012091398
New device reloc information: id19380192391293123012012010012012091398
```

The following example is a variation of the preceding, using the full pathname.

```
# metadevadm -u /dev/dsk/c2t3d0
```

The following example uses the `-n` option, which means that the command is emulated, but does not take effect. Note that when the `-v` option is used with `-u`, `-v` has no effect (verbose is the default).

```
# metadevadm -u -v -n c2t3d0
Updating SLVM device relocation information for c2t3d0.
Old device reloc information: id19280192391293123012012010012012091398
New device reloc information: id19380192391293123012012010012012091398
```

EXAMPLE 2 Recomputing Pathnames

In the following example, all device names are valid.

```
# metadevadm -r
Disk movement detected.
Updating device names in SLVM.
```

In the following example, once again device names are valid.

```
# metadevadm -r -v
Disk movement detected.
Updating device names in SLVM.
c0t0d0s0 changed to c0t0d1s0 from device relocation information
id120981231kmlsdjaasdkfjadfjakds
```

In the following example, metadevadm detects an invalid device name.

```
# metadevadm -r
Invalid device relocation information detected in SLVM.
Please check status of following disk(s):
c3t0d0
```

RETURN VALUES

The following exit values are returned:

0	Command was successful.
1	metadevadm encountered an error condition.
2	An invalid device ID was detected when using the <code>-r</code> option. This is for use in the <code>rc2.d</code> script. See <code>init.d(4)</code> .

metadevadm(1M)

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdu

SEE ALSO

`metaclear(1M)`, `metadb(1M)`, `metadetach(1M)`, `metahs(1M)`, `metainit(1M)`, `metaparam(1M)`, `metarecover(1M)`, `metareplace(1M)`, `metaroot(1M)`, `metaset(1M)`, `metastat(1M)`, `metasync(1M)`, `metattach(1M)`, `syslog(3C)`, `md.tab(4)`, `md.cf(4)`, `mddb.cf(4)`, `syslog.conf(4)`, `attributes(5)`

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NAME	metahs – manage hot spares and hot spare pools
SYNOPSIS	<pre> /usr/sbin/metahs [-s setname] -a all component /usr/sbin/metahs [-s setname] -a hot_spare_pool [component] /usr/sbin/metahs [-s setname] -d hot_spare_pool [component] /usr/sbin/metahs [-s setname] -d all component /usr/sbin/metahs [-s setname] -e component /usr/sbin/metahs [-s setname] -r hot_spare_pool component-old /usr/sbin/metahs [-s setname] -r all component-old component-new /usr/sbin/metahs [-s setname] -i [hot_spare_pool...] </pre>
DESCRIPTION	The metahs command manages existing hot spares and hot spare pools. It is used to add, delete, enable, and replace components (slices) in hot spare pools. Like the metainit command, the metahs command can also create an initial hot spare pool. The metahs command does not replace a component of a metadevice. This function is performed by the metareplace command. Hot spares are always in one of three states: available, in-use, or broken. Available hot spares are running and ready to accept data, but are not currently being written to or read from. In-use hot spares are currently being written to and read from. Broken hot spares are out of service and should be repaired. The status of hot spares is displayed when metahs is invoked with the <code>-i</code> option. Solaris Volume Manager supports storage devices and logical volumes, including hot spares, greater than 1 terabyte (TB) when Solaris 10 is running a 64-bit kernel. If a system with large volumes or hot spares is rebooted under a 32-bit Solaris 10 kernel, the large volumes are visible through <code>metastat</code> output, but they cannot be accessed, modified or deleted, and no new large volumes can be created. Any volumes or file systems on a large volume in this situation are also unavailable. If a system with large volumes is rebooted under a version of Solaris prior to Solaris 10, Solaris Volume Manager will not start. All large volumes must be removed before Solaris Volume Manager runs under another version of the Solaris Operating Environment.
OPTIONS	Root privileges are required for any of the following options except <code>-i</code>. The following options are supported: <code>-a all component</code> Add <i>component</i> to all hot spare pools. <i>all</i> is not case sensitive. <code>-a hot_spare_pool [component]</code> Add the <i>component</i> to the specified <i>hot_spare_pool</i>. <i>hot_spare_pool</i> is created if it does not already exist.

metahs(1M)

- d *all component*
Delete *component* from all the hot spare pools. The *component* cannot be deleted if it is in the in-use state.
- d *hot_spare_pool [component]*
Delete *hot_spare_pool*, if the *hot_spare_pool* is both empty and not referenced by a metadvice. If *component* is specified, it is deleted from the *hot_spare_pool*. Hot spares in the in-use state cannot be deleted.
- e *component*
Enable *component* to be available for use as a hot spare. The *component* can be enabled if it is in the broken state and has been repaired.
- i [*hot_spare_pool . . .*]
Display the status of the specified *hot_spare_pool* or for all hot spare pools if one is not specified.
- r *all component-old component-new*
Replace *component-old* with *component-new* in all hot spare pools which have the component associated. Components cannot be replaced from any hot spare pool if the old hot spare is in the in-use state.
- r *hot_spare_pool component-old component-new*
Replace *component-old* with *component-new* in the specified *hot_spare_pool*. Components cannot be replaced from a hot spare pool if the old hot spare is in the in-use state.
- s *setname*
Specify the name of the diskset on which metahs works. Using the -s option causes the command to perform its administrative function within the specified diskset. Without this option, the command performs its function on local hot spare pools.

OPERANDS The following operands are supported:

<i>component</i>	The logical name for the physical slice (partition) on a disk drive, such as <code>/dev/dsk/c0t0d0s2</code> .
<i>hot_spare_pool</i>	Hot spare pools must be of the form <code>hspnnn</code> , where <i>nnn</i> is a number in the range 000-999.

EXAMPLES **EXAMPLE 1** Adding a Hot Spare to a Hot Spare Pool

The following example adds a hot spare `/dev/dsk/c0t0d0s7` to a hot spare pool `hsp003`:

```
# metahs -a hsp003 c0t0d0s7
```

When the hot spare is added to the pool, the existing order of the hot spares already in the pool is preserved. The new hot spare is added at the end of the list of hot spares in the hot spare pool specified.

EXAMPLE 2 Adding a Hot Spare to All Currently Defined Pools

This example adds a hot spare to the hot spare pools that are currently defined:

```
# metahs -a all c0t0d0s7
```

The keyword `all` in this example specifies adding the hot spare, `/dev/dsk/c0t0d0s7`, to all the hot spare pools.

EXAMPLE 3 Deleting a Hot Spare

This example deletes a hot spare, `/dev/dsk/c0t0d0s7`, from a hot spare pool, `hsp003`:

```
# metahs -d hsp003 c0t0d0s7
```

When you delete a hot spare, the position of the remaining hot spares in the pool changes to reflect the new order. For instance, if in this example `/dev/dsk/c0t0d0s7` were the second of three hot spares, after deletion the third hot spare would move to the second position.

EXAMPLE 4 Replacing a Hot Spare

This example replaces a hot spare that was previously defined:

```
# metahs -r hsp001 c0t1d0s0 c0t3d0s0
```

In this example, the hot spare `/dev/dsk/c0t1d0s0` is replaced by `/dev/dsk/c0t3d0s0`. The order of the hot spares does not change.

EXIT STATUS The following exit values are returned:

0 Successful completion.
>0 An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdu

SEE ALSO `metaclear(1M)`, `metadb(1M)`, `metadetach(1M)`, `metainit(1M)`, `metaoffline(1M)`, `metaonline(1M)`, `metaparam(1M)`, `metareplace(1M)`, `metaroot(1M)`, `metaset(1M)`, `metastat(1M)`, `metasync(1M)`, `metattach(1M)`, `md.tab(4)`, `md.cf(4)`, `mddb.cf(4)`, `attributes(5)`

Solaris Volume Manager Administration Guide

metahs(1M)

WARNINGS	Do not create large (>1 TB) volumes if you expect to run the Solaris Operating Environment with a 32-bit kernel or if you expect to use a version of the Solaris Operating Environment prior to Solaris 10.

NAME	metainit – configure metadevices
SYNOPSIS	<pre> /sbin/metainit -h /sbin/metainit [generic options] concat/stripe numstripes width component... [-i interlace] /sbin/metainit [width component... [-i interlace]] [-h hot_spare_pool] /sbin/metainit [generic options] mirror -m submirror [read_options] [write_options] [pass_num] /sbin/metainit [generic options] RAID -r component... [-i interlace] [-h hot_spare_pool] [-k] [-o original_column_count] /sbin/metainit [generic options] trans -t master [log] /sbin/metainit [generic options] hot_spare_pool [hotspare...] /sbin/metainit [generic options] metadvice-name /sbin/metainit [generic options] -a /sbin/metainit [generic options] softpart -p [-e] component size /sbin/metainit -r </pre>
DESCRIPTION	The <code>metainit</code> command configures metadevices and hot spares according to the information specified on the command line. Alternatively, you can run <code>metainit</code> so that it uses configuration entries you specify in the <code>/etc/lvm/md.tab</code> file (see <code>md.tab(4)</code>). All metadevices must be set up by the <code>metainit</code> command before they can be used. Solaris Volume Manager supports storage devices and logical volumes greater than 1 terabyte (TB) when Solaris 10 is running a 64-bit kernel. Support for large volumes is automatic. If a device greater than 1 TB is created, Solaris Volume Manager configures it appropriately and without user intervention. If a system with large volumes is rebooted under a 32-bit Solaris 10 kernel, the large volumes are visible through <code>metastat</code> output. Large volumes cannot be accessed, modified or deleted, and no new large volumes can be created. Any volumes or file systems on a large volume in this situation are unavailable. If a system with large volumes is rebooted under a version of Solaris prior to Solaris 10, Solaris Volume Manager will not start. You must remove all large volumes before Solaris Volume Manager runs under another version of the Solaris Operating Environment. If you edit the <code>/etc/lvm/md.tab</code> file to configure metadevices, specify one complete configuration entry per line. You then run the <code>metainit</code> command with either the <code>-a</code> option, to activate all metadevices you entered in the <code>/etc/lvm/md.tab</code> file, or with the metadvice name corresponding to a specific configuration entry.

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metainit does not maintain the state of the volumes that would have been created when metainit is run with both the `-a` and `-n` flags. Any volumes in `md.tab` that have dependencies on other volumes in `md.tab` are reported as errors when `metainit -a -n` is run, although the operations might succeed when `metainit -a` is run. See `md.tab(4)`.

Volume Manager never updates the `/etc/lvm/md.tab` file. Complete configuration information is stored in the metadvice state database, not `md.tab`. The only way information appears in `md.tab` is through editing it by hand.

When setting up a disk mirror, the *first* step is to use metainit create a one-on-one concatenation for the root slice. See `EXAMPLES`.

OPTIONS

The following options are supported:

Generic Options

Root privileges are required for all of the following options except `-h`.

The following generic options are supported:

- `-f` Forces the metainit command to continue even if one of the slices contains a mounted file system or is being used as swap. This option is required when configuring mirrors on root (`/`), swap, and `/usr`.
- `-h` Displays usage message.
- `-n` Checks the syntax of your command line or `md.tab` entry without actually setting up the metadvice. If used with `-a`, all devices are checked but not initialized.
- `-r` Only used in a shell script at boot time. Sets up all metadevices that were configured before the system crashed or was shut down. The information about previously configured metadevices is stored in the metadvice state database (see `metadb(1M)`).
- `-s setname` Specifies the name of the diskset on which metainit works. Without the `-s` option, the metainit command operates on your local metadevices and/or hotspares.

CONCAT/STRIPE OPTIONS

The following concat/stripe options are supported:

- `concat/stripe` Specifies the metadvice name of the concatenation, stripe, or concatenation of stripes being defined.
- `numstripes` Specifies the number of individual stripes in the metadvice. For a simple stripe, `numstripes` is always 1. For a concatenation, `numstripes` is equal to the number of slices. For a concatenation of stripes, `numstripes` varies according to the number of stripes.
- `width` Specifies the number of slices that make up a stripe. When `width` is greater than 1, the slices are striped.

<i>component</i>	The logical name for the physical slice (partition) on a disk drive, such as <code>/dev/dsk/c0t0d0s2</code> . For RAID level 5 metadevices, a minimum of three slices is necessary to enable striping of the parity information across slices.
<code>-i interlace</code>	Specifies the interlace size. This value tells Volume Manager how much data to place on a slice of a striped or RAID level 5 metadevice before moving on to the next slice. <i>interlace</i> is a specified value, followed by either 'k' for kilobytes, 'm' for megabytes, or 'b' for blocks. The characters can be either uppercase or lowercase. The <i>interlace</i> specified cannot be less than 16 blocks, or greater than 100 megabytes. If <i>interlace</i> is not specified, it defaults to 16 kilobytes.
<code>-h hot_spare_pool</code>	Specifies the <i>hot_spare_pool</i> to be associated with the metadevice. If you use the command line, the hot spare pool must have been previously created by the <code>metainit</code> command before it can be associated with a metadevice. The <i>hot_spare_pool</i> must be of the form <i>hspnnn</i> , where <i>nnn</i> is a number in the range 000-999. Use <code>/-h hspnnn</code> when the concat/stripe being created is to be used as a submirror.

MIRROR OPTIONS

The following mirror options are supported:

mirror -m submirror

Specifies the metadevice name of the mirror. The `-m` indicates that the configuration is a mirror. *submirror* is a metadevice (stripe or concatenation) that makes up the initial one-way mirror. Volume Manager supports a maximum of four-way mirroring. When defining mirrors, first create the mirror with the `metainit` command as a one-way mirror. Then attach subsequent submirrors using the `metattach` command. This method ensures that Volume Manager properly syncs the mirrors. (The second and any subsequent submirrors are first created using the `metainit` command.)

read_options

The following read options for mirrors are supported:

- `-g` Enables the geometric read option, which results in faster performance on sequential reads.
- `-r` Directs all reads to the first submirror. This should only be used when the devices comprising the first submirror are substantially faster than those of the second mirror. This flag cannot be used with the `-g` flag.

If neither the `-g` nor `-r` flags are specified, reads are made in a round-robin order from all submirrors in the mirror. This enables load balancing across the submirrors.

write_options

The following write options for mirrors are supported:

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	-S Performs serial writes to mirrors. The first submirror write completes before the second is started. This may be useful if hardware is susceptible to partial sector failures. If -S is not specified, writes are replicated and dispatched to all mirrors simultaneously. <i>pass_num</i> A number in the range 0-9 at the end of an entry defining a mirror that determines the order in which that mirror is resynced during a reboot. The default is 1. Smaller pass numbers are resynced first. Equal pass numbers are run concurrently. If 0 is used, the resync is skipped. 0 should be used only for mirrors mounted as read-only, or as swap.
RAID Level 5 OPTIONS	The following RAID level 5 options are supported: <i>RAID -r</i> Specifies the name of the RAID level 5 metadvice. The -r specifies that the configuration is RAID level 5. -k For RAID level 5 metadvice, informs the driver that it is not to initialize (zero the disk blocks) due to existing data. Only use this option to recreate a previously created RAID level 5 device. Use the -k option with extreme caution. This option sets the disk blocks to the OK state. If any errors exist on disk blocks within the metadvice, Volume Manager might begin fabricating data. Instead of using the -k option, you might want to initialize the device and restore data from tape. -o <i>original_column_count</i> For RAID level 5 metadvice, used with the -k option to define the number of original slices in the event the originally defined metadvice was grown. This is necessary since the parity segments are not striped across concatenated devices. Use the -o option with extreme caution. This option sets the disk blocks to the OK state. If any errors exist on disk blocks within the metadvice, Volume Manager might begin fabricating data. Instead of using the -o option, you might want to initialize the device and restore data from tape.
TRANS OPTIONS	The following trans options are supported: <i>trans -t master [log]</i> <i>trans</i> specifies the name of the trans metadvice, which consists of <i>master</i> and <i>log</i> devices, or just a <i>master</i> device. The -t specifies that the configuration is a trans metadvice. If <i>log</i> is not specified when you create the trans metadvice, no logging can take place until a logging device is provided by using the <i>metattach</i> command. <i>master</i> and <i>log</i> can be simple, mirror, or RAID level 5 metadvice. They cannot be trans metadvice. <i>master</i> should be a UFS file system. You can configure an existing file system for logging by creating a trans metadvice as follows: make the existing file system into the master trans device, then create the log device on a separate, unused slice. The minimum log size is 1 Mbyte of disk space. Under heavy sustained loads, small logs detract from performance because old data must

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SOFT PARTITION OPTIONS

be copied from the log to the file system before new data can be logged. The maximum log size is 1 Gbyte. Large logs might increase performance. However, logs larger than 64 Mbytes can have negligible performance benefits.

The following soft partition options are supported:

softpart -p [-e] component size

The *softpart* argument specifies the name of the soft partition. The *-p* specifies that the configuration is a soft partition.

The *-e* specifies that the entire disk specified by *component* as *c*t*d** should be repartitioned and reserved for soft partitions. The specified component is repartitioned such that slice 7 reserves space for system (state database replica) usage and slice 0 contains all remaining space on the disk. Slice 7 is a minimum of 4MB, but can be larger, depending on the disk geometry. The newly created soft partition is placed on slice 0 of the device.

The *component* argument specifies the disk (*c*t*d**), slice (*c*t*d*s**), or meta device (*d**) from which to create the soft partition. The *size* argument determines the space to use for the soft partition and can be specified in K or k for kilobytes, M or m for megabytes, G or g for gigabytes, T or t for terabyte (one terabyte is the maximum size), and B or b for blocks (sectors).

HOT SPARE POOL OPTIONS

The following hot spare pool options are supported:

hot_spare_pool [hotspare...]

When used as arguments to the *metainit* command, *hot_spare_pool* defines the name for a hot spare pool, and *hotspare...* is the logical name for the physical slice(s) for availability in that pool. *hot_spare_pool* is a number of the form *hspnnn*, where *nnn* is a number in the range 000-999.

md.tab FILE OPTIONS

The following *md.tab* file options are supported:

metadevice-name

When the *metainit* command is run with a *metadevice-name* as its only argument, it searches the */etc/lvm/md.tab* file to find that name and its corresponding entry. The order in which entries appear in the *md.tab* file is unimportant. For example, consider the following *md.tab* entry:

```
d0 2 1 c1t0d0s0 1 c2t1d0s0
```

When you run the command *metainit d0*, it configures metadevice *d0* based on the configuration information found in the *md.tab* file.

-a

Activates all metadevices defined in the *md.tab* file.

metainit does not maintain the state of the volumes that would have been created when *metainit* is run with both the *-a* and *-n* flags. If a device *d0* is created in the first line of the *md.tab* file, and a later line in *md.tab* assumes the existence of *d0*, the later line fails when *metainit -an* runs (even if it would succeed with *metainit -a*).

EXAMPLES**EXAMPLE 1** Creating a One-on-One Concatenation

The following command creates a one-on-one concatenation for the root slice. Such a command is the first step you take when setting up a mirror for the root slice (and any other slice that cannot be unmounted). The `-f` option is required to create a volume with an existing file system.

```
# metainit -f d1 1 1 c0t0d0s0
```

The preceding command makes `d1` a one-on-one concatenation, using the root slice. You can then enter:

```
# metainit d0 -m d1
```

...to make a one-way mirror of the root slice.

EXAMPLE 2 Concatenation

All drives in the following examples have the same size of 525 Mbytes.

This example shows a metadvice, `/dev/md/dsk/d7`, consisting of a concatenation of four slices.

```
# metainit d7 4 1 c0t1d0s0 1 c0t2d0s0 1 c0t3d0s0 1 /dev/dsk/c0t4d0s0
```

The number 4 indicates there are four individual stripes in the concatenation. Each stripe is made of one slice, hence the number 1 appears in front of each slice. The first disk sector in all of the above devices contains a disk label. To preserve the labels on devices `/dev/dsk/c0t2d0s0`, `/dev/dsk/c0t3d0s0`, and `/dev/dsk/c0t4d0s0`, the metadisk driver must skip at least the first sector of those disks when mapping accesses across the concatenation boundaries. Because skipping only the first sector would create an irregular disk geometry, the entire first cylinder of these disks is skipped. This allows higher level file system software to optimize block allocations correctly.

EXAMPLE 3 Stripe

This example shows a metadvice, `/dev/md/dsk/d15`, consisting of two slices.

```
# metainit d15 1 2 c0t1d0s2 c0t2d0s2 -i 32k
```

The number 1 indicates that one stripe is being created. Because the stripe is made of two slices, the number 2 follows next. The optional `-i` followed by `32k` specifies the interlace size as 32 Kbytes. If the interlace size were not specified, the stripe would use the default value of 16 Kbytes.

EXAMPLE 4 Concatenation of Stripes

This example shows a metadvice, `/dev/md/dsk/d75`, consisting of a concatenation of two stripes of three disks.

```
# metainit d75 2 3 c0t1d0s2 c0t2d0s2 \
    c0t3d0s2 -i 16k \
    3 c1t1d0s2 c1t2d0s2 c1t3d0s2 -i 32k
```

EXAMPLE 4 Concatentation of Stripes *(Continued)*

On the first line, the `-i` followed by `16k` specifies that the stripe interlace size is 16 Kbytes. The second set specifies the stripe interlace size as 32 Kbytes. If the second set did not specify 32 Kbytes, the set would use the default interlace value of 16 Kbytes. The blocks of each set of three disks are interlaced across three disks.

EXAMPLE 5 Mirroring

This example shows a two-way mirror, `/dev/md/dsk/d50`, consisting of two submirrors. This mirror does not contain any existing data.

```
# metainit d51 1 1 c0t1d0s2
# metainit d52 1 1 c0t2d0s2
# metainit d50 -m d51
# metattach d50 d52
```

In this example, two submirrors, `d51` and `d52`, are created with the `metainit` command. These two submirrors are simple concatenations. Next, a one-way mirror, `d50`, is created using the `-m` option with `d51`. The second submirror is attached later using the `metattach` command. When creating a mirror, any combination of stripes and concatenations can be used. The default read and write options in this example are a round-robin read algorithm and parallel writes to all submirrors.

EXAMPLE 6 Logging (trans)

This example shows `trans` metadvice, `/dev/md/dsk/d1`, with mirrors for the master and logging devices. This `trans` does not contain any existing data.

```
# metainit d11 1 1 c0t1d0s2
# metainit d12 1 1 c0t2d0s2
# metainit d21 1 1 c1t1d0s3
# metainit d22 1 1 c1t2d0s3
# metainit d10 -m d11
# metattach d10 d12
# metainit d20 -m d21
# metattach d20 d22
# metainit d1 -t d10 d20
```

This example begins by defining four concatenations, `d11`, `d12`, `d21`, and `d22`. Next, mirror `d10` is defined, followed by mirror `d20`. The mirrors are initially defined as one-way mirrors, then the second submirrors are attached later with the `metattach` command. Finally, the `trans` metadvice `d1` is defined, with `d10` as the master device and `d20` as the logging device by using the `-t` option.

EXAMPLE 7 RAID Level 5

This example shows a RAID level 5 device, `d80`, consisting of three slices:

```
# metainit d80 -r c1t0d0s2 c1t1d0s2 c1t3d0s2 -i 20k
```

In this example, a RAID level 5 metadvice is defined using the `-r` option with an interlace size of 20 Kbytes. The data and parity segments are striped across the slices, `c1t0d0s2`, `c1t2d0s2`, and `c1t3d0s2`.

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EXAMPLE 8 Soft Partition

The following example shows a soft partition device, `d1`, built on metadvice `d100` and 100 Mbytes (indicated by `100M`) in size:

```
# metainit d1 -p d100 100M
```

The preceding command creates a 100-Mbyte soft partition on the `d100` metadvice. This metadvice could be a RAID level 5, stripe, concatenation, or mirror.

EXAMPLE 9 Soft Partition on Full Disk

The following example shows a soft partition device, `d1`, built on disk `c3t4d0`:

```
# metainit d1 -p -e c3t4d0 9Gb
```

In this example, the disk is repartitioned and a soft partition is defined to occupy all 9 Gbytes of disk `c3t4d0s0`.

EXAMPLE 10 Hot Spare

This example shows a two-way mirror, `/dev/md/dsk/d10`, and a hot spare pool with three hot spare components. The mirror does not contain any existing data.

```
# metainit hsp001 c2t2d0s2 c3t2d0s2 c1t2d0s2
# metainit d41 1 1 c1t0d0s2 -h hsp001
# metainit d42 1 1 c3t0d0s2 -h hsp001
# metainit d40 -m d41
# metattach d40 d42
```

In the above example, a hot spare pool, `hsp001`, is created with three disks used as hot spares. Next, two submirrors are created, `d41` and `d42`. These are simple concatenations. The `metainit` command uses the `-h` option to associate the hot spare pool `hsp001` with each submirror. A one-way mirror is then defined using the `-m` option. The second submirror is attached using the `metattach` command.

FILES

`/etc/lvm/md.tab`

Contains list of metadvice and hot spare configurations for batch-like creation.

WARNINGS

This section contains information on warnings.

Devices and Volumes Greater Than 1 TB

Do not create large (>1 TB) volumes if you expect to run the Solaris Operating Environment with a 32-bit kernel or if you expect to use a version of the Solaris Operating Environment prior to Solaris 10.

Multi-Way Mirror

Do not use the `metainit` command to create a multi-way mirror. Rather, create a one-way mirror with `metainit` then attach additional submirrors with `metattach`. When the `metattach` command is not used, no resync operations occur and data could become corrupted.

If you use `metainit` to create a mirror with multiple submirrors, the following message is displayed:

	WARNING: This form of metainit is not recommended. The submirrors may not have the same data. Please see ERRORS in metainit(1M) for additional information.				
Write-On-Write Problem	When mirroring data in Solaris Volume Manager, transfers from memory to the disks do not all occur at exactly the same time for all sides of the mirror. If the contents of buffers are changed while the data is in-flight to the disk (called write-on-write), then different data can end up being stored on each side of a mirror. This problem can be addressed by making a private copy of the data for mirror writes, however, doing this copy is expensive. Another approach is to detect when memory has been modified across a write by looking at the dirty-bit associated with the memory page. Volume Manager uses this dirty-bit technique when it can. Unfortunately, this technique does not work for raw I/O or direct I/O. By default, Volume Manager is tuned for performance with the liability that mirrored data might be out of sync if an application does a "write-on-write" to buffers associated with raw I/O or direct I/O. Without mirroring, you were not guaranteed what data would actually end up on media, but multiple reads would return the same data. With mirroring, multiple reads may return different data. The following line can be added to <code>/etc/system</code> to cause a stable copy of the buffers to be used for all raw I/O and direct I/O write operations. <pre>set md_mirror:md_mirror_wow_flg=0x20</pre> Setting this flag degrades performance.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWmdr</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWmdr
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWmdr				
SEE ALSO	<code>metaclear(1M)</code>, <code>metadb(1M)</code>, <code>metadetach(1M)</code>, <code>metahs(1M)</code>, <code>metaoffline(1M)</code>, <code>metaonline(1M)</code>, <code>metaparam(1M)</code>, <code>metarecover(1M)</code>, <code>metareplace(1M)</code>, <code>metaroot(1M)</code>, <code>metaset(1M)</code>, <code>metastat(1M)</code>, <code>metasync(1M)</code>, <code>metattach(1M)</code>, <code>md.cf(4)</code>, <code>md.tab(4)</code>, <code>mddb.cf(4)</code>, <code>attributes(5)</code> <i>Solaris Volume Manager Administration Guide</i>				
LIMITATIONS	Recursive mirroring is not allowed; that is, a mirror cannot appear in the definition of another mirror. Recursive logging is not allowed; that is, a trans metadvice cannot appear in the definition of another metadvice.				

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Stripes, concatenations, and RAID level 5 metadevices must consist of slices only.

Mirroring of RAID level 5 metadevices is not allowed.

Soft partitions can be built on raw devices, or on stripes, RAID level 5, or mirrors.

RAID level 5 or stripe metadevices can be built directly on soft partitions.

NAME	metaoffline, metaonline – place submirrors offline and online										
SYNOPSIS	<pre> /usr/sbin/metaoffline -h /usr/sbin/metaoffline [-s setname] [-f] mirror submirror /usr/sbin/metaonline -h /usr/sbin/metaonline [-s setname] mirror submirror </pre>										
DESCRIPTION	The metaoffline command prevents Solaris Volume Manager from reading and writing to the submirror that has been taken offline. While the submirror is offline, all writes to the mirror will be kept track of (by region) and will be written when the submirror is brought back online. The metaoffline command can also be used to perform online backups: one submirror is taken offline and backed up while the mirror remains accessible. (However, if this is a two-way mirror, data redundancy is lost while one submirror is offline.) The metaoffline command differs from the metadetach command because it does not sever the logical association between the submirror and the mirror. To completely remove a submirror from a mirror, use the metadetach command. A submirror that has been taken offline will only remain offline until the metaonline command is invoked or the system is rebooted. When the metaonline command is used, reading from and writing to the submirror resumes. A resync is automatically invoked to resync the regions written while the submirror was offline. Writes are directed to the submirror during resync. Reads, however, will come from a different submirror. Once the resync operation completes, reads and writes are performed on that submirror. The metaonline command is only effective on a submirror of a mirror that has been taken offline. Note: A submirror that has been taken offline with the metaoffline command can only be mounted as read-only.										
OPTIONS	Root privileges are required for all of the following options except -h. <table> <tr> <td>-f</td><td>Forces offlining of submirrors that have slices requiring maintenance.</td></tr> <tr> <td>-h</td><td>Displays usage message.</td></tr> <tr> <td>-s <i>setname</i></td><td>Specifies the name of the diskset on which metaoffline and metaonline will work. Using the -s option will cause the command to perform its administrative function within the specified diskset. Without this option, the command will perform its function on local metadevices.</td></tr> <tr> <td><i>mirror</i></td><td>Specifies the metadvice name of the mirror from which the submirror will be either taken offline or put online.</td></tr> <tr> <td><i>submirror</i></td><td>Specifies the metadvice name of the submirror to be either taken offline or put online.</td></tr> </table>	-f	Forces offlining of submirrors that have slices requiring maintenance.	-h	Displays usage message.	-s <i>setname</i>	Specifies the name of the diskset on which metaoffline and metaonline will work. Using the -s option will cause the command to perform its administrative function within the specified diskset. Without this option, the command will perform its function on local metadevices.	<i>mirror</i>	Specifies the metadvice name of the mirror from which the submirror will be either taken offline or put online.	<i>submirror</i>	Specifies the metadvice name of the submirror to be either taken offline or put online.
-f	Forces offlining of submirrors that have slices requiring maintenance.										
-h	Displays usage message.										
-s <i>setname</i>	Specifies the name of the diskset on which metaoffline and metaonline will work. Using the -s option will cause the command to perform its administrative function within the specified diskset. Without this option, the command will perform its function on local metadevices.										
<i>mirror</i>	Specifies the metadvice name of the mirror from which the submirror will be either taken offline or put online.										
<i>submirror</i>	Specifies the metadvice name of the submirror to be either taken offline or put online.										

metaoffline(1M)

EXAMPLES

EXAMPLE 1 Taking submirror offline

This example takes one submirror, d9, offline from mirror d10.

```
# metaoffline d10 d9
```

EXIT STATUS

The following exit values are returned:

0 Successful completion.

>0 An error occurred.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdu

SEE ALSO

`metaclear(1M)`, `metadb(1M)`, `metadetach(1M)`, `metahs(1M)`, `metainit(1M)`, `metaparam(1M)`, `metareplace(1M)`, `metaroot(1M)`, `metaset(1M)`, `metastat(1M)`, `metasync(1M)`, `metattach(1M)`, `md.tab(4)`, `md.cf(4)`, `mddb.cf(4)`, `attributes(5)`

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NAME	metaparam – modify parameters of metadevices	
SYNOPSIS	<pre> /usr/sbin/metaparam -h /usr/sbin/metaparam [-s setname] [concat/stripe or RAID5 options] concat/stripe RAID /usr/sbin/metaparam [-s setname] [mirror options] mirror </pre>	
DESCRIPTION	The metaparam command is used to display or modify current parameters of metadevices. If just the metadevice is specified as an argument to the metaparam command, the current settings are displayed. The metaparam command enables most metadevice (volume) parameters to be changed. Only the interlace value cannot be changed by metaparam, because it is established when the metadevice is created and cannot be changed thereafter.	
OPTIONS	Root privileges are required for all of the following options except -h. -h Displays usage message. -s <i>setname</i> Specifies the name of the diskset on which metaparam will work. Using the -s option will cause the command to perform its administrative function within the specified diskset. Without this option, the command will perform its function on local metadevices.	
CONCAT/STRIPE OR RAID5 OPTIONS	-h <i>hot_spare_pool</i> none <i>concat/stripe</i> RAID	Specifies the hot spare pool to be used by a metadevice. If none is specified, the metadevice is disassociated with the hot spare pool assigned to it. If the metadevice is currently using a hot spare, then metaparam cannot replace the hot spare pool. Specifies the metadevice name of the concatenation, stripe, or concatenation of stripes, or of the RAID5 metadevice.
MIRROR OPTIONS	-r roundrobin geometric first Modifies the read option for a mirror. The -r option must be followed by either roundrobin, geometric, or first. roundrobin, which is the default action under the metainit command, specifies reading the disks in a round-robin (load balancing) method. geometric allows for faster performance on sequential reads. first specifies reading only from the first submirror. -w parallel serial Modifies the write option for a mirror. The -w option must be followed by either parallel or serial. parallel, the default action under the metainit command, specifies that all writes are parallel. serial specifies that all writes are serial.	

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-p *pass_number*

A number from 0-to-9 that specifies the order in which a mirror is resynced during reboot. The default is 1. Smaller pass numbers are resynced first. Equal pass numbers are run concurrently. If 0 is used, the mirror resync is skipped. 0 should only be used for mirrors mounted as read-only, or as swap.

mirror

Specifies the metadvice name of the mirror.

EXAMPLES

EXAMPLE 1 Associating Hot Spare Pool with RAID5 Metadvice

This example associates a hot spare pool, hsp005, with a RAID5 metadvice, d80.

```
# metaparam -h hsp005 d80
```

EXAMPLE 2 Changing Read Option to Geometric

This example changes the read option on a mirror d50 from the default of roundrobin to geometric.

```
# metaparam -r geometric d50
```

EXIT STATUS

The following exit values are returned:

0 Successful completion.

>0 An error occurred.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdu

SEE ALSO

`metaclear(1M)`, `metadb(1M)`, `metadetach(1M)`, `metahs(1M)`, `metainit(1M)`, `metaoffline(1M)`, `metaonline(1M)`, `metareplace(1M)`, `metaroot(1M)`, `metaset(1M)`, `metastat(1M)`, `metasync(1M)`, `metattach(1M)`, `md.tab(4)`, `md.cf(4)`, `mddb.cf(4)`

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NAME	metarecover – recover soft partition information
SYNOPSIS	<pre> /sbin/metarecover [-n] [-v] [-s setname] component -p /sbin/metarecover [-n] [-v] [-s setname] component -p {-d} /sbin/metarecover [-n] [-v] [-s setname] component -p {-m} </pre>
DESCRIPTION	The metarecover command scans a specified component to look for soft partition configuration information and to regenerate the configuration.
OPTIONS	The metarecover command line options are as follows: -d Recover soft partitions in the metadvice state database from the extent headers on the device. Options -d and -m are mutually exclusive. -m Regenerates the extent headers and reapplies them to the underlying device based on the soft partitions listed in the metadvice state database. Options -d and -m are mutually exclusive. -n Does not actually perform the operation, but shows the output or errors that would have resulted from the operation, had it been run. -p Regenerates soft partitions based on the metadvice state database or extent headers on the underlying device. If neither -d nor -m are specified, this option compares the soft partition information in the metadvice state database to the extent headers. -s <i>setname</i> Specifies the name of the diskset on which metarecover will work. Using the s option causes the command to perform its function within the specified diskset. Without the -s option, the metarecover command operates on the metadevices and/or hot spare pools in the local diskset. -v Verbose mode, displaying the changes being made.
OPERANDS	The following operand is supported: <i>component</i> Specifies the c*t*d*s* number of the disk or slice containing the partitions, or the device name (for example, d10) of the metadvice containing the partitions.
EXAMPLES	EXAMPLE 1 Update Metadvice State Database Based on Disk Extent Headers A disk containing soft partitions is moved from one system to another. The system administrator would like to use the existing soft partitions. metarecover will update the metadvice state database based on the extent headers on the disk. <pre># metarecover -v c0t3d0s2 -p -d</pre>

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EXAMPLE 2 Update Metadevice State Database Based on Incomplete Soft Partition Creation

A system crashes in the middle of creating a new soft partition. The soft partition is in the creating state and the driver will not let that device be opened. `metarecover` will rewrite the extent headers for the partially created soft partition and mark it as Okay.

```
# metarecover -v c0t3d0s2 -p -m
```

EXAMPLE 3 Update Extent Headers Based on Metadevice State Database

Someone accidentally overwrote a portion of a disk leaving extent headers destroyed. `metarecover` will rewrite the extent headers to ensure a valid soft partition configuration, though user data will not be recovered.

```
# metarecover -v d5 -m
```

EXAMPLE 4 Validate Soft Partition Configuration

To validate the existing soft partition configuration, use `metarecover` with only the `-p` flag.

```
# metarecover c0t3d0s2 -p
```

EXIT STATUS The following exit values are returned:

0	Successful completion.
>0	An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdr

SEE ALSO `metaclear(1M)`, `metadb(1M)`, `metadetach(1M)`, `metahs(1M)`, `metaoffline(1M)`, `metaonline(1M)`, `metaparam(1M)`, `metareplace(1M)`, `metaroot(1M)`, `metaset(1M)`, `metastat(1M)`, `metasync(1M)`, `metattach(1M)`, `md.cf(4)`, `md.tab(4)`, `mddb.cf(4)`, `attributes(5)`

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NAME	metarename – rename metadevice or switch layered metadevice names
SYNOPSIS	<pre> /usr/sbin/metarename [-s <i>setname</i>] <i>metadevice1</i> <i>metadevice2</i> /usr/sbin/metarename [-s <i>setname</i>] [-f] -x <i>metadevice1</i> <i>metadevice2</i> /usr/sbin/metarename -h </pre>
DESCRIPTION	There are two ways to use metarename, one with and one without the -x option. The first method (without -x) renames an existing metadevice to a new name. This makes managing the metadevice namespace easier. The metadevice being renamed cannot be mounted or open, nor can the new name already exist. For example, to rename a metadevice that contains a mounted file system, you would first need to unmount the file system. With the second way to use metarename, using the -x option, metarename switches (exchanges) the names of an existing layered metadevice and one of its subdevices. (In Solaris Volume Manager terms, a layered metadevice can be either a mirror or a trans metadevice.) The -x option enables you to switch the metadevice names of a mirror and one of its submirrors, or a trans metadevice and its master device. metarename -x makes it easier to mirror or unmirror an existing stripe or concatenation, and to create or remove a trans of an existing metadevice. When used to mirror an existing stripe or concatenation, you must stop access to the device. For example, if the device contains a mounted file system, you must first unmount the file system before doing the rename. The metarename -x command can also be used to create a trans metadevice from an existing metadevice, or to untrans the device. This applies only to the master device. A logging device cannot be created or removed with metarename. Before you can rename a trans device, you must detach the logging device. Then you must stop access to the trans metadevice itself. You cannot rename or switch metadevices that are in an error state or that have subcomponents in an error state, or metadevices actively using a hot spare replacement. You can only switch metadevices that have a direct child/parent relationship. You could not, for example, directly exchange a stripe in a mirror that is a master device with the trans metadevice. You must use the -f flag when switching members of a trans metadevice. Only metadevices can be switched, not slices.
OPTIONS	<pre> -f Force the switching of trans metadevice members. -h Display a help message. </pre>

metarename(1M)

-s *setname*

Specifies the name of the diskset on which `metarename` will work. Using the `-s` option will cause the command to perform its administrative function within the specified diskset. Without this option, the command will perform its function on the local metadevices.

-x

Exchange the metadevice names *metadevice1* and *metadevice2*.

metadevice1

Specifies the metadevice to be renamed or switched.

metadevice2

Specifies the target metadevice name for the rename or switch operation.

EXAMPLES

EXAMPLE 1 Renaming a Metadevice

This example renames a metadevice named `d10` to `d100`. Note that `d100` must not exist for the rename to succeed.

```
# metarename d10 d100
```

EXAMPLE 2 Creating a Two-Way Mirror

This example creates a two-way mirror from an existing stripe named `d1` with a mounted file system, `/home2`.

```
# metainit d2 1 1 c13d0s1
# metainit -f d20 -m d1
# umount /home2
# metarename -x d20 d1
# metattach d1 d2
# mount /home2
```

First, a second concatenation `d2`, is created. (`d1` already exists.) The `metainit` command creates a one-way mirror, `d20`, from `d1`. Next, you unmount the file system and switch `d1` for `d20`, making `d1` the top-level device (mirror). You attach the second submirror, `d2`, to create a two-way mirror. Lastly, you remount the file system.

EXAMPLE 3 Mounting Mirrored File System on Stripe

This example takes an existing mirror named `d1` with a mounted file system, and ends up with the file system mounted on a stripe `d1`.

```
# umount /fs2
# metarename -x d1 d20
# metadetach d20 d1
# metaclear -r d20
# mount /fs2
```

First, you unmount the file system, then switch the mirror `d1` and its submirror `d20`. This makes the mirror into `d20`. Next, you detach `d1` from `d20`, then delete the mirror `d20` and its other submirror. You then remount the file system.

EXAMPLE 4 Creating Trans Metadevice from Existing RAID Level 5 Metadevice

This example creates a trans metadevice from an existing RAID level 5 metadevice named d1 which contains the file system /myhome.

```
# umount /myhome
# metainit d21 -t d1
# metarename -f -x d21 d1
# metattach d1 d0
# mount /myhome
```

You umount the file system before using the metainit command to create the trans metadevice d21, with d1 as the master device. You then switch d21 and d1, making d1 the top-level metadevice (trans metadevice). A logging device d0 is attached with the metattach command. You then remount the file system.

EXAMPLE 5 Deleting Trans Metadevice

This example deletes a trans metadevice named d10 while its mount point is /myhome. The master device, which is a stripe, is named d2. The logging device, also a stripe, is named d5.

```
# umount /myhome
# metadetach d10
# metarename -f -x d10 d2
# metaclear d2
# metaclear d5
# fsck /dev/md/dsk/d10
# mount /myhome
```

You umount the file system first, then detach the trans metadevice's logging device. The trans metadevice is switched with the master device, making the trans metadevice d2 and the underlying stripe d10. You clear the trans metadevice d2 and the logging device d5. d10 must be fsck'd, and then the file system is remounted.

EXIT STATUS The following exit values are returned:

```
0          Successful completion.
>0         An error occurred.
```

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdm

SEE ALSO metaclear(1M), metainit(1M), metastat(1M), attributes(5)

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metarename(1M)

LIMITATIONS

Renaming and exchanging metadvice names can only be used for metadvicees. A physical slice cannot be renamed to a metadvice, nor can a metadvice be exchanged with a physical slice name.

Metadvice names are strings of the pattern *d<xyz>* where *xyz* is a value between 0 and 8192. You cannot use logical names for metadvicees.

NAME	metareplace – enable or replace components of submirrors or RAID5 metadevices
SYNOPSIS	<pre> /usr/sbin/metareplace -h /usr/sbin/metareplace [-s setname] -e mirror component /usr/sbin/metareplace [-s setname] mirror component-old component-new /usr/sbin/metareplace [-s setname] -e RAID component /usr/sbin/metareplace [-s setname] [-f] RAID component-old component-new </pre>
DESCRIPTION	The <code>metareplace</code> command is used to enable or replace components (slices) within a submirror or a RAID5 metadvice. When you replace a component, the <code>metareplace</code> command automatically starts resyncing the new component with the rest of the metadvice. When the resync completes, the replaced component becomes readable and writable. If the failed component has been hot spare replaced, the hot spare is placed in the available state and made available for other hot spare replacements. Note that the new component must be large enough to replace the old component. A component may be in one of several states. The <code>Last Erred</code> and the <code>Maintenance</code> states require action. Always replace components in the <code>Maintenance</code> state first, followed by a resync and validation of data. After components requiring maintenance are fixed, validated, and resynced, components in the <code>Last Erred</code> state should be replaced. To avoid data loss, it is always best to back up all data before replacing <code>Last Erred</code> devices.
OPTIONS	Root privileges are required for all of the following options except <code>-h</code>. <code>-e</code> Transitions the state of <i>component</i> to the available state and resyncs the failed component. If the failed component has been hot spare replaced, the hot spare is placed in the available state and made available for other hot spare replacements. This command is useful when a component fails due to human error (for example, accidentally turning off a disk), or because the component was physically replaced. In this case, the replacement component must be partitioned to match the disk being replaced before running the <code>metareplace</code> command. <code>-f</code> Forces the replacement of an errored component of a metadvice in which multiple components are in error. The component determined by the <code>metastat</code> display to be in the “Maintenance” state must be replaced first. This option may cause data to be fabricated since multiple components are in error. <code>-h</code> Display help message. <code>-s setname</code> Specifies the name of the diskset on which <code>metareplace</code> will work. Using the <code>-s</code> option will cause the command to perform its

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administrative function within the specified diskset. Without this option, the command will perform its function on local metadevices.

mirror The metadvice name of the mirror.

component The logical name for the physical slice (partition) on a disk drive, such as `/dev/dsk/c0t0d0s2`.

component-old The physical slice that is being replaced.

component-new The physical slice that is replacing *component-old*.

RAID The metadvice name of the RAID5 device.

EXAMPLES

EXAMPLE 1 Recovering from Error Condition in RAID5 Metadvice

This example shows how to recover when a single component in a RAID5 metadvice is errored.

```
# metareplace d10 c3t0d0s2 c5t0d0s2
```

In this example, a RAID5 metadvice `d10` has an errored component, `c3t0d0s2`, replaced by a new component, `c5t0d0s2`.

EXAMPLE 2 Use of `-e` After Physical Disk Replacement

This example shows the use of the `-e` option after a physical disk in a submirror (a submirror of mirror `d11`, in this case) has been replaced.

```
# metareplace -e d11 c1t4d0s2
```

Note: The replacement disk must be partitioned to match the disk it is replacing before running the `metareplace` command.

EXIT STATUS

The following exit values are returned:

0 Successful completion.

>0 An error occurred.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdu

SEE ALSO

`metaclear(1M)`, `metadb(1M)`, `metadetach(1M)`, `metahs(1M)`, `metainit(1M)`, `metaoffline(1M)`, `metaonline(1M)`, `metaparam(1M)`, `metaroot(1M)`, `metaset(1M)`, `metastat(1M)`, `metasync(1M)`, `metattach(1M)`, `md.tab(4)`, `md.cf(4)`, `mddb.cf(4)`, `attributes(5)`

metaroot(1M)

NAME	metaroot – setup system files for root (/) metadvice		
SYNOPSIS	<pre>/usr/sbin/metaroot -h</pre> <pre>/usr/sbin/metaroot [-n] [-k <i>system-name</i>] [-v <i>vfstab-name</i>]</pre> <pre>[-c <i>mddb.cf-name</i>] <i>device</i></pre>		
DESCRIPTION	The metaroot command edits the <code>/etc/vfstab</code> and <code>/etc/system</code> files so that the system may be booted with the root file system (/) on an appropriate metadvice. The only metadvicees that support the root file system are a stripe with only a single slice or a mirror on a single-slice stripe. If necessary, the metaroot command can reset a system that has been configured to boot the root file system (/) on a metadvice so that it uses a physical slice.		
OPTIONS	Root privileges are required for all of the following options except <code>-h</code>. The following options are supported: <code>-c <i>mddb.cf-name</i></code> Uses <i>mddb.cf-name</i> instead of the default <code>/etc/lvm/mddb.cf</code> file as a source of metadvice database locations. <code>-h</code> Displays a usage message. <code>-k <i>system-name</i></code> Edits a user-supplied <i>system-name</i> instead of the default <code>/etc/system</code> system configuration information file. <code>-n</code> Print what would be done without actually doing it. <code>-v <i>vfstab-name</i></code> Edits <i>vfstab-name</i> instead of the default <code>/etc/vfstab</code> table of file system defaults.		
OPERANDS	The following operands are supported: <i>device</i> Specifies either the metadvice or the conventional disk device (slice) used for the root file system (/).		
EXAMPLES	EXAMPLE 1 Specifying Root File System on Metadvice The following command edits <code>/etc/system</code> and <code>/etc/vfstab</code> to specify that the root file system is now on metadvice d0. <pre># metaroot d0</pre> EXAMPLE 2 Specifying Root File System on SCSI Disk The following command edits <code>/etc/system</code> and <code>/etc/vfstab</code> to specify that the root file system is now on the SCSI disk device <code>/dev/dsk/c0t3d0s0</code>. <pre># metaroot /dev/dsk/c0t3d0s0</pre>		
FILES	<table border="0"> <tr> <td><code>/etc/system</code></td> <td>System configuration information file. See <code>system(4)</code>.</td> </tr> </table>	<code>/etc/system</code>	System configuration information file. See <code>system(4)</code> .
<code>/etc/system</code>	System configuration information file. See <code>system(4)</code> .		

	/etc/vfstab File system defaults. /etc/lvm/mddb.cf Metadevice state database locations.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWmdu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWmdu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWmdu				
SEE ALSO	metadb(1M), metainit(1M), metastat(1M), mddb.cf(4), system(4), vfstab(4), attributes(5) <i>Solaris Volume Manager Administration Guide</i>				
NOTES	Soft partitions cannot be boot devices. You can safely ignore the following messages. Their display is an artifact of the way drivers are loaded during the boot process. WARNING: forcload of misc/md_hotspares failed might appear during boot if root is on a metadevice and no hot spares are specified. This can be eliminated by defining an empty hot spare pool. WARNING: forcload of misc/md_trans failed might appear if no trans devices have been configured. WARNING: forcload of misc/md_raid failed might appear if no RAID5 devices have been configured.				

metaset(1M)

NAME	metaset – configure shared disksets
SYNOPSIS	<pre> /usr/sbin/metaset -s setname -a -h hostname... /usr/sbin/metaset -s setname -a [-l length] drivename... /usr/sbin/metaset -s setname -d [-f] -h hostname... /usr/sbin/metaset -s setname -d [-f] drivename... /usr/sbin/metaset -s setname -r /usr/sbin/metaset -s setname -t [-f] /usr/sbin/metaset -s setname -b /usr/sbin/metaset -s setname -o [-h hostname] /usr/sbin/metaset [-s setname] /usr/sbin/metaset [-s setname] -a -d [[m] mediator_host_list] </pre>
DESCRIPTION	In a diskset configuration, two hosts are physically connected to the same set of disks. When one host fails, the other host has exclusive access to the disks. The <code>metaset</code> command administers sets of disks shared for exclusive (but not concurrent) access between such hosts. While disksets enable a high-availability configuration, Solaris Volume Manager itself does not actually provide a high-availability environment. Shared metadevices/hot spare pools can be created only from drives which are in the diskset created by <code>metaset</code>. To create a set, one or more hosts must be added to the set. To create metadevices within the set, one or more devices must be added to the set. The <i>drivename</i> specified must be in the form <code>ctxdx</code> with no slice specified. When you add a new disk to a disk set, Solaris Volume Manager checks the disk format. If necessary, it repartitions the disk to ensure that the disk has an appropriately configured slice 7 (or slice 6 on an EFI labelled device), with adequate space for a state database replica. The precise size of slice 7 (or slice 6 on an EFI labelled device), depends on the disk geometry. The slice will be no less than 4 Mbytes, and probably closer to 6 Mbytes, depending on where the cylinder boundaries lie. The minimal size for slice 7 (or slice 6 on an EFI labelled device), might change in the future. This change is based on a variety of factors, including the size of the state database replica and information to be stored in the state database replica. For use in disk sets, disks must have a slice seven that meets specific criteria: ■ Slice 7 must start at sector 0 ■ Slice 7 must include enough space for disk label ■ State database replicas cannot be mounted does not overlap with any other slices, including slice 2

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If the existing partition table does not meet these criteria, Solaris Volume Manager repartitions the disk. A small portion of each drive is reserved in slice 7 (or slice 6 on an EFI labelled device), for use by Solaris Volume Manager. The remainder of the space on each drive is placed into slice 0. Any existing data on the disks is lost by repartitioning.

After you add a drive to a disk set, it might be repartitioned as necessary, with the exception that slice 7 (or slice 6 on an EFI labelled device), is not altered in any way. The minimum size for slice seven is variable, based on disk geometry, but is always equal to or greater than 4MB.

After a diskset is created and metadevices are set up within the set, the metadvice name will be in the following form:

/dev/md/setname/{disk,rdisk}/dnumber

where *setname* is the name of the diskset, and *number* is the number of the metadvice (0-127).

Hot spare pools within local disksets use standard Volume Manager naming conventions. Hot spare pools with shared disksets use the following convention:

setname/hspnumber

where *setname* is the name of the diskset, and *number* is the number of the hot spare pool (0-999).

Mediator Configuration

SVM provides support for a low-end HA solution consisting of two hosts that share only two strings of drives. The hosts in this type of configuration, referred to as *mediators* or mediator hosts, run a special daemon, `rpc.metamedd(1M)`. The mediator hosts take on additional responsibilities to ensure that data is available in the case of host or drive failures.

A mediator configuration can survive the failure of a single host or a single string of drives, without administrative intervention. If both a host and a string of drives fail (multiple failures), the integrity of the data cannot be guaranteed. At this point, administrative intervention is required to make the data accessible. See `mediator(7D)` for further details.

Use the `-m` option, described below, to add or delete a mediator host.

OPTIONS

The following options are supported:

`-a`

Adds drives or hosts to the named set. For a drive to be accepted into a set, the drive must not be in use within another metadvice or diskset, mounted on, or swapped on. When the drive is accepted into the set, it is repartitioned and the metadvice state database replica (for the set) may be placed on it. However, if a slice 7 (or slice 6 on an EFI labelled device), starts at cylinder 0, and is large enough to hold a state database replica, then the disk is not repartitioned. Also, a drive is not

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accepted if it cannot be found on all hosts specified as part of the set. This means that if a host within the specified set is unreachable due to network problems, or is administratively down, the add will fail.

-b

Insures that the replicas are distributed according to the replica layout algorithm. This can be invoked at any time, and will do nothing if the replicas are correctly distributed. In cases where the user has used the `metadb` command to manually remove or add replicas, this command can be used to insure that the distribution of replicas matches the replica layout algorithm.

-d

Deletes drives or hosts from the named diskset. For a drive to be deleted, it must not be in use within the set. The last host cannot be deleted unless all of the drives within the set are deleted. Note that deleting the last host in a diskset destroys the diskset.

-f

Forces one of three actions to occur: takes ownership of a diskset when used with `-t`; deletes the last disk drive from the diskset; or deletes the last host from the diskset. (Deleting the last drive or host from a diskset requires the `-d` option.) When used to forcibly take ownership of the diskset, this causes the diskset to be grabbed whether or not another host owns the set. All of the disks within the set are taken over (reserved) and fail fast is enabled, causing the other host to panic if it had diskset ownership. The metadvice state database will be read in by the host performing the take, and the shared metadevices contained in the set will be accessible. The `-f` option is also used to delete the last drive in the diskset, because this drive would implicitly contain the last state database replica. The `-f` option is also used for deleting hosts from a set. When specified with a partial list of hosts, it can be used for one-host administration. One-host administration could be useful when a host is known to be non-functional, thus avoiding timeouts and failed commands. When specified with a complete list of hosts, the set is completely deleted. It is generally specified with a complete list of hosts to clean up after one-host administration has been performed.

-h *hostname...*

Specifies one or more host names to be added to or deleted from a diskset. Adding the first host creates the set. The last host cannot be deleted unless all of the drives within the set have been deleted. The host name is not accepted if all of the drives within the set cannot be found on the specified host. The host name is the same name found in `/etc/nodename`.

-l *length*

Sets the size (in blocks) for the metadvice state database replica. The length can only be set when adding a new drive; it cannot be changed on an existing drive. The default (and maximum) size is 8192 blocks, which should be appropriate for most configurations. The minimum size of the length is 64 blocks.

-a | -d -m *mediator_host_list*

Adds (-a) or deletes (-d) mediator hosts to the specified diskset. A *mediator_host_list* is the `nodename(4)` of the mediator host to be added and (for

adding) up to two other aliases for the mediator host. The nodename and aliases for each mediator host are separated only by commas. Up to two mediator hosts can be specified for the named diskset. For deleting a mediator host, specify only the nodename of that host as the argument to `-m`.

In a single `metaset` command you can add or delete two mediator hosts. See **EXAMPLES**.

- `-o`
Returns an exit status of 0 if the local host or the host specified with the `-h` option is the owner of the diskset.
- `-r`
Releases ownership of a diskset. All of the disks within the set are released. The metadevices set up within the set are no longer accessible.
- `-s setname`
Specifies the name of a diskset on which `metaset` will work. If no *setname* is specified, all disksets are returned.
- `-t`
Takes ownership of a diskset safely. If `metaset` finds that another host owns the set, this host will not be allowed to take ownership of the set. If the set is not owned by any other host, all the disks within the set will be owned by the host on which `metaset` was executed. The metadevice state database is read in, and the shared metadevices contained in the set become accessible. The `-t` option will take a diskset that has stale databases. When the databases are stale, `metaset` will exit code 66, and a message will be printed. At that point, the only operations permitted are the addition and deletion of replicas. Once the addition or deletion of the replicas has been completed, the diskset should be released and retaken to gain full access to the data.

EXAMPLES

EXAMPLE 1 Defining a Diskset

This example defines a diskset.

```
# metaset -s relo-red -a -h red blue
```

The name of the diskset is `relo-red`. The names of the first and second hosts added to the set are `red` and `blue`, respectively. (The hostname is found in `/etc/nodename`.) Adding the first host creates the diskset. A diskset can be created with just one host, with the second added later. The last host cannot be deleted until all of the drives within the set have been deleted.

EXAMPLE 2 Adding Drives to a Diskset

This example adds drives to a diskset.

```
# metaset -s relo-red -a c2t0d0 c2t1d0 c2t2d0 c2t3d0 c2t4d0 c2t5d0
```

The name of the previously created diskset is `relo-red`. The names of the drives are `c2t0d0`, `c2t1d0`, `c2t2d0`, `c2t3d0`, `c2t4d0`, and `c2t5d0`. Note that there is no slice identifier ("`sx`") at the end of the drive names.

metaset(1M)

EXAMPLE 3 Adding Multiple Mediator Hosts

The following command adds two mediator hosts to the specified diskset.

```
# metaset -s mydiskset -a -m myhost1,alias1 myhost2,alias2
```

FILES /etc/lvm/md.tab Contains list of metadvice configurations.

EXIT STATUS The following exit values are returned:

0 Successful completion.

>0 An error occurred.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdu

SEE ALSO metaclear(1M), metadb(1M), metadetach(1M), metahs(1M), metainit(1M), metaoffline(1M), metaonline(1M), metaparam(1M), metareplace(1M), metaroot(1M), metastat(1M), metasync(1M), metattach(1M), md.cf(4), md.tab(4), mddb.cf(4), attributes(5)

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NOTES Diskset administration, including the addition and deletion of hosts and drives, requires all hosts in the set to be accessible from the network.

NAME	metastat – display status for metadevice or hot spare pool								
SYNOPSIS	<pre> /sbin/metastat -h /sbin/metastat [-B] [-i] [-p] [-s setname] [-t] [metadevice...] [hot_spare_pool...] /sbin/metastat [-B] [-i] [-p] [-s setname] component... </pre>								
DESCRIPTION	The metastat command displays the current status for each metadevice (including stripes, concatenations, concatenations of stripes, mirrors, RAID5, soft partitions, and trans devices) or hot spare pool, or of specified metadevices, components, or hot spare pools. It is helpful to run the metastat command after using the metattach command to view the status of the metadevice. metastat displays the state of each Solaris Volume Manager volume on the system. The possible states include: <table> <tr> <td>Okay</td><td>The device reports no errors.</td></tr> <tr> <td>Needs maintenance</td><td>A problem has been detected. This requires that the system administrator replace the failed physical device. Volumes displaying Needs maintenance have incurred no data loss, although additional failures could risk data loss. Take action as quickly as possible.</td></tr> <tr> <td>Last erred</td><td>A problem has been detected. Data loss is a possibility. This might occur if a component of a submirror fails and is not replaced by a hot spare, therefore going into Needs maintenance state. If the corresponding component also fails, it would go into Last erred state and, as there is no remaining valid data source, data loss could be a possibility.</td></tr> <tr> <td>Unavailable</td><td>A device cannot be accessed, but has not incurred errors. This might occur if a physical device has been removed with Solaris Dynamic Reconfiguration (DR) features, thus leaving the Solaris Volume Manager volume unavailable. It could also occur if an array or disk is powered off at system initialization, or if a >1TB volume is present when the system is booted in 32-bit mode.</td></tr> </table> See the <i>Solaris Volume Manager Administration Guide</i> for instructions on replacing disks and handling volumes in Needs maintenance or Last erred states.	Okay	The device reports no errors.	Needs maintenance	A problem has been detected. This requires that the system administrator replace the failed physical device. Volumes displaying Needs maintenance have incurred no data loss, although additional failures could risk data loss. Take action as quickly as possible.	Last erred	A problem has been detected. Data loss is a possibility. This might occur if a component of a submirror fails and is not replaced by a hot spare, therefore going into Needs maintenance state. If the corresponding component also fails, it would go into Last erred state and, as there is no remaining valid data source, data loss could be a possibility.	Unavailable	A device cannot be accessed, but has not incurred errors. This might occur if a physical device has been removed with Solaris Dynamic Reconfiguration (DR) features, thus leaving the Solaris Volume Manager volume unavailable. It could also occur if an array or disk is powered off at system initialization, or if a >1TB volume is present when the system is booted in 32-bit mode.
Okay	The device reports no errors.								
Needs maintenance	A problem has been detected. This requires that the system administrator replace the failed physical device. Volumes displaying Needs maintenance have incurred no data loss, although additional failures could risk data loss. Take action as quickly as possible.								
Last erred	A problem has been detected. Data loss is a possibility. This might occur if a component of a submirror fails and is not replaced by a hot spare, therefore going into Needs maintenance state. If the corresponding component also fails, it would go into Last erred state and, as there is no remaining valid data source, data loss could be a possibility.								
Unavailable	A device cannot be accessed, but has not incurred errors. This might occur if a physical device has been removed with Solaris Dynamic Reconfiguration (DR) features, thus leaving the Solaris Volume Manager volume unavailable. It could also occur if an array or disk is powered off at system initialization, or if a >1TB volume is present when the system is booted in 32-bit mode.								
OPTIONS	The following options are supported: <table> <tr> <td>-B</td><td>Print the current status of all of the 64-bit metadevices and hot spares.</td></tr> </table>	-B	Print the current status of all of the 64-bit metadevices and hot spares.						
-B	Print the current status of all of the 64-bit metadevices and hot spares.								

metastat(1M)

	-h	Display usage message.
	-i	Check the status of all active metadevices and hot spares. The inquiry causes all components of each metadevice to be checked for accessibility, starting at the top level metadevice. When problems are discovered, the metadevice state databases are updated as if an error had occurred.
	-p	Display the list of active metadevices and hot spare pools in the same format as <code>md.tab</code> .
	-r	Display whether sub-devices are relocatable. At the end of the output, displays the devices and their associated device IDs.
	-s <i>setname</i>	Specify the name of the diskset on which <code>metastat</code> works. Using the <code>-s</code> option causes the command to perform its administrative function within the specified diskset. Without this option, the command performs its function on metadevices and hot spare pools in the local diskset.
	-t	Print the current status and timestamp for the specified metadevices and hot spare pools. The timestamp provides the date and time of the last state change.
OPERANDS	The following operands are supported:	
	<i>component</i>	Display the status of the component hosting a soft partition, including extents, starting blocks, and block count.
	<i>hot_spare_pool</i>	Display the status of the specified hot spare pool(s).
	<i>metadevice</i>	Display the status of the specified metadevice(s). If a trans metadevice is specified, the status of the master and log devices is also displayed.
EXAMPLES	EXAMPLE 1 Output Showing Mirror with Two Submirrors The following example shows the partial output of the <code>metastat</code> command after creating a mirror, <code>d0</code>, consisting of two submirrors, <code>d70</code> and <code>d80</code>. <pre># metastat d0 d0: Mirror Submirror 0: d80 State: Okay Submirror 1: d70 State: Resyncing Resync in progress: 15 % done Pass: 1 Read option: roundrobin (default) Write option: parallel (default)</pre>	

EXAMPLE 1 Output Showing Mirror with Two Submirrors (Continued)

```
Size: 2006130 blocks
.
.
.
```

EXAMPLE 2 Soft Partition on Mirror with Submirror

The following example shows the partial output of the `metastat` command after creating a soft partition, `d3`, on concat `d2`, which is built on a soft partition.

```
# metastat
d2: Concat/Stripe
  Size: 204800 blocks
  Stripe 0:
    Device      Start Block  Dbase State      Hot Spare
    d0          0         No   Okay
d0: Soft Partition
  Component: c0t3d0s0
  Status: Okay
  Size: 204800 blocks
    Extent      Start Block  Block count
    0           129      204800
d3: Soft Partition
  Component: d2
  Status: Okay
  Size: 202752 blocks
    Extent      Start Block  Block count
    0           129      202752
```

WARNINGS `metastat` displays states as of the time the command is entered. It is unwise to use the output of the `metastat -p` command to create a `md.tab(4)` file for a number of reasons:

- The output of `metastat -p` might show hot spares being used.
- It might show mirrors with multiple submirrors. See `metainit(1M)` for instructions for creating multi-way mirrors using `metainit` and `metattach`.
- A slice may go into an error state after `metastat -p` is issued.

EXIT STATUS The following exit values are returned:

- 0 Successful completion.
- >0 An error occurred.

metastat(1M)

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdr

SEE ALSO

cfgadm(1M), mdmonitord(1M), metaclear(1M), metadb(1M), metadetach(1M),
metahs(1M), metainit(1M), metaoffline(1M), metaonline(1M),
metaparam(1M), metarecover(1M), metareplace(1M), metaroot(1M),
metaset(1M), metasync(1M), metattach(1M), md.tab(4), md.cf(4), mddb.cf(4),
attributes(5)

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NAME	metasync – handle metadvice resync during reboot												
SYNOPSIS	<pre> /usr/sbin/metasync -h /usr/sbin/metasync [-s setname] [buffer_size] metadvice /usr/sbin/metasync [-s setname] -r [buffer_size] /usr/sbin/metasync -p metadvice </pre>												
DESCRIPTION	The <code>metasync</code> command starts a resync operation on the specified <i>metadvice</i>. All components that need to be resynced are resynced. If the system crashes during a RAID5 initialization, or during a RAID5 resync, either an initialization or resync restarts when the system reboots. Applications are free to access a metadvice at the same time that it is being resynced by <code>metasync</code>. Also, <code>metasync</code> performs the copy operations from inside the kernel, which makes the utility more efficient. Use the <code>-r</code> option in boot scripts to resync all possible submirrors.												
OPTIONS	<table> <tr> <td><code>-h</code></td><td>Displays usage message.</td></tr> <tr> <td><code>-r</code></td><td>Specifies that the <code>metasync</code> command handle special resync requirements during a system reboot. <code>metasync -r</code> should only be invoked from <code>/etc/rc2.d/S95svm.sync</code>. The <code>metasync</code> command only resyncs those metadvicees that need to be resynced. <code>metasync</code> schedules all the mirror resyncs according to their pass numbers.</td></tr> <tr> <td><code>-p metadvice</code></td><td>As root, you can edit <code>S95svm.sync</code> to specify the <code>-r 2048</code> option to <code>metasync</code>, so that resync following a reboot occurs as quickly as possible. See the description of <i>buffer_size</i>, below.</td></tr> <tr> <td><code>-s setname</code></td><td>Regenerates parity information for RAID5 metadvicees.</td></tr> <tr> <td><code>buffer_size</code></td><td>Specifies the name of the diskset on which <code>metasync</code> will work. Using the <code>-s</code> option will cause the command to perform its administrative function within the specified diskset. Without this option, the command will perform its function on local metadvicees.</td></tr> <tr> <td></td><td>Specifies the size (number of 512-byte disk blocks) of the internal copy buffer for the mirror resync. The size defaults to 128 512-byte disk blocks (64 Kbytes). It can be no more than 2048 blocks. For best performance (quickest completion of the resync), 2048 blocks is the recommended size.</td></tr> </table>	<code>-h</code>	Displays usage message.	<code>-r</code>	Specifies that the <code>metasync</code> command handle special resync requirements during a system reboot. <code>metasync -r</code> should only be invoked from <code>/etc/rc2.d/S95svm.sync</code> . The <code>metasync</code> command only resyncs those metadvicees that need to be resynced. <code>metasync</code> schedules all the mirror resyncs according to their pass numbers.	<code>-p metadvice</code>	As root, you can edit <code>S95svm.sync</code> to specify the <code>-r 2048</code> option to <code>metasync</code> , so that resync following a reboot occurs as quickly as possible. See the description of <i>buffer_size</i> , below.	<code>-s setname</code>	Regenerates parity information for RAID5 metadvicees.	<code>buffer_size</code>	Specifies the name of the diskset on which <code>metasync</code> will work. Using the <code>-s</code> option will cause the command to perform its administrative function within the specified diskset. Without this option, the command will perform its function on local metadvicees.		Specifies the size (number of 512-byte disk blocks) of the internal copy buffer for the mirror resync. The size defaults to 128 512-byte disk blocks (64 Kbytes). It can be no more than 2048 blocks. For best performance (quickest completion of the resync), 2048 blocks is the recommended size.
<code>-h</code>	Displays usage message.												
<code>-r</code>	Specifies that the <code>metasync</code> command handle special resync requirements during a system reboot. <code>metasync -r</code> should only be invoked from <code>/etc/rc2.d/S95svm.sync</code> . The <code>metasync</code> command only resyncs those metadvicees that need to be resynced. <code>metasync</code> schedules all the mirror resyncs according to their pass numbers.												
<code>-p metadvice</code>	As root, you can edit <code>S95svm.sync</code> to specify the <code>-r 2048</code> option to <code>metasync</code> , so that resync following a reboot occurs as quickly as possible. See the description of <i>buffer_size</i> , below.												
<code>-s setname</code>	Regenerates parity information for RAID5 metadvicees.												
<code>buffer_size</code>	Specifies the name of the diskset on which <code>metasync</code> will work. Using the <code>-s</code> option will cause the command to perform its administrative function within the specified diskset. Without this option, the command will perform its function on local metadvicees.												
	Specifies the size (number of 512-byte disk blocks) of the internal copy buffer for the mirror resync. The size defaults to 128 512-byte disk blocks (64 Kbytes). It can be no more than 2048 blocks. For best performance (quickest completion of the resync), 2048 blocks is the recommended size.												
EXIT STATUS	The following exit values are returned: <table> <tr> <td>0</td><td>Successful completion.</td></tr> <tr> <td>>0</td><td>An error occurred.</td></tr> </table>	0	Successful completion.	>0	An error occurred.								
0	Successful completion.												
>0	An error occurred.												

metasync(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdu

SEE ALSO metaclear(1M), metadb(1M), metadetach(1M), metahs(1M), metainit(1M), metaoffline(1M), metaonline(1M), metaparam(1M), metareplace(1M), metaroot(1M), metaset(1M), metastat(1M), metattach(1M), md.tab(4), md.cf(4), mddb.cf(4), attributes(5)

Solaris Volume Manager Administration Guide

NAME	metattach, metadetach – attach or detach metadevice to or from a mirror or trans device, or attach space (blocks) to a soft partition to grow the soft partition
SYNOPSIS	<pre> /usr/sbin/metattach [-h] /usr/sbin/metattach [-s setname] mirror [metadevice] /usr/sbin/metattach [-s setname] [-i size] concat/stripe component... /usr/sbin/metattach [-s setname] RAID component... /usr/sbin/metattach [-s setname] softpart size /usr/sbin/metattach [-s setname] trans log /usr/sbin/metadetach [-s setname] [-f] mirror submirror /usr/sbin/metadetach [-s setname] [-f] trans </pre>
DESCRIPTION	metattach is used to add submirrors to a mirror, add logging devices to trans devices, grow metadevices, or grow soft partitions. Growing metadevices can be done without interrupting service. To grow the size of a mirror or trans, the slices must be added to the submirrors or to the master devices. Solaris Volume Manager supports storage devices and logical volumes greater than 1 terabyte (TB) when Solaris 10 is running a 64-bit kernel. Support for large volumes is automatic. If a device greater than 1 TB is created, Solaris Volume Manager configures it appropriately and without user intervention. If a system with large volumes is rebooted under a 32-bit Solaris 10 kernel, the large volumes are visible through <code>metastat</code> output. Large volumes cannot be accessed, modified or deleted, and no new large volumes can be created. Any volumes or file systems on a large volume in this situation are also be unavailable. If a system with large volumes is rebooted under a version of Solaris prior to Solaris 10, Solaris Volume Manager will not start. You must remove all large volumes before Solaris Volume Manager runs under another version of the Solaris Operating Environment. Solaris Volume Manager supports one-to-four-way mirrors. You can only attach a metadevice to a mirror if there are three or fewer submirrors beneath the mirror. Once a new metadevice is attached to a mirror, <code>metattach</code> automatically starts a resync operation to the new submirror. Attaching a new logging device to a busy trans metadevice is allowed, although a trans metadevice starts using its new logging device only after the trans is idle (after it is unmounted, for example). The busy trans is in an <i>Attaching</i> state (<code>metastat</code>) until the logging device is actually attached. Attaching a logging device in the <i>Hard Error</i> or <i>Error</i> state (<code>metastat</code>) is not allowed. <code>metadetach</code> is used to detach submirrors from mirrors and to detach logging devices from trans metadevices.

metattach(1M)

When a submirror is detached from a mirror, it is no longer part of the mirror, thus reads and writes to and from that metadvice by way of the mirror are no longer performed through the mirror. Detaching the only existing submirror is not allowed. Detaching a submirror that has slices reported as needing maintenance (by `metastat`) is not allowed unless the `-f` (force) flag is used.

`metadetach` also detaches the logging device from a trans. Once detached, the logging device is no longer part of the trans, thus the trans is no longer logging and all benefits of logging are lost. Any information on the logging device that pertains to the master device is written to the master device before the logging device is detached.

Detaching the logging device from a busy trans device is not allowed unless the `-f` (force) flag is used. Even so, the logging device is not actually detached until the trans is idle. The trans is in the *Detaching* state (`metastat`) until the logging device is detached.

OPTIONS

Root privileges are required for all of the following options except `-h`.

The following options are supported:

- `-f` Force the detaching of metadevices that have components that need maintenance or are busy. You can use this option only when a mirror is in a maintenance state that can be fixed with `metareplace(1M)`. If the mirror is in a maintenance state that can only be fixed with `metasync(1M)` (as shown by the output of `metastat(1M)`), `metadetach -f` has no effect, because the mirrors must be resynchronized before one of them can be detached.
- `-h` Display a usage message.
- `-i size` Specify the interlace value for stripes, where *size* is a specified value followed by either *k* for kilobytes, *m* for megabytes, or *b* for blocks. The units can be either uppercase or lowercase. If *size* is not specified, the size defaults to the interlace size of the last stripe of the metadvice. When an interlace size change is made on a stripe, it is carried forward on all stripes that follow.
- `-s setname` Specify the name of the diskset on which the `metattach` command or the `metadetach` command works.. Using the `-s` option causes the command to perform its administrative function within the specified diskset. Without this option, the command performs its function on local metadevices.

OPERANDS

The following operands are supported:

- component* The logical name for the physical slice (partition) on a disk drive, such as `/dev/dsk/c0t0d0s2`, being added to the concatenation, stripe, concatenation of stripes, or RAID5 metadvice.

metattach(1M)

<i>concat/stripe</i>	The metadvice name of the concatenation, stripe, or concatenation of stripes.
<i>log</i>	The metadvice name of the logging device to be attached to the trans metadvice.
<i>metadvice</i>	The metadvice name to be attached to the mirror as a submirror. This metadvice must have been previously created by the <code>metainit</code> command.
<i>mirror</i>	The name of the mirror.
<i>RAID</i>	The metadvice name of the RAID5 metadvice.
<i>size</i>	The amount of space to add to the soft partition in K or k for kilobytes, M or m for megabytes, G or g for gigabytes, T or t for terabytes, and B or b for blocks (sectors).
<i>softpart</i>	The metadvice name of the existing soft partition.
<i>submirror</i>	The metadvice name of the submirror to be detached from the mirror.
<i>trans</i>	The metadvice name of the trans metadvice (not the master or logging device).

EXAMPLES

EXAMPLE 1 Concatenating a New Slice to a Metadvice

This example concatenates a single new slice to an existing metadvice, d8. Afterwards, you would use the `growfs(1M)` command to expand the file system.

```
# metattach d8 /dev/dsk/c0t1d0s2
```

EXAMPLE 2 Detaching Logging Device from Trans Metadvice

This example detaches the logging device from a trans metadvice d9. Notice that you do not have to specify the logging device itself, as there can only be one.

```
# metadetach d9
```

EXAMPLE 3 Expanding a RAID5 Metadvice

This example expands a RAID5 metadvice, d45, by attaching another slice.

```
# metattach d45 /dev/dsk/c3t0d0s2
```

When you add additional slices to a RAID5 metadvice, the additional space is devoted to data. No new parity blocks are allocated. The data on the added slices is, however, included in the overall parity calculations, so it is protected against single-device failure.

metattach(1M)

EXAMPLE 4 Expanding a Soft Partition

The following example expands a soft partition, d42, by attaching 150 Mbytes.

```
# metattach d42 150M
```

When you add additional space to a soft partition, the additional space is taken from any available space on the slice and might not be contiguous with the existing soft partition.

EXAMPLE 5 Adding Space to Two-Way Mirror

This example adds space to a two-way mirror by adding a slice to each submirror. Afterwards, you would use the `growfs(1M)` command to expand the file system.

```
# metattach d9 /dev/dsk/c0t2d0s5
# metattach d10 /dev/dsk/c0t3d0s5
```

EXAMPLE 6 Detaching a Submirror from a Mirror

This example detaches a submirror, d2, from a mirror, d4.

```
# metadetach d4 d2
```

EXAMPLE 7 Adding Four Slices to Metadevice

This example adds four slices to an existing metadevice, d9. Afterwards, you would use the `growfs(1M)` command to expand the file system.

```
# metattach d9 /dev/dsk/c0t1d0s2 /dev/dsk/c0t2d0s2 \
    /dev/dsk/c0t3d0s2 /dev/dsk/c0t4d0s2
```

EXIT STATUS The following exit values are returned:

0	Successful completion.
>0	An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdm

SEE ALSO `metaclear(1M)`, `metadb(1M)`, `metadetach(1M)`, `metahs(1M)`, `metainit(1M)`, `metaoffline(1M)`, `metaonline(1M)`, `metaparam(1M)`, `metarecover(1M)`, `metareplace(1M)`, `metaroot(1M)`, `metaset(1M)`, `metastat(1M)`, `metasync(1M)`, `md.tab(4)`, `md.cf(4)`, `mddb.cf(4)`, `attributes(5)`

WARNINGS This section provides information regarding warnings for devices greater than 1 TB and for multi-way mirrors.

Devices and Volumes Greater Than 1 TB Do not create large (>1 TB) volumes if you expect to run the Solaris Operating Environment with a 32-bit kernel or if you expect to use a version of the Solaris Operating Environment prior to Solaris 10.

Multi-Way Mirrors When a submirror is detached from its mirror, the data on the metadvice may not be the same as the data that existed on the mirror prior to running metadetach. In particular, if the -f option was needed, the metadvice and mirror probably do not contain the same data.

mib2mof(1M)

NAME	mib2mof – generate MOF file(s) from input SNMP MIB file(s)																																																																								
SYNOPSIS	<code>/usr/sadm/bin/mib2mof</code> [-n] [-d <i>directory</i>] [-q] [-c] [-a] [-h] <i>files</i>																																																																								
DESCRIPTION	The <code>mib2mof</code> utility reads input Management Information Base (MIB) files and produces one or more Managed Object Format (MOF) files. MOF files contain a Common Information Model (CIM) class declaration that represents the MIB for the Solaris Simple Network Management Protocol (SNMP) provider. The SNMP provider allows Web-Based Enterprise Management (WBEM) applications to access SNMP device information. SNMP scalar variables map to properties in the CIM class. Qualifiers on each property convey the following MIB information for each scalar variable: ■ syntax ■ read/write access ■ OID (Object IDentifier) ■ description (optional) ■ index (if the variable is within a group [sequence] that defines a row) The syntax of an SNMP scalar variable is represented in a CIM class by the property’s CIM datatype. All properties are marked with write access (true or false). The following table shows how a Solaris SNMP datatype in a MIB maps to a Web-Based Enterprise Management (WBEM) CIM datatype and then to an SNMP datatype used by the WBEM SNMP API: <table><tr><th>SNMP SMI Datatype</th><th>SNMP Ver.</th><th>CIM Datatype</th><th>SNMP API Object type</th></tr><tr><td>INTEGER</td><td>v1</td><td>sint32</td><td>SnmpInt</td></tr><tr><td>OCTET STRING</td><td>v1</td><td>string</td><td>SnmpString</td></tr><tr><td>OBJECT IDENTIFIER</td><td>v1</td><td>string</td><td>SnmpOid</td></tr><tr><td>IpAddress</td><td>v1</td><td>string</td><td>SnmpIpAddress</td></tr><tr><td>Counter</td><td>v1</td><td>uint32</td><td>SnmpCounter</td></tr><tr><td>Gauge</td><td>v1</td><td>uint32</td><td>SnmpGauge</td></tr><tr><td>TimeTicks</td><td>v1</td><td>uint32</td><td>SnmpTimeticks</td></tr><tr><td>Opaque</td><td>v1</td><td>sint8[]</td><td>SnmpOpaque</td></tr><tr><td>DisplayString - see OCTET STRING</td><td>v1</td><td></td><td></td></tr><tr><td>NetworkAddress - see IpAddress</td><td>v1</td><td></td><td></td></tr><tr><td>Counter32 - see Counter</td><td>v2</td><td></td><td></td></tr><tr><td>Counter64</td><td>v2</td><td>uint64</td><td>SnmpCounter64</td></tr><tr><td>Integer32</td><td>v2</td><td>sint32</td><td>SnmpInt</td></tr><tr><td>Gauge32 - see Gauge</td><td>v2</td><td></td><td></td></tr><tr><td>Unsigned32</td><td>v2</td><td>uint32</td><td>SnmpGauge</td></tr><tr><td>TruthValue</td><td>v2</td><td>sint32</td><td>SnmpInt</td></tr><tr><td>BITS - see OCTET STRING</td><td>v2</td><td></td><td></td></tr></table> The <code>mib2mof</code> utility includes its required <code>Solaris_SNMPmib_core.txt</code> file (containing core MIB definitions), installed in <code>/usr/sadm/mof</code>. The <code>mib2mof</code> utility looks first for <code>mib</code> core file in local directory. If this file is not found in the local directory, <code>mib2mof</code> looks in <code>/usr/sadm/mof</code>.	SNMP SMI Datatype	SNMP Ver.	CIM Datatype	SNMP API Object type	INTEGER	v1	sint32	SnmpInt	OCTET STRING	v1	string	SnmpString	OBJECT IDENTIFIER	v1	string	SnmpOid	IpAddress	v1	string	SnmpIpAddress	Counter	v1	uint32	SnmpCounter	Gauge	v1	uint32	SnmpGauge	TimeTicks	v1	uint32	SnmpTimeticks	Opaque	v1	sint8[]	SnmpOpaque	DisplayString - see OCTET STRING	v1			NetworkAddress - see IpAddress	v1			Counter32 - see Counter	v2			Counter64	v2	uint64	SnmpCounter64	Integer32	v2	sint32	SnmpInt	Gauge32 - see Gauge	v2			Unsigned32	v2	uint32	SnmpGauge	TruthValue	v2	sint32	SnmpInt	BITS - see OCTET STRING	v2		
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A MOF file is generated for each SNMP group and table row sequence (that is, the columns in one row) found in the supplied MIBs. (This does not include the core MIB definitions contained in the `Solaris_SNMPmib_core.txt` file.)

There is no MOF file or property for an SNMP table - all table access is through the rows and columns of the table, and the SNMP variable for the table is marked as inaccessible in the MIB.

The MOF file created contains a CIM class that represents an SNMP group or row and a CIM class to represent a CIM association. The output file name (and CIM class) is of the format `<SNMP_><MIB name><Group name>.mof`.

OPTIONS

The following options are supported:

- a Generate MOF files for all of the input MIB files. If -a is not given, a MOF file is generated only for the last file of the input list.
- c Do not use the default `Solaris_SNMPmib_core.txt` definitions file shipped with the Solaris SNMP Provider for WBEM. If this option is specified, you must specify another `MIB_CORE` definitions file as one of the input files.
- d *directory* Generate output MOF files in the specified directory.
- h Show how to invoke `mib2mof` and list its arguments.
- n Parse the input MIB files without generating any output.
- q Include the `DESCRIPTION` clause of `SNMP OBJECT-TYPE` as a qualifier in the generated MOF file.

OPERANDS

The following operands are supported:

files List of SNMP MIB files to be converted.

EXIT STATUS

The `mib2mof` utility terminates with exit status 0.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwbcou

SEE ALSO

`init.wbem(1M)`, `mofcomp(1M)`, `wbemadmin(1M)`, `attributes(5)`

mibiisa(1M)

NAME	mibiisa – Sun SNMP Agent
SYNOPSIS	mibiisa [-ar] [-c <i>config-dir</i>] [-d <i>debug-level</i>] [-p <i>port</i>] [-t <i>cache-timer</i>]
DESCRIPTION	The mibiisa utility is an RFC 1157-compliant SNMP agent. It supports MIB-II as defined in <i>RFC 1213</i>, with Sun extensions under Sun's enterprise number. The MIB (Management Information Base) is both readable and writable. The mibiisa utility supports all SNMP protocol operations including GET-REQUEST, GETNEXT-REQUEST, SET-REQUEST, GET-REPLY, and TRAP. The mibiisa utility supports the coldStart, linkUp, linkDown, and authentication traps. The authentication trap may be disabled by a command-line switch, which itself may be overridden by a management station writing to a MIB variable in the standard SNMP MIB group. The mibiisa utility supports four distinct views of the MIB. The view used for any request is determined by the community string contained in that request. To enhance security, mibiisa supports an option to block all writes to the MIB. You can also limit the set of management stations from which the agent will accept requests in the configuration file used when starting the mibiisa. See the SECURITY section for more information. Unless overridden, mibiisa uses UDP port 161, the standard SNMP port. The mibiisa utility issues traps through the same port on which it receives SNMP requests. The mibiisa utility must run with super-user privileges and is typically started at system startup via <i>/etc/rc3.d</i>. mibiisa may not be started using <i>inetd</i>(1M). When started, mibiisa detaches itself from the keyboard, disables all signals except SIGKILL, SIGILL, SIGUSR1, and SIGUSR2, and places itself in the background.
OPTIONS	The following options are supported: -a Disable the generation of authentication traps. However, an SNMP manager may write a value into <i>snmpEnableAuthenTraps</i> to enable or disable authentication traps. -c <i>config-dir</i> Specify a directory where it expects <i>snmpd.conf</i> file, on startup. The default directory is <i>/etc/snmp/conf</i>. -d <i>debug-level</i> Debug. A value of 0 disables all debug and is the default. Levels 1 through 3 represent increasing levels of debug output. When mibiisa receives the signal SIGUSR1, it resets the debug-level to 0. When mibiisa receives the signal SIGUSR2, it increments the debug-level by one. Debug output is sent to the standard output in effect at the time mibiisa is started. No matter what debug level is in effect, certain significant events are logged in the system log.

**CONFIGURATION
FILE**

- p *port* Define an alternative UDP port on which mibiisa listens for incoming requests. The default is UDP port 161.
- r Place the MIB into read-only mode.
- t *cache-timer* By default, information fetched from the kernel is considered to be valid for 45 seconds from the time it is retrieved. This cache lifetime may be altered with this parameter. You cannot set *cache-timer* to any value less than 1.

The `snmpd.conf` file is used for configuration information. Each entry in the file consists of a keyword followed by a parameter string. The keyword must begin in the first position. Parameters are separated from the keyword and from one another by white space. Case in keywords is ignored. Each entry must be contained on a single line. All text following (and including) a pound sign (#) is ignored. Keywords currently supported are:

- `sysdescr` The value to be used to answer queries for `sysDescr`.
- `syscontact` The value to be used to answer queries for `sysContact`.
- `syslocation` The value to be used to answer queries for `sysLocation`.
- `trap` The parameter names one or more hosts to receive traps. Only five hosts may be listed.
- `system-group-read-community` The community name to get read access to the system group and Sun's extended system group.
- `system-group-write-community` The community name to get write access to the system group and Sun's extended system group.
- `read-community` The community name to get read access to the entire MIB.
- `write-community` The community name to get write access to the entire MIB (implies read access).
- `trap-community` The community name to be used in traps.
- `kernel-file` The name of the file to use for kernel symbols.
- `managers` The names of hosts that may send SNMP queries. Only five hosts may be listed on any one line. This keyword may be repeated for a total of 32 hosts.

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newdevice

The additional devices which are not built in SNMPD. The format is as follows:
newdevice type speed name where *newdevice* is the keyword, *type* is an integer which has to match your schema file, *speed* is the new device's speed, and *name* is this new device's name.

An example `snmpd.conf` file is shown below:

```
sysdescr      Sun SNMP Agent, SPARCstation 10, Company
               Property Number 123456
syscontact    Cliff Claven
sysLocation   Stool next to Norms at Cheers
#
system-group-read-community    public
system-group-write-community   private
#
read-community  all_public
write-community all_private
#
trap            localhost
trap-community  SNMP-trap
#
#kernel-file    /vmunix
#
managers        lvs golden
managers        swap
```

INSTALLATION

The mibiisa utility and its configuration file, `snmpd.conf`, may be placed in any directory. However for Solaris 2.4 and subsequent releases, use `/usr/lib/snmp` for mibiisa itself and `/etc/snmp/conf` for the configuration file. You can modify the configuration file as appropriate. If you make any changes to `snmpd.conf` file keyword values, you must kill and restart mibiisa for the changes to take effect.

Your `/etc/services` file (or NIS equivalent) should contain the following entries:

snmp	161/udp		# Simple Network Mgmt Protocol
snmp-trap	162/udp	snmptrap	# SNMP trap (event) messages

The following is an example for Solaris 2.x:

```
#
# Start the SNMP agent
#
if [ -f /etc/snmp/conf/snmpd.conf -a -x
    /usr/lib/snmp/mibiisa ];
then
```

```
/opt/SUNWconn/snm/agents/snmpd
echo 'Starting SNMP-agent.'
```

SECURITY

SNMP, as presently defined, offers relatively little security. The `mibiisa` utility accepts requests from other machines, which can have the effect of disabling the network capabilities of your computer. To limit the risk, the configuration file lets you specify a list of up to 32 manager stations from which `mibiisa` will accept requests. If you do not specify any such manager stations, `mibiisa` accepts requests from anywhere.

The `mibiisa` utility also allows you to mark the MIB as “read-only” by using the `-r` option.

Finally, `mibiisa` supports four different community strings. These strings, however, are visible in the configuration file and within the SNMP packets as they flow on the network.

The configuration file should be owned by, and readable only by super-user. In other words the mode should be:

```
-rw----- 1 root          2090 Oct 17 15:04 /etc/snmplib/conf/snmpd.conf
```

MIB

This section discusses some of the differences between the `mibiisa` MIB and the standard MIB-II (as defined in RFC 1213).

The following variables are read-only in the `mibiisa` MIB:

```
sysName
atIfIndex
ipDefaultTTL
```

These variables are read-write in the standard MIB-II.

The `mibiisa` MIB Address Translation tables support limited write access: only `atPhysAddress` may be written, either to change the physical address of an existing entry or to delete an entire ARP table entry.

The `mibiisa` MIB IP Net to Media table supports limited write access: only `ipNetToMediaPhysAddress` and `ipNetToMediaType` may be written, either to change the physical address of an existing entry or to delete an entire ARP table entry.

The following variables are read-write in the `mibiisa` MIB; however, these variables have fixed values. Any new values “set” to them are accepted, but have no effect:

```
ipRouteIfIndex
ipRouteMetric1
ipRouteMetric2
ipRouteMetric3
ipRouteMetric4
ipRouteType
ipRouteAge
```

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ipRouteMask
ipRouteMetric5

The following mibiisa MIB variable reflects the actual state of the related table entry.
“Sets” are accepted but have no effect:

tcpConnState

The following mibiisa MIB variables are readable, but return a fixed value:

icmpInDestUnreachs	Returns 1
icmpInTimeExcds	Returns 1
icmpInParmProbs	Returns 1
icmpInSrcQuenchs	Returns 1
icmpInRedirects	Returns 1
icmpInEchos	Returns 1
icmpInEchoReps	Returns 1
icmpInTimestamps	Returns 1
icmpInTimestampReps	Returns 1
icmpInAddrMasks	Returns 1
icmpInAddrMaskReps	Returns 1
icmpOutDestUnreachs	Returns 1
icmpOutTimeExcds	Returns 1
icmpOutParmProbs	Returns 1
icmpOutSrcQuenchs	Returns 1
icmpOutRedirects	Returns 1
icmpOutEchos	Returns 1
icmpOutEchoReps	Returns 1
icmpOutTimestamps	Returns 1
icmpOutTimestampReps	Returns 1
icmpOutAddrMasks	Returns 1
icmpOutAddrMaskReps	Returns 1
ifInUnknownProtos	Returns 0

ipAdEntBcastAddr	Returns 1
ipAdEntReasmMaxSiz	Returns 65535
ipRouteMetric1	Returns -1
ipRouteMetric2	Returns -1
ipRouteMetric3	Returns -1
ipRouteMetric4	Returns -1
ipRouteAge	Returns 0
ipRouteMetric5	Returns -1
ipNetToMediaType	Returns (3) dynamic
ipRoutingDiscards	Returns 0

The following variables return a fixed value of 0 for drivers not conforming to the GLD framework (see `gld(7D)`), including the old LAN drivers on SPARC machines:

ifInOctets	Returns 0
ifInNUcastPkts	Returns 0
ifInDiscards	Returns 0
ifOutOctets	Returns 0
ifOutNUcastPkts	Returns 0
ifOutDiscards	Returns 0

SCHEMA ATTRIBUTES

system

The following describes the attributes in the group and table definitions in the `/var/snmp/mib/sun.mib` file.

The `system` group reports statistics about a particular system (for example, a workstation or a printer).

`sysDescr` – A textual description of the entity. This value should include the full name and version identification of the system's hardware type, software operating-system, and networking software. This value must only contain printable ASCII characters. (string[255])

`sysObjectID` – The vendor's authoritative identification of the network management subsystem contained in the entity. This value is allocated within the SMI enterprises subtree (1.3.6.1.4.1) and provides an easy and unambiguous means for determining what type of equipment is being managed. For example, if vendor "Flintstones, Inc." was assigned the subtree 1.3.6.1.4.1.4242, it could assign the identifier 1.3.6.1.4.1.4242.1.1 to its "Fred Router." (objectid)

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sysUpTime – Time (in hundredths of a second) since the network management portion of the system was last reinitialized. (timeticks)

sysContact – The textual identification of the contact person for this managed node, together with information on how to contact this person. (string[255])

sysName – An administratively-assigned name for this managed node. By convention, this is the node's fully-qualified domain name. (string[255])

sysLocation – The physical location of this node (for example, "telephone closet, 3rd floor" (string[255]))

sysServices – A value indicating the set of services that this entity primarily offers. (int) The value is a sum. This sum initially takes the value zero. Then, for each layer L in the range 1 through 7 for which this node performs transactions, 2 raised to (L - 1) is added to the sum. For example, a node that performs primarily routing functions would have a value of 4 ($2^{(3-1)}$). In contrast, a node that is a host offering application services would have a value of 72 ($2^{(4-1)} + 2^{(7-1)}$). Note that in the context of the Internet suite of protocols, values should be calculated accordingly:

layer	functionality
1	physical (such as repeaters)
2	datalink/subnetwork (such as bridges)
3	internet (such as IP gateways)
4	end-to-end (such as IP hosts)
7	applications (such as mail relays)

For systems including OSI protocols, Layers 5 and 6 may also be counted.

interfaces The **interfaces** group reports the number of interfaces handled by the agent.

ifNumber – The number of network interfaces, regardless of their current state, present on this system. (int)

ifTable The **ifTable** is a table of interface entries. The number of entries is given by the value of **ifNumber**.

ifIndex – A unique value for each interface. Its value ranges between 1 and the value of **ifNumber**. The value for each interface must remain constant at least from one reinitialization of the entity's network management system to the next reinitialization. (int)

ifDescr – A textual string containing information about the interface. This string should include the name of the manufacturer, the product name, and the version of the hardware interface. (string[255])

`ifType` – The type of interface, distinguished according to the physical/link protocol(s) immediately below the network layer in the protocol stack. (enum)

`ifMtu` – The size of the largest datagram that can be sent/received on the interface, specified in octets. For interfaces used for transmitting network datagrams, this is the size of the largest network datagram that can be sent on the interface. (int)

`ifSpeed` – An estimate of the interface's current bandwidth in bits-per-second. For interfaces that do not vary in bandwidth, or for those where no accurate estimation can be made, this object should contain the nominal bandwidth. (gauge)

`ifPhysAddress` – The interface's address at the protocol layer immediately below the network layer in the protocol stack. For interfaces without such an address (for example, a serial line), this object should contain an octet string of zero length. (octet[128])

`ifAdminStatus` – The desired state of the interface. The testing(3) state indicates that no operational packets can be passed. (enum)

`ifOperStatus` – The current operational state of the interface. The testing(3) state indicates that no operational packets can be passed. (enum)

`ifLastChange` – The value of `sysUpTime` at the time the interface entered its current operational state. If the current state was entered prior to the last reinitialization of the local network management subsystem, then this object contains a zero value. (timeticks)

`ifInOctets` – The total number of octets received on the interface, including framing characters. (counter) Returns a fixed value of 0.

`ifInUcastPkts` – The number of subnetwork-unicast packets delivered to a higher-layer protocol. (counter)

`ifInNUcastPkts` – The number of non-unicast (that is, subnetwork- broadcast or subnetwork-multicast) packets delivered to a higher-layer protocol. (counter) Returns a fixed value of 0.

`ifInDiscards` – The number of inbound packets chosen to be discarded, even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space. (counter) Returns a fixed value of 0.

`ifInErrors` – The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol. (counter)

`ifInUnknownProtos` – The number of packets received via the interface that were discarded because of an unknown or unsupported protocol. (counter) Returns a fixed value of 0.

`ifOutOctets` – The total number of octets transmitted out of the interface, including framing characters. (counter) Returns a fixed value of 0.

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	ifOutUcastPkts – The total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent. (counter) ifOutNUcastPkts – The total number of packets that higher-level protocols requested be transmitted to a non- unicast (that is, a subnetwork-broadcast or subnetwork-multicast) address, including those that were discarded or not sent. (counter) Returns a fixed value of 0. ifOutDiscards – The number of outbound packets that were chosen to be discarded even though no errors had been detected to prevent their being transmitted. One possible reason for discarding such a packet could be to free up buffer space. (counter) Returns a fixed value of 0. ifOutErrors – The number of outbound packets that could not be transmitted because of errors. (counter) ifOutQLen – The length of the output packet queue (in packets). (gauge) ifSpecific – A reference to MIB definitions specific to the particular media being used to realize the interface. For example, if the interface is realized by an Ethernet, then the value of this object refers to a document defining objects specific to Ethernet. If this information is not present, its value should be set to the OBJECT IDENTIFIER { 0 0 }, which is a syntactically valid object identifier. Any conformant implementation of ASN.1 and BER must be able to generate and recognize this value. (objectid)
atTable	atTable Address Translation tables contain the NetworkAddress to physical address equivalences. Some interfaces do not use translation tables for determining address equivalences (for example, DDN-X.25 has an algorithmic method). If all interfaces are of this type, then the Address Translation table is empty, that is, has zero entries. atIfIndex – The interface on which this entry’s equivalence is effective. The interface identified by a particular value of this index is the same interface as identified by the same value of ifIndex. (int) atPhysAddress – The media-dependent physical address. (octet[128]) Setting this object to a null string (one of zero length) has the effect of invalidating the corresponding entry in the atTable object. That is, it effectively dissociates the interface identified with said entry from the mapping identified with said entry. It is an implementation-specific matter as to whether the agent removes an invalidated entry from the table. Accordingly, management stations must be prepared to receive tabular information from agents that corresponds to entries not currently in use. Proper interpretation of such entries requires examination of the relevant atPhysAddress object. atNetAddress – The NetworkAddress (that is, the IP address) corresponding to the media-dependent physical address. (netaddress)
ip	The ip group reports statistics about the Internet Protocol (IP) group.

`ipForwarding` – The indication of whether this entity is acting as an IP gateway in respect to the forwarding of datagrams received by, but not addressed to, this entity. IP gateways forward datagrams. IP hosts do not— except those source-routed via the host. (enum)

Note that for some managed nodes, this object may take on only a subset of the values possible. Accordingly, it is appropriate for an agent to return a “badValue” response if a management station attempts to change this object to an inappropriate value.

`ipDefaultTTL` – The default value inserted into the Time-To-Live field of the IP header of datagrams originated at this entity, whenever a TTL value is not supplied by the transport layer protocol. (int)

`ipInReceives` – The total number of input datagrams received from interfaces, including those received in error. (counter)

`ipInHdrErrors` – The number of input datagrams discarded due to errors in their IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, and so on. (counter)

`ipInAddrErrors` – The number of input datagrams discarded because the IP address in their IP header’s destination field was not a valid address to be received at this entity. This count includes invalid addresses (for example, 0.0.0.0) and addresses of unsupported Classes (for example, Class E). For entities that are not IP Gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address. (counter)

`ipForwDatagrams` – The number of input datagrams for which this entity was not their final IP destination, as a result of which an attempt was made to find a route to forward them to that final destination. In entities that do not act as IP Gateways, this counter will include only those packets that were Source-Routed via this entity, and the Source- Route option processing was successful. (counter)

`ipInUnknownProtos` – The number of locally-addressed datagrams received successfully but discarded because of an unknown or unsupported protocol. (counter)

`ipInDiscards` – The number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded, for example, for lack of buffer space. Note that this counter does not include any datagrams discarded while awaiting reassembly. (counter)

`ipInDelivers` – The total number of input datagrams successfully delivered to IP user-protocols (including ICMP). (counter)

`ipOutRequests` – The total number of IP datagrams that local IP user-protocols (including ICMP) supplied to IP in requests for transmission. Note that this counter does not include any datagrams counted in `ipForwDatagrams`. (counter)

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	ipOutDiscards – The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded (for example, for lack of buffer space). Note that this counter would include datagrams counted in ipForwDatagrams if any such packets met this (discretionary) discard criterion. (counter) ipOutNoRoutes – The number of IP datagrams discarded because no route could be found to transmit them to their destination. Note that this counter includes any packets counted in ipForwDatagrams which meet this “no-route” criterion. Note that this includes any datagrams that a host cannot route because all its default gateways are down. (counter) ipReasmTimeout – The maximum number of seconds that received fragments are held while they are awaiting reassembly at this entity. (int) ipReasmReqds – The number of IP fragments received that needed to be reassembled at this entity. (counter) ipReasmOKs – The number of IP datagrams successfully reassembled. (counter) ipReasmFails – The number of failures detected by the IP reassembly algorithm, for whatever reason: timed out, errors, and the like. Note that this is not necessarily a count of discarded IP fragments since some algorithms (notably the algorithm in RFC 815) can lose track of the number of fragments by combining them as they are received. (counter) ipFragOKs – The number of IP datagrams that have been successfully fragmented at this entity. (counter) ipFragFails – The number of IP datagrams that have been discarded because they needed to be fragmented at this entity but could not be, for example, because their “Don’t Fragment” flag was set. (counter) ipFragCreates – The number of IP datagram fragments that have been generated as a result of fragmentation at this entity. (counter) ipRoutingDiscards – The number of routing entries that were chosen to be discarded even though they were valid. One possible reason for discarding such an entry could be to free-up buffer space for other routing entries. (counter) Returns a fixed value of 0.
ipAddrTable	ipAddrTable is a table of addressing information relevant to this entity’s IP addresses. ipAdEntAddr – The IP address to which this entry’s addressing information pertains. (netaddress) ipAdEntIfIndex – The index value that uniquely identifies the interface to which this entry is applicable. The interface identified by a particular value of this index is the same interface as identified by the same value of ifIndex. (int)

	ipAdEntNetMask – The subnet mask associated with the IP address of this entry. The value of the mask is an IP address with all the network bits set to 1, and all the hosts bits set to 0. (netaddress) ipAdEntBcastAddr – The value of the least-significant bit in the IP broadcast address used for sending datagrams on the (logical) interface associated with the IP address of this entry. For example, when the Internet standard all-ones broadcast address is used, the value will be 1. This value applies to both the subnet and network broadcasts addresses used by the entity on this (logical) interface. (int) Returns a fixed value of 1. ipAdEntReasmMaxSize – The size of the largest IP datagram that this entity can reassemble from incoming IP fragmented datagrams received on this interface. (int) Returns a fixed value of 65535.
ipRouteTable	The ipRouteTable is this entity's IP Routing table. ipRouteDest – The destination IP address of this route. An entry with a value of 0.0.0.0 is considered a default route. Multiple routes to a single destination can appear in the table, but access to such multiple entries is dependent on the table- access mechanisms defined by the network management protocol in use. (netaddress) ipRouteIfIndex – The index value that uniquely identifies the local interface through which the next hop of this route should be reached. The interface identified by a particular value of this index is the same interface as identified by the same value of ifIndex. (int) ipRouteMetric1 – The primary routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1. (int) Returns a fixed value of -1. ipRouteMetric2 – An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1. (int) Returns a fixed value of -1. ipRouteMetric3 – An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1. (int) Returns a fixed value of -1. ipRouteMetric4 – An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1. (int) Returns a fixed value of -1. ipRouteNextHop – The IP address of the next hop of this route. (In the case of a route bound to an interface that is realized via a broadcast media, the value of this field is the agent's IP address on that interface.) (netaddress)

`ipRouteType` – The type of route. Note that the values direct (3) and indirect (4) refer to the notion of direct and indirect routing in the IP architecture. (enum)

Setting this object to the value invalid (2) has the effect of invalidating the corresponding entry in the `ipRouteTable` object. That is, it effectively dissociates the destination identified with said entry from the route identified with said entry. It is an implementation-specific matter as to whether the agent removes an invalidated entry from the table. Accordingly, management stations must be prepared to receive tabular information from agents that corresponds to entries not currently in use. Proper interpretation of such entries requires examination of the relevant `ipRouteType` object.

`ipRouteProto` – The routing mechanism through which this route was learned. Inclusion of values for gateway routing protocols is not intended to imply that hosts should support those protocols. (enum)

`ipRouteAge` – The number of seconds since this route was last updated or otherwise determined to be correct. Note that no semantics of “too old” can be implied except through knowledge of the routing protocol by which the route was learned. (int) Returns a fixed value of 0.

`ipRouteMask` – Indicate the mask to be logical-ANDed with the destination address before being compared to the value in the `ipRouteDest` field. For those systems that do not support arbitrary subnet masks, an agent constructs the value of the `ipRouteMask` by determining whether the value of the correspondent `ipRouteDest` field belongs to a class-A, B, or C network, and then using one of:

mask	network
255.0.0.0	class-A
255.255.0.0	class-B
255.255.255.0	class-C

If the value of the `ipRouteDest` is 0.0.0.0 (a default route), then the mask value is also 0.0.0.0. It should be noted that all IP routing subsystems implicitly use this mechanism. (netaddress)

`ipRouteMetric5` – An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route’s `ipRouteProto` value. If this metric is not used, its value should be set to -1. (int) Returns a fixed value of -1.

`ipRouteInfo` – A reference to MIB definitions specific to the particular routing protocol responsible for this route, as determined by the value specified in the route’s `ipRouteProto` value. If this information is not present, its value should be set to the OBJECT IDENTIFIER { 0 0 }, which is a syntactically valid object identifier. Any conformant implementation of ASN.1 and BER must be able to generate and recognize this value. (objectid)

ipNetToMediaTable	The <code>ipNetToMediaTable</code> is the IP Address Translation table used for mapping from IP addresses to physical addresses. <code>ipNetToMediaIfIndex</code> – The interface on which this entry’s equivalence is effective. The interface identified by a particular value of this index is the same interface as identified by the same value of <code>ifIndex</code>. (int) <code>ipNetToMediaPhysAddress</code> – The media-dependent physical address. (octet[128]) <code>ipNetToMediaNetAddress</code> – The <code>IpAddress</code> corresponding to the media-dependent physical address. (netaddress) <code>ipNetToMediaType</code> – The type of mapping. (enum) Returns a fixed value of (3)dynamic. Setting this object to the value invalid(2) has the effect of invalidating the corresponding entry in the <code>ipNetToMediaTable</code>. That is, it effectively dissociates the interface identified with said entry from the mapping identified with said entry. It is an implementation-specific matter as to whether the agent removes an invalidated entry from the table. Accordingly, management stations must be prepared to receive tabular information from agents that corresponds to entries not currently in use. Proper interpretation of such entries requires examination of the relevant <code>ipNetToMediaType</code> object.
icmp	The <code>icmp</code> group reports statistics about the ICMP group. <code>icmpInMsgs</code> – The total number of ICMP messages that the entity received. Note that this counter includes all those counted by <code>icmpInErrors</code>. (counter) <code>icmpInErrors</code> – The number of ICMP messages that the entity received but determined as having ICMP-specific errors (bad ICMP checksums, bad length, and the like.). (counter) <code>icmpInDestUnreachs</code> – The number of ICMP Destination Unreachable messages received. (counter) <code>icmpInTimeExcds</code> – The number of ICMP Time Exceeded messages received. (counter) <code>icmpInParmProbs</code> – The number of ICMP Parameter Problem messages received. (counter) <code>icmpInSrcQuenchs</code> – The number of ICMP Source Quench messages received. (counter) <code>icmpInRedirects</code> – The number of ICMP Redirect messages received. (counter) <code>icmpInEchos</code> – The number of ICMP Echo (request) messages received. (counter) <code>icmpInEchoReps</code> – The number of ICMP Echo Reply messages received. (counter) <code>icmpInTimestamps</code> – The number of ICMP Timestamp (request) messages received. (counter)

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	<code>icmpInTimestampReps</code> – The number of ICMP Timestamp Reply messages received. (counter) <code>icmpInAddrMasks</code> – The number of ICMP Address Mask Request messages received. (counter) <code>icmpInAddrMaskReps</code> – The number of ICMP Address Mask Reply messages received. (counter) <code>icmpOutMsgs</code> – The total number of ICMP messages that this entity attempted to send. Note that this counter includes all those counted by <code>icmpOutErrors</code>. (counter) <code>icmpOutErrors</code> – The number of ICMP messages that this entity did not send due to problems discovered within ICMP, such as a lack of buffers. This value should not include errors discovered outside the ICMP layer, such as the inability of IP to route the resultant datagram. In some implementations there may be no types of errors that contribute to this counter's value. (counter) <code>icmpOutDestUnreachs</code> – The number of ICMP Destination Unreachable messages sent. (counter) <code>icmpOutTimeExcds</code> – The number of ICMP Time Exceeded messages sent. (counter) <code>icmpOutParmProbs</code> – The number of ICMP Parameter Problem messages sent. (counter) <code>icmpOutSrcQuenchs</code> – The number of ICMP Source Quench messages sent. (counter) <code>icmpOutRedirects</code> – The number of ICMP Redirect messages sent. For a host, this object will always be zero, since hosts do not send redirects. (counter) <code>icmpOutEchos</code> – The number of ICMP Echo (request) messages sent. (counter) <code>icmpOutEchoReps</code> – The number of ICMP Echo Reply messages sent. (counter) <code>icmpOutTimestamps</code> – The number of ICMP Timestamp (request) messages sent. (counter) <code>icmpOutTimestampReps</code> – The number of ICMP Timestamp Reply messages sent. (counter) <code>icmpOutAddrMasks</code> – The number of ICMP Address Mask Request messages sent. (counter) <code>icmpOutAddrMaskReps</code> – The number of ICMP Address Mask Reply messages sent. (counter)
tcp	The <code>tcp</code> group reports statistics about the TCP group.

`tcpRtoAlgorithm` – The algorithm used to determine the timeout value used for retransmitting unacknowledged octets. (enum)

`tcpRtoMin` – The minimum value permitted by a TCP implementation for the retransmission timeout, measured in milliseconds. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission timeout. In particular, when the timeout algorithm is `rsre(3)`, an object of this type has the semantics of the `LBOUND` quantity described in RFC 793. (int)

`tcpRtoMax` – The maximum value permitted by a TCP implementation for the retransmission timeout, measured in milliseconds. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission timeout. In particular, when the timeout algorithm is `rsre(3)`, an object of this type has the semantics of the `UBOUND` quantity described in RFC 793. (int)

`tcpMaxConn` – The limit on the total number of TCP connections that the entity can support. In entities where the maximum number of connections is dynamic, this object should contain the value `-1`. (int)

`tcpActiveOpens` – The number of times that TCP connections have made a direct transition to the `SYN-SENT` state from the `CLOSED` state. (counter)

`tcpPassiveOpens` – The number of times that TCP connections have made a direct transition to the `SYN-RCVD` state from the `LISTEN` state. (counter)

`tcpAttemptFails` – The number of times that TCP connections have made a direct transition to the `CLOSED` state from either the `SYN-SENT` state or the `SYN-RCVD` state, plus the number of times TCP connections have made a direct transition to the `LISTEN` state from the `SYN-RCVD` state. (counter)

`tcpEstabResets` – The number of times TCP connections have made a direct transition to the `CLOSED` state from either the `ESTABLISHED` state or the `CLOSE-WAIT` state. (counter)

`tcpCurrEstab` – The number of TCP connections for which the current state is either `ESTABLISHED` or `CLOSE-WAIT`. (gauge)

`tcpInSegs` – The total number of segments received, including those received in error. This count includes segments received on currently established connections. (counter)

`tcpOutSegs` – The total number of segments sent, including those on current connections but excluding those containing only retransmitted octets. (counter)

`tcpRetransSegs` – The total number of segments retransmitted - that is, the number of TCP segments transmitted containing one or more previously transmitted octets. (counter)

`tcpInErrs` – The total number of segments received in error (for example, bad TCP checksums). (counter)

	<code>tcpOutRsts</code> – The number of TCP segments sent containing the RST flag. (counter)
tcpConnTable	The <code>tcpConnTable</code> is a table containing TCP connection-specific information. <code>tcpConnState</code> – The state of this TCP connection. (enum) The only value that may be set by a management station is <code>deleteTCB(12)</code>. Accordingly, it is appropriate for an agent to return a “badValue” response if a management station attempts to set this object to any other value. If a management station sets this object to the value <code>deleteTCB(12)</code>, then this has the effect of deleting the TCB (as defined in RFC 793) of the corresponding connection on the managed node. This results in immediate termination of the connection. As an implementation-specific option, an RST segment may be sent from the managed node to the other TCP endpoint. (Note, however, that RST segments are not sent reliably.) <code>tcpConnLocalAddress</code> – The local IP address for this TCP connection. For a connection in the listen state that is willing to accept connections for any IP interface associated with the node, the value 0.0.0.0 is used. (netaddress) <code>tcpConnLocalPort</code> – The local port number for this TCP connection. (int) <code>tcpConnRemAddress</code> – The remote IP address for this TCP connection. (netaddress) <code>tcpConnRemPort</code> – The remote port number for this TCP connection. (int)
udp	The <code>udp</code> group reports statistics about the UDP group. <code>udpInDatagrams</code> – The total number of UDP datagrams delivered to UDP users. (counter) Returns a fixed value of 0. <code>udpNoPorts</code> – The total number of received UDP datagrams for which there was no application at the destination port. (counter) Returns a fixed value of 0. <code>udpInErrors</code> – The number of received UDP datagrams that could not be delivered for reasons other than the lack of an application at the destination port. (counter) <code>udpOutDatagrams</code> – The total number of UDP datagrams sent from this entity. (counter) Returns a fixed value of 0.
udpTable	The <code>udpTable</code> is a table containing UDP listener information. <code>udpLocalAddress</code> – The local IP address for this UDP listener. For a UDP listener that is willing to accept datagrams for any IP interface associated with the node, the value 0.0.0.0 is used. (netaddress) <code>udpLocalPort</code> – The local port number for this UDP listener. (int)
snmp	The <code>snmp</code> group reports statistics about the SNMP group.

`snmpInPkts` – The total number of Messages delivered to the SNMP entity from the transport service. (counter)

`snmpOutPkts` – The total number of SNMP Messages passed from the SNMP protocol entity to the transport service. (counter)

`snmpInBadVersions` – The total number of SNMP Messages delivered to the SNMP protocol entity that were for an unsupported SNMP version. (counter)

`snmpInBadCommunityNames` – The total number of SNMP Messages delivered to the SNMP protocol entity that used a SNMP community name not known to said entity. (counter)

`snmpInBadCommunityUses` – The total number of SNMP Messages delivered to the SNMP protocol entity, which represented an SNMP operation not allowed by the SNMP community named in the Message. (counter)

`snmpInASNParseErrs` – The total number of ASN.1 or BER errors encountered by the SNMP protocol entity when decoding received SNMP Messages. (counter)

`snmpInTooBigs` – The total number of SNMP PDUs delivered to the SNMP protocol entity for which the value of the error-status field is “tooBig.” (counter)

`snmpInNoSuchNames` – The total number of SNMP PDUs delivered to the SNMP protocol entity for which the value of the error-status field is “noSuchName.” (counter)

`snmpInBadValues` – The total number of SNMP PDUs delivered to the SNMP protocol entity for which the value of the error-status field is “badValue.” (counter)

`snmpInReadOnlys` – The total number valid SNMP PDUs delivered to the SNMP protocol entity for which the value of the error-status field is “readOnly.” It should be noted that it is a protocol error to generate an SNMP PDU that contains the value “readOnly” in the error-status field. This object is provided as a means of detecting incorrect implementations of the SNMP. (counter)

`snmpInGenErrs` – The total number of SNMP PDUs delivered to the SNMP protocol entity for which the value of the error-status field is “genErr.” (counter)

`snmpInTotalReqVars` – The total number of MIB objects successfully retrieved by the SNMP protocol entity as the result of receiving valid SNMP Get-Request and Get-Next PDUs. (counter)

`snmpInTotalSetVars` – The total number of MIB objects successfully altered by the SNMP protocol entity as the result of receiving valid SNMP Set-Request PDUs. (counter)

`snmpInGetRequests` – The total number of SNMP Get-Request PDUs accepted and processed by the SNMP protocol entity. (counter)

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`snmpInGetNexts` – The total number of SNMP Get-Next PDUs accepted and processed by the SNMP protocol entity. (counter)

`snmpInSetRequests` – The total number of SNMP Set-Request PDUs accepted and processed by the SNMP protocol entity. (counter)

`snmpInGetResponses` – The total number of SNMP Get-Response PDUs accepted and processed by the SNMP protocol entity. (counter)

`snmpInTraps` – The total number of SNMP Trap PDUs accepted and processed by the SNMP protocol entity. (counter)

`snmpOutTooBigs` – The total number of SNMP PDUs generated by the SNMP protocol entity for which the value of the error-status field is “tooBig.” (counter)

`snmpOutNoSuchNames` – The total number of SNMP PDUs generated by the SNMP protocol entity for which the value of the error-status is “noSuchName.” (counter)

`snmpOutBadValues` – The total number of SNMP PDUs generated by the SNMP protocol entity for which the value of the error-status field is “badValue.” (counter)

`snmpOutGenErrs` – The total number of SNMP PDUs generated by the SNMP protocol entity for which the value of the error-status field is “genErr.” (counter)

`snmpOutGetRequests` – The total number of SNMP Get-Request PDUs which have been generated by the SNMP protocol entity. (counter)

`snmpOutGetNexts` – The total number of SNMP Get-Next PDUs generated by the SNMP protocol entity. (counter)

`snmpOutSetRequests` – The total number of SNMP Set-Request PDUs generated by the SNMP protocol entity. (counter)

`snmpOutGetResponses` – The total number of SNMP Get-Response PDUs generated by the SNMP protocol entity. (counter)

`snmpOutTraps` – The total number of SNMP Trap PDUs generated by the SNMP protocol entity. (counter)

`snmpEnableAuthenTraps` – Indicates whether the SNMP agent process is permitted to generate authentication-failure traps. The value of this object overrides any configuration information. As such, it provides a means whereby all authentication-failure traps may be disabled. (enum)

Note that this object must be stored in non-volatile memory, so that it remains constant between reinitializations of the network management system.

The following are Sun-specific group and table definitions.

sunSystem

The `sunSystem` group reports general system information.

sunProcessTable

agentDescr – The SNMP agent’s description of itself. (string[255])

hostID – The unique Sun hardware identifier. The value returned is four byte binary string. (octet[4])

motd – The first line of /etc/motd. (string[255])

unixTime – The UNIX system time. Measured in seconds since January 1, 1970 GMT. (counter)

The sunProcessTable table reports UNIX process table information.

psProcessID – The process identifier for this process. (int)

psParentProcessID – The process identifier of this process’s parent. (int)

psProcessSize – The combined size of the data and stack segments (in kilobytes.) (int)

psProcessCpuTime – The CPU time (including both user and system time) consumed so far. (int)

psProcessState – The run-state of the process. (octet[4])

R	Runnable
T	Stopped
P	In page wait
D	Non-interruptable wait
S	Sleeping (less than 20 seconds)
I	Idle (more than 20 seconds)
Z	Zombie

psProcessWaitChannel – Reason process is waiting. (octet[16])

psProcessTTY – Terminal, if any, controlling this process. (octet[16])

psProcessUserName – Name of the user associated with this process. (octet[16])

psProcessUserID – Numeric form of the name of the user associated with this process. (int)

psProcessName – Command name used to invoke this process. (octet[64])

psProcessStatus – Setting this variable will cause a signal of the set value to be sent to the process. (int)

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sunHostPerf	The sunHostPerf group reports hostperf information.	
	rsUserProcessTime – Total number of timeticks used by user processes since the last system boot. (counter)	
	rsNiceModeTime – Total number of timeticks used by “nice” mode since the last system boot. (counter)	
	rsSystemProcessTime – Total number of timeticks used by system processes since the last system boot. (counter)	
	rsIdleModeTime – Total number of timeticks in idle mode since the last system boot. (counter)	
	rsDiskXfer1 – Total number of disk transfers since the last boot for the first of four configured disks. (counter)	
	rsDiskXfer2 – Total number of disk transfers since the last boot for the second of four configured disks. (counter)	
	rsDiskXfer3 – Total number of disk transfers since the last boot for the third of four configured disks. (counter)	
	rsDiskXfer4 – Total number of disk transfers since the last boot for the fourth of four configured disks. (counter)	
	rsVPagesIn – Number of pages read in from disk. (counter)	
	rsVPagesOut – Number of pages written to disk. (counter)	
	rsVSwapIn – Number of pages swapped in. (counter)	
	rsVSwapOut – Number of pages swapped out. (counter)	
	rsVIntr – Number of device interrupts. (counter)	
	rsIfInPackets – Number of input packets. (counter)	
	rsIfOutPackets – Number of output packets. (counter)	
	rsIfInErrors – Number of input errors. (counter)	
	rsIfOutErrors – Number of output errors. (counter)	
	rsIfCollisions – Number of output collisions. (counter)	
FILES	/etc/snmp/conf/snmpd.conf	configuration information
	/var/snmp/mib/sun.mib	standard SNMP MIBII file

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmibii
Interface Stability	Obsolete

SEE ALSO inetd(1M), select(3C), recvfrom(3SOCKET), sendto(3SOCKET), attributes(5), gld(7D),

DIAGNOSTICS

cannot dispatch request
The proxy cannot dispatch the request. The rest of the message indicates the cause of the failure.

select(3C) failed
A select(3C) call failed. The rest of the message indicates the cause of the failure.

sendto(3SOCKET) failed
A sendto(3SOCKET) call failed. The rest of the message indicates the cause of the failure.

recvfrom(3SOCKET) failed
A recvfrom(3SOCKET) call failed. The rest of the message indicates the cause of the failure.

no response from system
The SNMP agent on the target system does not respond to SNMP requests. This error might indicate that the SNMP agent is not running on the target system, the target system is down, or the network containing the target system is unreachable.

response too big
The agent could not fit the results of an operation into a single SNMP message. Split large groups or tables into smaller entities.

missing attribute
An attribute is missing from the requested group.

bad attribute type
An object attribute type received from the SNMP agent that does not match the attribute type specified by the proxy agent schema. The rest of the message indicates the expected type and received type.

cannot get sysUpTime
The proxy agent cannot get the variable *sysUpTime* from the SNMP agent.

sysUpTime type bad
The variable *sysUpTime* received from the SNMP agent has the wrong data type.

unknown SNMP error
An unknown SNMP error was received.

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bad variable value

The requested specified an incorrect syntax or value for a set operation.

variable is read only

The SNMP agent did not perform the set request because a variable to set may not be written.

general error

A general error was received.

cannot make request PDU

An error occurred building a request PDU.

cannot make request varbind list

An error occurred building a request variable binding list.

cannot parse response PDU

An error occurred parsing a response PDU.

request ID - response ID mismatch

The response ID does not match the request ID.

string contains non-displayable characters

A displayable string contains non-displayable characters.

cannot open schema file

An error occurred opening the proxy agent schema file.

cannot parse schema file

The proxy agent couldn't parse the proxy agent schema file.

cannot open host file

An error occurred opening the file associated with the *na.snmp.hostfile* keyword in */etc/snmp/conf/snmpd.conf*

cannot parse host file

The proxy agent was unable to parse the file associated with the *na.snmp.hostfile* keyword in */etc/snmp/conf/snm.conf*.

attribute unavailable for set operations

The set could not be completed because the attribute was not available for set operations.

BUGS The mibiisa utility returns the wrong interface speed for the SBUS FDDI interface (for example, "bf0").

The mibiisa utility does not return a MAC address for the SBUS FDDI interface (for example, "bf0").

Process names retrieved from mibiisa contain a leading blank space.

When you change attribute values in the system group with an SNMP set request, the change is effective only as long as mibiisa is running. mibiisa does not save the changes to */etc/snmp/conf/snmpd.conf*.

NAME	mipagent – Mobile IP agent
SYNOPSIS	<code>/usr/lib/inet/mipagent</code>
DESCRIPTION	The <code>mipagent</code> utility implements the Mobile IP home agent and foreign agent functionality described in <i>RFC 2002, IP Mobility Support</i>. The term “mobility agent” is used to refer to the home agent and foreign agent functionality collectively. <code>mipagent</code> responds to Mobile IP registration and deregistration requests and router discovery solicitation messages from a mobile node. Besides responding to external messages, the <code>mipagent</code> utility also tasks on a periodic basis, such as aging the mobility bindings and visitor entries and sending agent advertisements. The mobility agent can also handle direct delivery style reverse tunneling as specified in <i>RFC 2344, Reverse Tunneling for Mobile IP</i>. Limited private address support for mobile nodes is also available. In addition, separate IPsec policies for registration requests, replies, and tunnel traffic can be configured to protect the datagrams associated with these between two mobility agents. Run the <code>mipagent</code> daemon as root using the start-up script, which has the following syntax: <pre>example# /etc/init.d/mipagent [start stop]</pre> <code>/etc/inet/mipagent.conf</code> must be present before you start-up the <code>mipagent</code> daemon. See <code>mipagent.conf(4)</code>. At start up, <code>mipagent</code> reads the configuration information from <code>/etc/inet/mipagent.conf</code>. The <code>mipagent</code> daemon records a continuous log of its activities by means of <code>syslog()</code>. See <code>syslog(3C)</code>. You can use the <i>LogVerbosity</i> parameter in <code>/etc/inet/mipagent.conf</code> to control the verbosity level of the log. The <code>mipagent</code> daemon can be terminated either by the script: <pre>example# /etc/init.d/mipagent stop</pre> or by the <code>kill</code> command. Periodically while running, or if terminated or shutdown, the <code>mipagent</code> daemon stores the following internal state information in <code>/var/inet/mipagent_state</code>: ■ a list of the mobile nodes supported as home agents; ■ their current care-of addresses; and ■ the remaining registration lifetimes. If the <code>mipagent</code> utility is terminated for maintenance and restarted, <code>mipagent_state</code> is used to recreate as much of the mobility agent’s internal state as possible. This minimizes service disruption for mobile nodes that may be visiting other networks. If <code>mipagent_state</code> exists, it is read immediately after <code>mipagent.conf</code> when <code>mipagent</code> is restarted. The format of <code>mipagent_state</code> is undocumented since it is likely to change and programs other than <code>mipagent</code> should not use it for any purpose. A separate utility program <code>mipagentstat</code> is provided for monitoring <code>mipagent</code>.

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EXIT STATUS The following exit values are returned:

0 The daemon started successfully.
-1 The daemon failed to start.

FILES /etc/inet/mipagent.conf
 Configuration file for Mobile IP mobility agent.

/var/inet/mipagent_state
 File where private state information from mipagent is stored.

/etc/init.d/mipagent [start|stop]
 mipagent start-up script.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmipu

SEE ALSO mipagentstat(1M), mipagentconfig(1M), syslog(3C), mipagent.conf(4), attributes(5)

Montenegro, G., editor. *RFC 2344, Reverse Tunneling for Mobile IP*. Network Working Group. May 1998.

Perkins, C. *RFC 2002, IP Mobility Support*. Network Working Group. October 1996.

DIAGNOSTICS The mipagent utility exits with an error if the configuration file, mipagent.conf, cannot be read successfully. Upon receiving a SIGTERM or SIGINT signal, mipagent cleans its internal state, including any changes to the routing and ARP tables, and exits.

NOTES The foreign agent adds host-specific local routes to its routing table for visiting mobile nodes after they are successfully registered. If a visiting mobile node departs without sending a de-registration message through the foreign agent, these routing entries persist until the mobile node's previous registration expires. Any packets that arrive at the foreign agent for the departed mobile node during this time, for example because the foreign agent is also a router for the foreign network, will be lost. System administrators can configure foreign agents to accept only short registration lifetimes. This will automatically restrict the maximum duration for which a departed mobile node will be temporarily unreachable.

Home and foreign agents dynamically add and delete IPsec policies configured with a mobility agent peer. Those pertaining to the tunnel are only added when the tunnel is plumbed. At this time, IPsec tunnel policies must be identical in the forward and reverse direction. IPsec policies pertaining to permitting registration requests on the home agent are added to the IPsec policy file at init time as it must be ready to receive

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these at any time. Otherwise, IPsec policies pertaining to registration request and reply messages with a mobility agent peer are added as soon as they are needed, and are not removed until all mobile nodes are no longer registered with the mobility agent peer, at which point the tunnels are torn down.

mipagentconfig(1M)

NAME	mipagentconfig – configure Mobility IP Agent
SYNOPSIS	<code>/sbin/mipagentconfig [-f <i>configfile</i>] <i>command dest</i> [<i>parameters...</i>]</code>
DESCRIPTION	The <code>mipagentconfig</code> utility is used to configure the Mobility IP Agent. It allows the user to change settings and to add and delete mobility clients, Pools, and SPIs in the mobility agent configuration file.
OPTIONS	The following options are supported: <code>-f <i>configfile</i></code> Use the specified configuration file instead of the system default, <code>/etc/inet/mipagent.conf</code>.
OPERANDS	The <i>command</i> operand, as well as the parameters for each command are described below. See <code>mipagent.conf(4)</code> for the default values of the configuration operands described here. <code>add</code> Depending on the destination <i>dest</i>, this command will add advertisement parameters, security parameters, SPIs, or addresses to the configuration file. <code>add Address <i>ipAddress attr_value</i></code> Add the specified <i>ipAddress</i> with the specified SPI. To add an NAI address, you must specify the <code>Pool</code>. <code>add adv <i>device</i></code> Enable home and foreign agent functionality on the specified interface. <code>add adv <i>device AdvLifetime seconds</i></code> Add <code>AdvLifetime</code> to the specified device. <code>add adv <i>device RegLifetime seconds</i></code> Add <code>RegLifetime</code> to the specified device. <code>add adv <i>device AdvFrequency seconds</i></code> Add <code>AdvFrequency</code> to the specified device. <code>add adv <i>device AdvInitCount count</i></code> Add initial unsolicited advertisement count. <i>count</i> should be a small integer. <code>add adv <i>device AdvLimitUnsolicited yes no</i></code> Enable limited or unlimited unsolicited advertisements for foreign agent. Accepted values are: <code>yes</code> Limit unsolicited advertisement to <code>AdvInitCount</code> initial advertisements. <code>no</code> Do not limit unsolicited advertisement. The advertisement should take place periodically at the frequency specified by <code>AdvFrequency</code>.

add adv *device* HomeAgent yes | no

Add the HomeAgent flag to the specified device.

add adv *device* ForeignAgent yes | no

Add the ForeignAgent flag to the specified device.

add adv *device* PrefixLengthExt yes | no

Add the PrefixLengthExt flag to the specified device.

add adv *device* NAExt yes | no

Add the NAExt flag to the specified device.

add adv *device* Challenge yes | no

Add the Challenge flag to the specified device.

add adv *device* ReverseTunnel no | neither fa ha yes | both

Add the level of ReverseTunnel support indicated to the specified device. Possible values include:

no Do not support ReverseTunnel as either a foreign agent or a home agent on this device. Does not advertise reverse tunneling nor accept a registration requesting reverse tunnel support on this device.

neither Do not support ReverseTunnel as either a foreign agent or a home agent on this device. Do not advertise reverse tunneling nor accept a registration requesting reverse tunnel support on this device.

fa When the foreign agent processes a registration request received on this device, check to see if the mobile node requests that a reverse tunnel be set up to its home agent. If so, perform the necessary encapsulation of datagrams to the mobile node's home agent as described in *RFC 2344*. This means that a mobile node must see the agent advertising reverse tunnel support, so the reverse tunnel bit is advertised in the agent advertisement on this device.

ha When the home agent processes a registration request received on this device, check to see if the mobile node requests that a reverse tunnel be set up from its care-of address. If so, perform the necessary decapsulation as described in *RFC 2344*. This does not mean the home agent is advertising support of reverse tunneling on

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this device. Mobile nodes are only interested in the advertisement flags if they are going to use foreign agent services. Moreover, reverse tunnels by definition originate at the care-of address, and HA support is therefore only of interest to the owner of the care-of address.

yes Whenever the mobility agent is processing a registration request received on this device, check to see if the mobile node is requesting a reverse tunnel be set up. If so, apply RFC 2344 as appropriate, either as an encapsulating foreign agent, or a decapsulating home agent, depending on how this mobility agent is servicing the specific mobile node. As a result, the mobility agent will be advertising reverse tunnel support on this device.

both Whenever the mobility agent is processing a registration request received on this device, check to see if the mobile node is requesting a reverse tunnel be set up. If so, apply RFC 2344 as appropriate, either as an encapsulating foreign agent, or a decapsulating home agent, depending on how this mobility agent is servicing the specific mobile node. As a result, the mobility agent will be advertising reverse tunnel support on this device.

`add adv device ReverseTunnelRequired no | neither fa ha
yes | both yes | both`

Add the requirement that the ReverseTunnel flag be set in any registration request received on the indicated device.
Possible values include:

no Reverse tunneling is not required by the mipagent on this device.

neither Reverse tunneling is not required by the mipagent on this device.

fa The ReverseTunnel flag is required to be set in registration requests received by the foreign agent on this device.

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	ha	The ReverseTunnel flag is required to be set in registration requests received by the home agent on this device.
	yes	The ReverseTunnel flag is required to be set in all registration requests received by either home and or foreign agents on this device.
	both	The ReverseTunnel flag is required to be set in all registration requests received by either home and or foreign agents on this device.
	add Pool <i>number startAddr length</i> Add the specified Pool with the specified start addresses and length.	
	add SPI <i>number replay Key</i> Add the specified SPI with the given replay type and key. The replay type can have a value of none or timestamps.	
	add HA-FAAuth yes no Add the HA-FAAuth flag.	
	add MN-FAAuth yes no Add the MN-FAAuth flag.	
	add MaxClockSkew <i>seconds</i> Add the MaxClockSkew.	
	add KeyDistribution <i>type</i> Add the KeyDistribution type. The only value for KeyDistribution that is supported at this time is file.	
change	Depending on the destination <i>dest</i> , this command will change advertisement parameters, security parameters, SPIs, or addresses in the configuration file. Any of the above destinations are valid.	
delete	Depending on the destination <i>dest</i> , this command will delete advertisement parameters, security parameters, SPIs, or addresses from the configuration file. Any destination discussed above is valid.	
get	Display all of the parameters associated with <i>dest</i> . Any destination discussed above is valid.	

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EXAMPLES

EXAMPLE 1 Adding an SPI, a Pool, and a Mobile Node and Requiring Reverse Tunneling on a Device to the *configfile*

The following example adds an SPI, a Pool, a mobile node, and requires reverse tunneling for the foreign agent in the *configfile*. First, the SPI of 250 is added. Then, a Pool of 200 addresses starting at 192.168.168.1 is added. joe@mobile.com is added with an SPI of 250 and using Pool 1. Finally, reverse tunneling is required for the foreign agent on device le0.

```
example# mipagentconfig add SPI 250 ReplayMethod none
example# mipagentconfig add SPI 250 Key 00ff00ff00ff
example# mipagentconfig add Pool 1 192.168.168.1 200
example# mipagentconfig add Address joe@mobile.com 250 1
example# mipagentconfig add le0 reversetunnel fa
example# mipagentconfig add le0 reversetunnelrequired fa
```

EXAMPLE 2 Adding Dynamic Interface Mobility Support on PPP Interfaces

The following example adds dynamic interface mobility support on PPP interfaces. The backslash (\) escape character is used to type in device number *. The example also indicates that all the new ppp interfaces offer reverse tunnel service.

```
example# mipagentconfig add ppp\* reversetunnel yes
example# mipagentconfig add ppp\* AdvLimitUnsolicited yes
example# mipagentconfig add ppp\* AdvInitCount 3
example# mipagentconfig add ppp\* AdvFrequency 1
```

EXAMPLE 3 Adding IPsec Policies to an Agent-Peer Entry

The following example adds IPsec policies to an existing mobility agent entry, then displays the configuration for the mobility agent peer. The backslash (\) character denotes a line continuation for the formatting of this example.

```
example# mipagentconfig add Address 192.168.10.1 \
        IPsecRequest apply {auth_algs md5 sa shared}
example# mipagentconfig add Address 192.168.10.1 \
        IPsecReply permit {auth_algs md5}
example# mipagentconfig add Address 192.168.10.1 \
        IPsecTunnel permit {encr_auth_algs md5 encr_algs 3des}
example# mipagentconfig get Address 192.168.10.1
```

```
[Address 192.168.10.1]
  Type = agent
  SPI = 137
  IPsecRequest = apply {auth_algs md5 sa shared}
  IPsecReply = permit {auth_algs md5}
  IPsecTunnel = \
    permit {encr_auth_algs md5 encr_algs 3des}
```

EXAMPLE 4 Modifying an SPI

To modify the SPI associated with joe, first, use the command `get` to verify the existing settings, then change the SPI from 250 to 257.

```
example# mipagentconfig get Address joe@mobile.com
Address: joe@mobile.com
SPI: 250
Pool: 1
example# mipagentconfig change Address joe@mobile.com 257 1
```

EXAMPLE 5 Deleting a Pool

Use the following example to delete Pool 3:

```
example# mipagentconfig delete Pool 3
```

EXIT STATUS

The following exit values are returned:

- 0 Successful completion.
- non-zero An error occurred.

FILES

- `/etc/inet/mipagent.conf`
Configuration file for Mobile IP mobility agent.
- `/etc/inet/mipagent.conf-sample`
Sample configuration file for mobility agents.
- `/etc/inet/mipagent.conf.ha-sample`
Sample configuration file for home agent functionality.
- `/etc/inet/mipagent.conf.fa-sample`
Sample configuration file for foreign agent functionality.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmipu

SEE ALSO

- `mipagent(1M)`, `mipagent.conf(4)`, `attributes(5)`
- Montenegro, G., editor. *RFC 2334, Reverse Tunneling for Mobile IP*. Network Working Group. May, 1998.
- Perkins, C. *RFC 2002, IP Mobility Support*. Network Working Group. October 1996.

mipagentstat(1M)

NAME	mipagentstat – show Mobile IP Mobility Agent status															
SYNOPSIS	mipagentstat [-fhp]															
DESCRIPTION	Use the mipagentstat utility to display the content of various Mobile-IP related data structures.															
Visitor Table (First Form)	The visitor table display lists information for all mobile nodes registered with the foreign agent, one mobile node per line. This list consists of the mobile node’s home address or Network Access Identifier (NAI), home agent address, total registration lifetime and the number of seconds remaining before the registration expires. The following command line shows the output from a foreign agent with two mobile nodes registered: <pre>example# mipagentstat -f</pre> <table><tr><th>Mobile Node</th><th>Foreign Agent</th><th>Time Granted (in secs)</th><th>Time Remaining (in secs)</th><th>Flags</th></tr><tr><td>foobar@xyz.com</td><td>fal@tuv.com</td><td>600</td><td>125</td><td></td></tr><tr><td>10.1.5.23</td><td>123.2.5.12</td><td>1000</td><td>10</td><td>R</td></tr></table> An “R” in the flags column indicates a reverse tunnel is present. No reverse tunnel is configured for the mobile node foobar@xyz.com. A reverse tunnel is configured from mobile node 10.1.5.23.	Mobile Node	Foreign Agent	Time Granted (in secs)	Time Remaining (in secs)	Flags	foobar@xyz.com	fal@tuv.com	600	125		10.1.5.23	123.2.5.12	1000	10	R
Mobile Node	Foreign Agent	Time Granted (in secs)	Time Remaining (in secs)	Flags												
foobar@xyz.com	fal@tuv.com	600	125													
10.1.5.23	123.2.5.12	1000	10	R												
Binding Table (Second Form)	The binding table display lists information for all mobile nodes registered with the home agent, one mobile node per line. This list consists of the mobile node’s home address or NAI, foreign agent address, total registration lifetime and the number of seconds remaining before the registration expires. Use the following command line to show the output from a home agent with two active mobile nodes: <pre>example# mipagentstat -h</pre> <table><tr><th>Mobile Node</th><th>Home Agent</th><th>Time Granted (in secs)</th><th>Time Remaining (in secs)</th><th>Flags</th></tr><tr><td>foobar@xyz.com</td><td>hal@xyz.com</td><td>600</td><td>125</td><td></td></tr><tr><td>10.1.5.23</td><td>10.1.5.1</td><td>1000</td><td>10</td><td>R</td></tr></table> An “R” in the flags column indicates a reverse tunnel is present. No reverse tunnel is configured for the mobile node foobar@xyz.com. A reverse tunnel is configured for mobile node 10.1.5.23.	Mobile Node	Home Agent	Time Granted (in secs)	Time Remaining (in secs)	Flags	foobar@xyz.com	hal@xyz.com	600	125		10.1.5.23	10.1.5.1	1000	10	R
Mobile Node	Home Agent	Time Granted (in secs)	Time Remaining (in secs)	Flags												
foobar@xyz.com	hal@xyz.com	600	125													
10.1.5.23	10.1.5.1	1000	10	R												
Agent Table (Third Form)	The agent table display lists information for all current mobility agent-peers, that is all mobility agents with which mobile-nodes we are servicing are trying to obtain service. Provided in this display are the IPsec protection mechanisms being used with registration requests, replies, and tunnels. Use the following command line to show the output from a home agent with two (foreign) mobility agent peers: <pre>example# mipagentstat -hp</pre>															

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```
Foreign      . . . . . Security Association(s) . . . . .
Agent        Requests Replies FTunnel RTunnel
-----
fa.eng.sun.com    AH,ESP  AH,ESP  AH,ESP  AH,ESP
fa.central.sun.com AH      AH      ESP     ESP
```

Use the following command line to show the output from a home agent with two (foreign) mobility agent peers:

```
example# mipagentstat -fp
Home      . . . . . Security Association(s) . . . . .
Agent     Requests Replies FTunnel RTunnel
-----
ha.eng.sun.com    AH,ESP  AH,ESP  AH,ESP  AH,ESP
ha.central.sun.com
```

Use of the -p option without specifying the agent results in both displays described above, that is one display for each agent.

An AH in any column indicates the IPsec AH mechanism is in place for those datagrams.

An ESP in any column indicates the IPsec ESP mechanism is in place for those datagrams.

OPTIONS The following options are supported:

- f Display the list of active mobile nodes in the foreign agent's visitor's list.
- h Display the list of active mobile nodes in the home agent's binding table.
- p Display the list of mobility agent peers, and the IPsec protection mechanisms currently in use for registration and tunnel traffic.

EXIT STATUS The following exit values are returned:

- 0 Successful completion.
- non-zero An error occurred.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmipu

SEE ALSO mipagent(1M), mipagentconfig(1M), mipagent.conf(4), attributes(5)

Aboda, B., and Beadles, M. *RFC 2486, The Network Access Identifier*. The Internet Society, 1999.

mkdevalloc(1M)

NAME	mkdevalloc – Make device_allocate entries						
SYNOPSIS	<code>/usr/sbin/mkdevalloc</code>						
DESCRIPTION	The mkdevalloc command writes to standard out a set of device_allocate(4) entries describing the system's frame buffer, audio and removable media devices. The mkdevalloc command is used by the <code>init.d(4)</code> scripts to create or update the <code>/etc/security/device_allocate</code> file. Entries are generated based on the device special files found in <code>/dev</code>. For the different categories of devices, the mkdevalloc command checks for the following files under <code>/dev</code>: <pre> audio /dev/audio, /dev/audioc1, /dev/sound/... tape /dev/rst*, /dev/nrst*, /dev/rmt/... floppy /dev/diskette, /dev/fd*, /dev/rdiskette, /dev/rfd* removable disk /dev/sr*, /dev/nsr*, /dev/dsk/c0t?d0s?, /dev/rdsk/c0t?d0s? frame buffer /dev/fb </pre> All entries set the <i>device-minimum</i> and <i>device-maximum</i> fields to the hex representations of ADMIN_LOW and ADMIN_HIGH, respectively. The <i>device-authorization</i> field is set to <code>solaris.device.allocate</code>, except for the <code>framebuffer</code> entry, where it is set to <code>*</code>. The <i>device-name</i>, <i>device-type</i> and <i>device-clean</i> fields are set to the following values: <pre> device-name device-type device-clean audio audio audio audio_clean_wrapper tape mag_tape_0,1,... st st_clean floppy floppy_0,1,... fd disk_clean removable disk cdrom_0,1,... sr disk_clean frame buffer framebuffer fb /bin/true </pre>						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> <tr> <td>Interface Stability</td><td>Obsolete</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu	Interface Stability	Obsolete
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWcsu						
Interface Stability	Obsolete						
SEE ALSO	allocate(1), bsmconv(1M), attributes(5)						
NOTES	mkdevalloc might not be supported in a future release of the Solaris Operating Environment.						

NAME	mkdevmaps – make device_maps entries						
SYNOPSIS	/usr/sbin/mkdevmaps						
DESCRIPTION	The mkdevmaps command writes to standard out a set of device_maps(4) entries describing the system's frame buffer, audio, and removable media devices. The mkdevmaps command is used by the <code>init.d(4)</code> scripts to create or update the <code>/etc/security/device_maps</code> file. Entries are generated based on the device special files found in <code>/dev</code>. For the different categories of devices, the mkdevmaps command checks for the following files under <code>/dev</code>: <pre> audio /dev/audio, /dev/audioc1, /dev/sound/... tape /dev/rst*, /dev/nrst*, /dev/rmt/... floppy /dev/diskette, /dev/fd*, /dev/rdiskette, /dev/rfd* removable disk /dev/dsk/c0t?d0s?, /dev/rdisk/c0t?d0s? frame buffer /dev/fb </pre>						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> <tr> <td>Interface Stability</td><td>Obsolete</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu	Interface Stability	Obsolete
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWcsu						
Interface Stability	Obsolete						
SEE ALSO	allocate(1), bsmconv(1M), attributes(5)						
NOTES	mkdevmaps might not be supported in a future release of the Solaris Operating Environment.						

mkfifo(1M)

NAME	mkfifo – make FIFO special file						
SYNOPSIS	<code>/usr/bin/mkfifo [-m <i>mode</i>] <i>path</i>...</code>						
DESCRIPTION	The <code>mkfifo</code> utility creates the FIFO special files named by its argument list. The arguments are taken sequentially, in the order specified; and each FIFO special file is either created completely or, in the case of an error or signal, not created at all. If errors are encountered in creating one of the special files, <code>mkfifo</code> writes a diagnostic message to the standard error and continues with the remaining arguments, if any. The <code>mkfifo</code> utility calls the library routine <code>mkfifo(3C)</code>, with the <i>path</i> argument is passed as the <i>path</i> argument from the command line, and <i>mode</i> is set to the equivalent of <code>a=rw</code>, modified by the current value of the file mode creation mask <code>umask(1)</code>.						
OPTIONS	The following option is supported: <code>-m <i>mode</i></code> Sets the file permission bits of the newly-created FIFO to the specified <i>mode</i> value. The <i>mode</i> option-argument will be the same as the <i>mode</i> operand defined for the <code>chmod(1)</code> command. In <i><symbolicmode></i> strings, the <i>op</i> characters <code>+</code> and <code>-</code> will be interpreted relative to an assumed initial mode of <code>a=rw</code>.						
OPERANDS	The following operand is supported: <i>file</i> A path name of the FIFO special file to be created.						
USAGE	See <code>largefile(5)</code> for the description of the behavior of <code>mkfifo</code> when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).						
ENVIRONMENT VARIABLES	See <code>environ(5)</code> for descriptions of the following environment variables that affect the execution of <code>mkfifo</code> : <code>LANG</code> , <code>LC_ALL</code> , <code>LC_CTYPE</code> , <code>LC_MESSAGES</code> , and <code>NLSPATH</code> .						
EXIT STATUS	The following exit values are returned: 0 All the specified FIFO special files were created successfully. >0 An error occurred.						
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWesu</td></tr> <tr> <td>Interface Stability</td><td>Standard</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWesu	Interface Stability	Standard
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWesu						
Interface Stability	Standard						
SEE ALSO	<code>mkfifo(3C)</code> , <code>attributes(5)</code> , <code>environ(5)</code> , <code>largefile(5)</code> , <code>standards(5)</code>						

NAME	mkfile – create a file				
SYNOPSIS	mkfile [-nv] <i>size</i> [g k b m] <i>filename...</i>				
DESCRIPTION	mkfile creates one or more files that are suitable for use as NFS-mounted swap areas, or as local swap areas. When a root user executes <code>mkfile()</code> , the sticky bit is set and the file is padded with zeros by default. When non-root users execute <code>mkfile()</code> , they must manually set the sticky bit using <code>chmod(1)</code> . The default <i>size</i> is in bytes, but it can be flagged as gigabytes, kilobytes, blocks, or megabytes, with the g, k, b, or m suffixes, respectively.				
OPTIONS	-n Create an empty <i>filename</i>. The size is noted, but disk blocks are not allocated until data is written to them. Files created with this option cannot be swapped over local UFS mounts. -v Verbose. Report the names and sizes of created files.				
USAGE	See <code>largefile(5)</code> for the description of the behavior of <code>mkfile</code> when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:				
	<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>chmod(1)</code> , <code>swap(1M)</code> , <code>attributes(5)</code> , <code>largefile(5)</code>				

mkfs(1M)

NAME	mkfs – construct a file system	
SYNOPSIS	mkfs [-F <i>FSType</i>] [<i>generic_options</i>] [-o <i>FSType-specific_options</i>] <i>raw_device_file</i> [<i>operands</i>]	
DESCRIPTION	The mkfs utility constructs a file system on the <i>raw_device_file</i> by calling the specific mkfs module indicated by -F <i>FSType</i>. Note: ufs file systems are normally created with the newfs(1M) command. <i>generic_options</i> are independent of file system type. <i>FSType-specific_options</i> is a comma-separated list of <i>keyword=value</i> pairs (with no intervening spaces), which are <i>FSType</i>-specific. <i>raw_device_file</i> specifies the disk partition on which to write the file system. It is required and must be the first argument following the <i>specific_options</i> (if any). <i>operands</i> are <i>FSType</i>-specific. See the <i>FSType</i>-specific manual page of mkfs (for example, mkfs_ufs(1M)) for a detailed description.	
OPTIONS	The following are the generic options for mkfs: -F Specify the <i>FSType</i> to be constructed. If -F is not specified, the <i>FSType</i> is determined from <i>/etc/vfstab</i> by matching the <i>raw_device_file</i> with a <i>vfstab</i> entry, or by consulting the <i>/etc/default/fs</i> file. -V Echo the complete command line, but do not execute the command. The command line is generated by using the options and arguments provided and adding to them information derived from <i>/etc/vfstab</i> or <i>/etc/default/fs</i>. This option may be used to verify and validate the command line. -m Return the command line which was used to create the file system. The file system must already exist. This option provides a means of determining the command used in constructing the file system. -o Specify <i>FSType</i>-specific options. See the manual page for the mkfs module specific to the file system type.	
USAGE	See largefile(5) for the description of the behavior of mkfs when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).	
FILES	<i>/etc/default/fs</i>	Default file system type. Default values can be set for the following flags in <i>/etc/default/fs</i> . For example: LOCAL=ufs
	LOCAL	The default partition for a command if no <i>FSType</i> is specified.
	<i>/etc/vfstab</i>	List of default parameters for each file system

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `mkfs_ufs(1M)`, `newfs(1M)`, `vfstab(4)`, `attributes(5)`, `largefile(5)`

Manual pages for the *FSType*-specific modules of `mkfs`.

NOTES This command might not be supported for all *FSTypes*.

You can use `lofiadm` to create a file that appears to a `mkfs` command as a raw device. You can then use a `mkfs` command to create a file system on that device. See `lofiadm(1M)` for examples of creating a UFS and a PC (FAT) file system (using `mkfs_ufs(1M)` and `mkfs_pcfs(1M)`) on a device created by `lofiadm`.

mkfs_pcfs(1M)

NAME	mkfs_pcfs – construct a FAT file system
SYNOPSIS	mkfs -F pcfs [<i>generic_options</i>] [-o <i>FSType_specific_options</i>] <i>raw_device_file</i>
DESCRIPTION	The pcfs-specific module of mkfs constructs a File Allocation Table (FAT) on removable media (diskette, JAZ disk, ZIP disk, PCMCIA card), a hard disk, or a file (see NOTES). FATs are the standard MS-DOS and Windows file system format. Note that you can use fdformat(1) to construct a FAT file system only on a diskette or PCMCIA card. mkfs for pcfs determines an appropriate FAT size for the medium, then it installs an initial boot sector and an empty FAT. A sector size of 512 bytes is used. mkfs for pcfs can also install the initial file in the file system (see the pcfs-specific -o i option). This first file can optionally be marked as read-only, system, and/or hidden. If you want to construct a FAT with mkfs for pcfs on a medium that is not formatted, you must first perform a low-level format on the medium with fdformat(1) or format(1M). Non-diskette media must also be partitioned with the fdisk(1M) utility. Note that all existing data on the diskette or disk partition, if any, is destroyed when a new FAT is constructed. <i>generic_options</i> are supported by the generic mkfs command. See mkfs(1M) for a description of these options. <i>raw_device_file</i> indicates the device on which to write unless the -o N option has been specified, or if the -V or -m generic options are passed from the generic mkfs module.
OPTIONS	See mkfs(1M) for the list of supported generic options. The following options are supported: -o <i>FSType_specific_options</i> Specify pcfs file system-specific options in a comma-separated list with no intervening spaces. If invalid options are specified, a warning message is printed and the invalid options are ignored. b=<i>label</i> Label the media with volume label. The volume label is restricted to 11 uppercase characters. B=<i>filename</i> Install <i>filename</i> as the boot loader in the file system's boot sector. If you don't specify a boot loader, an MS-DOS boot loader is installed. The MS-DOS boot loader requires specific MS-DOS system files to make the diskette bootable. See NOTES for more information. fat=<i>n</i> The size of a FAT entry. Currently, only 12 and 16 are valid values. The default is 12 for diskettes, 16 for larger media. h Mark the first file installed as a hidden file. The -i option must also be specified.

<code>hidden=<i>n</i></code>	Set the number of hidden sectors to <i>n</i> . This is the number of sectors on the physical disk preceding the start of the volume (which is the boot sector itself). This defaults to 0 for diskettes or a computed value (based on the fdisk table) for disks. This option may be used only in conjunction with the <code>nofdisk</code> option.
<code>i=<i>filename</i></code>	Install <i>filename</i> as the initial file in the new file system. The initial file's contents are guaranteed to occupy consecutive clusters at the start of the files area. When creating bootable media, a boot program should be specified as the initial file.
<code>nofdisk</code>	Do not attempt to find an fdisk table on the medium. Instead rely on the <code>size</code> option for determining the partition size. By default, the created FAT is 16 bits and begins at the first sector of the device. This origination sector can be modified with the <code>hidden</code> option (<code>-h</code>).
<code>nsect=<i>n</i></code>	The number of sectors per track on the disk. If not specified, the value is determined by using a <code>dkio(7I)</code> ioctl to get the disk geometry, or (for diskette) from the results of an <code>FDIOGCHAR</code> ioctl.
<code>ntrack=<i>n</i></code>	The number of tracks per cylinder on the disk. If not specified, the value is determined by using a <code>dkio(7I)</code> ioctl to get the disk geometry, or (for diskette) from the results of an <code>FDIOGCHAR</code> ioctl.
<code>N</code>	No execution mode. Print normal output, but do not actually write the file system to the medium. This is most useful when used in conjunction with the <code>verbose</code> option.
<code>r</code>	Mark the first file installed as read-only. The <code>-i</code> option must also be specified.
<code>reserve=<i>n</i></code>	Set the number of reserved sectors to <i>n</i> . This is the number of sectors in the volume, preceding the start of the first FAT, including the boot sector. The value should always be at least 1, and the default value is exactly 1.
<code>s</code>	Mark the first file installed as a system file. The <code>-i</code> option must also be specified.
<code>size=<i>n</i></code>	The number of sectors in the file system. If not specified, the value is determined from the size of the partition given in the fdisk table or (for diskette) by way of computation using the <code>FDIOGCHAR</code> ioctl.
<code>spc=<i>n</i></code>	The size of the allocation unit for space within the file system, expressed as a number of sectors. The default value depends on the FAT entry size and the size of the file system.

mkfs_pcfs(1M)

	v	Verbose output. Describe, in detail, operations being performed.
FILES	<i>raw_device_file</i>	The device on which to build the FAT. The device name for a diskette must be specified as <code>/dev/rdiskette0</code> for the first diskette drive, or <code>/dev/rdiskette1</code> for a second diskette drive. For non-diskette media, a disk device name must be qualified with a suffix to indicate the proper partition. For example, in the name <code>/dev/rdisk/c0t0d0p0:c</code>, the <code>:c</code> suffix indicates that the first partition on the disk should receive the new FAT. For a file, <i>raw_device_file</i> is the block device name returned by <code>lofiadm(1M)</code>.
EXAMPLES	The media in these examples must be formatted before running <code>mkfs</code> for <code>pcfs</code>. See DESCRIPTION for more details. EXAMPLE 1 Creating a FAT File System on a Diskette The following command creates a FAT file system on a diskette: <pre>mkfs -F pcfs /dev/rdiskette</pre> EXAMPLE 2 Creating a FAT File System on a Disk The following command creates a FAT file system on the second fdisk partition of a disk attached to an x86 based system: <pre>mkfs -F pcfs /dev/rdisk/c0d0p0:d</pre> EXAMPLE 3 Creating a FAT File System on a ZIP Disk The following command creates a FAT file system on a ZIP disk located on a SPARC based system: <pre>mkfs -F pcfs /dev/rdisk/c0t4d0s2:c</pre> EXAMPLE 4 Creating a FAT File System on a JAZ Disk The following command creates a FAT file system on a JAZ disk located on a SPARC based system and overrides the sectors/track and tracks/cylinder values obtained from the device's controller: <pre>mkfs -F pcfs -o nsect=32,ntrack=64 /dev/rdisk/c0t3d0s2:c</pre>	

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWesu
Interface Stability	Stable

SEE ALSO `fdformat(1)`, `fdisk(1M)`, `format(1M)`, `lofiadm(1M)`, `mkfs(1M)`, `attributes(5)`, `fd(7D)`, `dkio(7I)`, `fdio(7I)`

NOTES The default MS-DOS boot loader, which is installed by default if `-o B` is not specified, requires specific MS-DOS system files to make the diskette bootable. These MS-DOS files are not installed when you format a diskette with `mkfs` for `pcfs`, which makes a diskette formatted this way not bootable. Trying to boot from it on an x86 based system will result in the following message:

```
Non-System disk or disk error
Replace and strike any key when ready
```

You must format a diskette with the DOS `format` command to install the specific MS-DOS system files required by the default boot loader.

You can use `lofiadm` to create a file that appears to a `mkfs` command (for example, `mkfs_pcfs` or `mkfs_ufs`) as a raw device. You can then use a `mkfs` command to create a file system on that device. See `lofiadm(1M)` for examples of creating a UFS and a PC (FAT) file system on a device created by `lofiadm`.

mkfs_udfs(1M)

NAME	mkfs_udfs – construct a udfs file system				
SYNOPSIS	mkfs -F udfs [<i>generic_options</i>] [-o <i>specific_options</i>] <i>raw_device_file</i> [<i>size</i>]				
DESCRIPTION	This is the universal disk format file system (udfs) -specific module of the mkfs command. mkfs constructs a udfs file system with a root directory.				
OPTIONS	See mkfs(1M) for the list of supported <i>generic_options</i> . The following options are supported: -o <i>specific_options</i> Specify a udfs-specific option. Specify udfs file system specific options in a comma-separated list with no intervening spaces. If invalid options are specified, a warning message is printed and the invalid options are ignored. The following <i>specific_options</i> are available: N Print the file system parameters without actually creating the file system. label= <i>string</i> Specify the label to be written into the volume header structures. Specify <i>string</i> as the name of the label. If <i>string</i> is not specified, a default <i>string</i> is generated in the form of *NoLabel*.				
OPERANDS	The following operands are supported: <i>raw_device_file</i> Specify the disk partition on which to write. <i>size</i> Specify the number of 512-byte blocks in the file system.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWudf</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWudf
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWudf				
SEE ALSO	fsck(1M),mkfs(1M), attributes(5)				
DIAGNOSTICS	not currently a valid file system The specified device does not contain a valid udfs file system. Invalid size: larger than the partition size Number of blocks given as parameter to create the file system is larger than the size of the device specified.				

mkfs_udfs(1M)

is mounted can't mkfs

Device is in use, cannot create file system when the device is in use.

preposterous size

Negative size parameter provided is invalid.

sector size must be between 512, 8192 bytes

Sector size given is not in the valid range.

Volume integrity sequence descriptors too long

File set descriptor too long.

Not enough space to create volume integrity sequence or file set descriptor.

mkfs: argument out of range

One of the arguments is out of range.

mkfs: bad numeric arg

One of the arguments is potentially a bad numeric.

NOTES You can use `lofiadm` to create a file that appears to a `mkfs` command (for example, `mkfs_pcfs` or `mkfs_ufs`) as a raw device. You can then use a `mkfs` command to create a file system on that device. See `lofiadm(1M)` for examples of creating a UFS and a PC (FAT) file system on a device created by `lofiadm`.

mkfs_ufs(1M)

NAME	mkfs_ufs – construct a ufs file system
SYNOPSIS	mkfs -F ufs [<i>generic_options</i>] [-o <i>FSType_specific_options</i>] <i>raw_device_file</i> [<i>size</i>]
DESCRIPTION	The ufs-specific module of mkfs builds a ufs file system with a root directory and a <code>lost+found</code> directory (see fsck(1M)) The ufs-specific mkfs is rarely run directly; use the newfs(1M) command instead. <i>raw_device_file</i> indicates the disk partition to write on unless the -o <i>N</i> option has been specified, or either the -V or -m generic options are passed from the generic mkfs module. <i>size</i> specifies the number of sectors in the file system. This argument must follow the <i>raw_device_file</i> argument and is required (even with -o <i>N</i>), unless the -V or -m generic options are specified. <i>generic_options</i> are supported by the generic mkfs command. See mkfs(1M) for a description of these options.
OPTIONS	The following options are supported: -o Use one or more of the following values separated by commas (with no intervening spaces) to specify ufs-specific options: <i>apc=n</i> The number of alternate sectors per cylinder to reserve for bad block replacement (SCSI devices only). The default is 0. <i>bsize=n</i> Logical block size, either 4096 or 8192. The default is 8192. The sun4u architecture does not support the 4096 block size. <i>cgsiize=n</i> The number of cylinders per cylinder group (ranging from 16 to 256). The default is calculated by dividing the number of sectors in the file system by the number of sectors in a gigabyte, and then multiplying the result by 32. The default value will always be between 16 and 256. The per-cylinder-group meta data must fit in a space no larger than that available in one logical file system block. If too large a <i>cgsiize</i> is requested, it is changed by the minimum amount necessary. <i>fragsize=n</i> The smallest amount of disk space in bytes to allocate to a file. If the logical block size is 4096, legal values are 512, 1024, 2048, and 4096. When the logical block size is 8192, legal values are 1024, 2048, 4096, and 8192. The default value is 1024. For file systems greater than 1 terabyte or for file systems created with the <i>mtb=y</i> option, <i>fragsize</i> is forced to match block size (<i>bsize</i>).

mkfs_ufs(1M)

free= <i>n</i>	The minimum percentage of free space to maintain in the file system. This space is off-limits to normal users. Once the file system is filled to this threshold, only the superuser can continue writing to the file system. This parameter can be subsequently changed using the <code>tunefs(1M)</code> command. The default is 10%.
gap= <i>n</i>	Rotational delay. The expected time (in milliseconds) to service a transfer completion interrupt and initiate a new transfer on the same disk. The value is used to decide how much rotational spacing to place between successive blocks in a file. This parameter can be subsequently changed using the <code>tunefs(1M)</code> command. The default is zero, indicating a disk drive with track readahead buffering.
maxcontig= <i>n</i>	The maximum number of logical blocks, belonging to one file, that will be allocated contiguously before inserting a rotational delay. For a 4K file system, the default is 14; for an 8K file system it is 7. This parameter can be subsequently changed using the <code>tunefs(1M)</code> command. Where <i>maxphys</i> is the maximum size of physical I/O requests supported by UFS (1048576 bytes), the value for <code>maxcontig</code> must obey the relationship: $\text{maxphys} \geq \text{maxcontig} * \text{logical bsize}$ This parameter also controls clustering. Regardless of the value of <i>gap</i>, clustering is enabled only when <code>maxcontig</code> is greater than 1. Clustering allows higher I/O rates for sequential I/O and is described in <code>tunefs(1M)</code>.
mtb= <i>y</i>	Set the parameters of the file system to allow eventual growth to over a terabyte in total file system size. This option sets <i>fragsize</i> to be the same as <i>bsize</i>, and sets <i>nbpi</i> to 1 megabyte, unless the <code>-i</code> option is used to make it even larger. If you use the <code>-f</code> or <code>-i</code> options to specify a <i>fragsize</i> or <i>nbpi</i> that is incompatible with this option, the user-supplied value of <i>fragsize</i> or <i>nbpi</i> is ignored. Logging is enabled by default on all file systems created with this option.
N	Print out the file system parameters without actually creating the file system.
nbpi= <i>n</i>	The number of bytes per inode, which specifies the density of inodes in the file system. The number is

mkfs_ufs(1M)

divided into the total size of the file system to determine the fixed number of inodes to create. It should reflect the expected average size of files in the file system. If fewer inodes are desired, a larger number should be used; to create more inodes, a smaller number should be given. The default is 2048.

nrpos=n The number of different rotational positions in which to divide a cylinder group. The default is 8.

nsect=n The number of sectors per track on the disk. The default is 32.

ntrack=n The number of tracks per cylinder on the disk. The default is 16.

opt=a Space or time optimization preference; *s* specifies optimization for space, *t* specifies optimization for time. The default is *t*. This parameter may be subsequently changed with the *tunefs(1M)* command.

rps=n The rotational speed of the disk, in revolutions per second. The default is 60.

Note that you specify *rps* for *mkfs* and *rpm* for *newfs*.

Alternatively, parameters can be entered as a list of space-separated values (without keywords) whose meaning is positional. In this case, the *-o* option is omitted and the list follows the size operand. This is the way *newfs* passes the parameters to *mkfs*.

OPERANDS The following operands are supported:

raw_device_file The disk partition on which to write.

ATTRIBUTES See *attributes(5)* for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO *fsck(1M)*, *mkfs(1M)*, *newfs(1M)*, *tunefs(1M)*, *dir_ufs(4)*, *attributes(5)*, *ufs(7FS)*

DIAGNOSTICS The following error message occurs typically on very high density disks. On such disks, the file system structure cannot encode the proper disk layout information. However, such disks have enough onboard intelligence to make up for any layout deficiencies, so there is no actual impact on performance. The warning that performance might be impaired can be safely ignored.

Warning: insufficient space in super block for rotational layout tables with nsect *sblock.fs_nsect* and ntrak *sblock.fs_ntrak*. (File system performance may be impaired.)

The following error message occurs when the disk geometry results in a situation where the last truncated cylinder group cannot contain the correct number of data blocks. Some disk space is wasted.

Warning: inode blocks/cyl group (*grp*) >= data blocks (*num*) in last cylinder

The following error message occurs when the best calculated file system layout is unable to include the last few sectors in the last cylinder group. This is due to the interaction between how much space is used for various pieces of metadata and the total blocks available in a cylinder group. Modifying nbpi and cpg might reduce this number, but it is rarely worth the effort.

Warning: *num* sector(s) in last cylinder group unallocated

NOTES

You can use `lofiadm` to create a file that appears to a `mkfs` command (for example, `mkfs_pcfs` or `mkfs_ufs`) as a raw device. You can then use a `mkfs` command to create a file system on that device. See `lofiadm(1M)` for examples of creating a UFS and a PC (FAT) file system on a device created by `lofiadm`.

mknod(1M)

NAME	mknod – make a special file				
SYNOPSIS	mknod <i>name</i> <i>b</i> <i>major</i> <i>minor</i> mknod <i>name</i> <i>c</i> <i>major</i> <i>minor</i> mknod <i>name</i> <i>p</i>				
DESCRIPTION	mknod makes a directory entry for a special file.				
OPTIONS	The following options are supported: <i>b</i> Create a block-type special file. <i>c</i> Create a character-type special file. <i>p</i> Create a FIFO (named pipe).				
OPERANDS	The following operands are supported: <i>major</i> The <i>major</i> device number. <i>minor</i> The <i>minor</i> device number; can be either decimal or octal. The assignment of major device numbers is specific to each system. You must be the super-user to use this form of the command. <i>name</i> A special file to be created.				
USAGE	See <code>largefile(5)</code> for the description of the behavior of <code>mknod</code> when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>ftp(1)</code> , <code>in.ftpd(1M)</code> , <code>mknod(2)</code> , <code>symlink(2)</code> , <code>attributes(5)</code> , <code>largefile(5)</code>				
NOTES	If <code>mknod(2)</code> is used to create a device, the major and minor device numbers are always interpreted by the kernel running on that machine. With the advent of physical device naming, it would be preferable to create a symbolic link to the physical name of the device (in the <code>/devices</code> subtree) rather than using <code>mknod</code>.				

NAME	modinfo – display information about loaded kernel modules								
SYNOPSIS	<code>/usr/sbin/modinfo [-c] [-w] [-i <i>module-id</i>]</code>								
DESCRIPTION	The <code>modinfo</code> utility displays information about the loaded modules. The format of the information is as follows: <i>Id Loadaddr Size Info Rev Module Name</i> where <i>Id</i> is the module ID, <i>Loadaddr</i> is the starting text address in hexadecimal, <i>Size</i> is the size of text, data, and bss in hexadecimal bytes, <i>Info</i> is module specific information, <i>Rev</i> is the revision of the loadable modules system, and <i>Module Name</i> is the filename and description of the module. The module specific information is the block and character major numbers for drivers, the system call number for system calls, or, for other module types, the index into the appropriate kernel table: <table> <tr> <td><code>fmodsw</code></td><td>for STREAMS modules</td></tr> <tr> <td><code>vfssw</code></td><td>for filesystems</td></tr> <tr> <td><code>class</code></td><td>for scheduling classes</td></tr> <tr> <td><code>execsw</code></td><td>for <code>exec</code> modules</td></tr> </table>	<code>fmodsw</code>	for STREAMS modules	<code>vfssw</code>	for filesystems	<code>class</code>	for scheduling classes	<code>execsw</code>	for <code>exec</code> modules
<code>fmodsw</code>	for STREAMS modules								
<code>vfssw</code>	for filesystems								
<code>class</code>	for scheduling classes								
<code>execsw</code>	for <code>exec</code> modules								
OPTIONS	The following options are supported: <code>-c</code> Displays the number of instances of the module loaded and the module's current state. <code>-i <i>module-id</i></code> Displays information about this module only. <code>-w</code> Does not truncate module information at 80 characters.								
EXAMPLES	EXAMPLE 1 Using the <code>modinfo</code> command. The following example displays the status of module 3: <pre>example% modinfo -i 3 Id Loadaddr Size Info Rev Module Name 3 f5a7a000 3bc0 1 1 specfs (filesystem for specfs)</pre>								
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu				
ATTRIBUTE TYPE	ATTRIBUTE VALUE								
Availability	SUNWcsu								
SEE ALSO	<code>modload(1M)</code> , <code>modunload(1M)</code> , <code>attributes(5)</code>								

modload(1M)

NAME	modload – load a kernel module				
SYNOPSIS	modload [-p] [-e <i>exec_file</i>] <i>filename</i>				
DESCRIPTION	The modload command loads the loadable module <i>filename</i> into the running system. <i>filename</i> is an object file produced by <code>ld -r</code>. If <i>filename</i> is an absolute pathname then the file specified by that absolute path is loaded. If <i>filename</i> does not begin with a slash (/), then the path to load <i>filename</i> is relative to the current directory unless the <code>-p</code> option is specified. The kernel's <code>modpath</code> variable can be set using the <code>/etc/system</code> file. The default value of the kernel's <code>modpath</code> variable is set to the path where the operating system was loaded. Typically this is <code>/kernel /usr/kernel</code>. For example, the following command looks for <code>./drv/foo</code>: <pre>example# modload drv/foo</pre> The following command looks for <code>/kernel/drv/foo</code> and then <code>/usr/kernel/drv/foo</code>: <pre>example# modload -p drv/foo</pre>				
OPTIONS	The following options are supported: <table><tr><td><code>-e <i>exec_file</i></code></td><td>Specify the name of a shell script or executable image file that is executed after the module is successfully loaded. The first argument passed is the module ID (in decimal). The other argument is module specific. The module specific information is: the block and character major numbers for drivers, the system call number for system calls, or, for other module types, the index into the appropriate kernel table. See <code>modinfo(1M)</code></td></tr><tr><td><code>-p</code></td><td>Use the kernel's internal <code>modpath</code> variable as the search path for the module.</td></tr></table>	<code>-e <i>exec_file</i></code>	Specify the name of a shell script or executable image file that is executed after the module is successfully loaded. The first argument passed is the module ID (in decimal). The other argument is module specific. The module specific information is: the block and character major numbers for drivers, the system call number for system calls, or, for other module types, the index into the appropriate kernel table. See <code>modinfo(1M)</code>	<code>-p</code>	Use the kernel's internal <code>modpath</code> variable as the search path for the module.
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<code>-p</code>	Use the kernel's internal <code>modpath</code> variable as the search path for the module.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>ld(1)</code>, <code>add_drv(1M)</code>, <code>kernel(1M)</code>, <code>modinfo(1M)</code>, <code>modunload(1M)</code>, <code>system(4)</code>, <code>attributes(5)</code>, <code>modldrv(9S)</code>, <code>modlinkage(9S)</code>, <code>modlstrmod(9S)</code>, <code>module_info(9S)</code> <i>Writing Device Drivers</i>				
NOTES	Use <code>add_drv(1M)</code> to add device drivers, not <code>modload</code>. See <i>Writing Device Drivers</i> for procedures on adding device drivers.				

NAME	modunload – unload a module				
SYNOPSIS	modunload -i <i>module_id</i> [-e <i>exec_file</i>]				
DESCRIPTION	modunload unloads a loadable module from the running system. The <i>module_id</i> is the ID of the module as shown by modinfo(1M). If ID is 0, all modules that were autoloaded which are unloadable, are unloaded. Modules loaded by modload(1M) are not affected.				
OPTIONS	The following options are supported: -e <i>exec_file</i> Specify the name of a shell script or executable image file to be executed before the module is unloaded. The first argument passed is the module id (in decimal). There are two additional arguments that are module specific. For loadable drivers, the second argument is the driver major number. For loadable system calls, the second argument is the system call number. For loadable exec classes, the second argument is the index into the <i>execsw</i> table. For loadable filesystems, the second argument is the index into the <i>vfilesw</i> table. For loadable streams modules, the second argument is the index into the <i>fmodsw</i> table. For loadable scheduling classes, the second argument is the index into the class array. Minus one is passed for an argument that does not apply. -i <i>module_id</i> Specify the module to be unloaded.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	modinfo(1M), modload(1M), update_drv(1M), attributes(5)				
NOTES	The modunload command has often been used on driver modules to force the system to reread the associated driver configuration file. While this works in Solaris 9, this behavior might break in future releases. The supported way for rereading driver configuration file is through the update_drv(1M) command.				

mofcomp(1M)

NAME	mofcomp – compile MOF files into CIM classes										
SYNOPSIS	<pre>/usr/sadm/bin/mofcomp [-c <i>cimom_hostname</i>] [-h] [-j <i>filename</i>] [-n <i>namespace</i>] [-o <i>dirname</i>] [-p <i>password</i>] [-CIQ] [-u <i>username</i>] [-v] [-version] [-x] <i>file</i></pre>										
DESCRIPTION	The <code>mofcomp</code> utility is executed during installation to compile managed object format (MOF) files that describe the Common Information Model (CIM) and Solaris Schemas into the CIM Object Manager Repository, a central storage area for management data. The CIM Schema is a collection of class definitions used to represent managed objects that occur in every management environment. The Solaris Schema is a collection of class definitions that extend the CIM Schema and represent managed objects in a typical Solaris operating environment. The <code>mofcomp</code> utility must be run as root or as a user with write access to the namespace in which you are compiling. MOF is a language for defining CIM classes and instances. MOF files are ASCII text files that use the MOF language to describe CIM objects. A CIM object is a computer representation or model of a managed resource, such as a printer, disk drive, or CPU. Many sites store information about managed resources in MOF files. Because MOF can be converted to Java, Java applications that can run on any system with a Java Virtual Machine can interpret and exchange this information. You can also use the <code>mofcomp</code> utility to compile MOF files at any time after installation.										
OPTIONS	The following options are supported: <table><tr><td>-c <i>cimom_hostname</i></td><td>Specify a remote system running the CIM Object Manager.</td></tr><tr><td>-C</td><td>Run the compiler set with the class option, which updates a class if it exists, and returns an error if the class does not exist. If you do not specify this option, the compiler adds a CIM class to the connected namespace, and returns an error if the class already exists.</td></tr><tr><td>-h</td><td>List the arguments to the <code>mofcomp</code> utility.</td></tr><tr><td>-I</td><td>Run the compiler set with the instance option, which updates an instance if it exists, and returns an error if the instance does not exist. If you do not specify this option, the compiler adds a CIM instance to the connected namespace, and returns an error if the instance already exists.</td></tr><tr><td>-j <i>filename</i></td><td>Generate Java Beans and Java Interfaces to manage the CIM instances related to the CIM classes in the MOF being compiled.</td></tr></table> The contents of <i>filename</i> are:	-c <i>cimom_hostname</i>	Specify a remote system running the CIM Object Manager.	-C	Run the compiler set with the class option, which updates a class if it exists, and returns an error if the class does not exist. If you do not specify this option, the compiler adds a CIM class to the connected namespace, and returns an error if the class already exists.	-h	List the arguments to the <code>mofcomp</code> utility.	-I	Run the compiler set with the instance option, which updates an instance if it exists, and returns an error if the instance does not exist. If you do not specify this option, the compiler adds a CIM instance to the connected namespace, and returns an error if the instance already exists.	-j <i>filename</i>	Generate Java Beans and Java Interfaces to manage the CIM instances related to the CIM classes in the MOF being compiled.
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-h	List the arguments to the <code>mofcomp</code> utility.										
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-j <i>filename</i>	Generate Java Beans and Java Interfaces to manage the CIM instances related to the CIM classes in the MOF being compiled.										

	PACKAGE= <i>Java package name</i> IMPORTS= <i>import1:...:importN</i> <EXCEPTIONS= <i>exception1:...:exceptionN</i>
	PACKAGE is a valid Java package name to include in all generated Java source. IMPORTS is an optional colon separated list of valid Java classes to be imported in all generated Java source. EXCEPTIONS is an optional colon separated list of valid Java exceptions to be thrown by the methods in all generated Java source.
-n <i>namespace</i>	Requests that the compiler load the MOF file into the namespace specified as <i>namespace</i> . The default namespace (<code>root\cimv2</code>) is used unless this switch is used or a <code>#pragma namespace ("namespace")</code> statement appears in the MOF file. If both the -n <i>namespace</i> switch and the <code>#pragma namespace</code> construct are used, all namespaces are created, but the objects are created only in the <code>#pragma namespace</code> s.
-o <i>dirname</i>	Run compiler in standalone mode, without the CIM Object Manager. Specify <i>dirname</i> as the directory in which the compiler output is to be stored. In this mode, the CIM Object Manager need not be running.
-p <i>password</i>	Specify a password for connecting to the CIM Object Manager. Use this option for compilations that require privileged access to the CIM Object Manager. If you specify both -p and -u, you must type the password on the command line, which can pose a security risk. A more secure way to specify a password is to specify -u but not -p, so that the compiler will prompt for the password.
-Q	Run the compiler set with the qualifier types option, which updates a qualifier type if it exists, and returns an error if the qualifier type does not exist. If you do not specify this option, the compiler adds a CIM qualifier type to the connected namespace, and returns an error if the qualifier type already exists.
-u <i>username</i>	Specify user name for connecting to the CIM Object Manager. Use this option for compilations that require privileged access to the CIM Object Manager. If you specify both -p and -u, you must type the password on the command line, which can pose a security risk. A more secure way to specify a password is to specify -u but not -p, so that the compiler will prompt for the password.

mofcomp(1M)

-v	Run the compiler in verbose mode, which displays compiler messages.
-version	Display the version of the MOF compiler.
-x	Generate XML documents for the CIM classes defined in the input MOF file.

OPERANDS The following operands are supported:

file The pathname of the file to be compiled.

EXIT STATUS The mofcomp utility exits with 0 upon success and a positive integer upon failure.

FILES MOF files are installed in /usr/sadm/mof.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwbcor

SEE ALSO init.wbem(1M), mofreg(1M), wbemadmin(1M), wbemlogviewer(1M), attributes(5), wbem(5),

NAME	mofreg – register MOF classes with WBEM services
SYNOPSIS	<pre> /usr/sadm/bin/mofreg -r tag file /usr/sadm/bin/mofreg -s /usr/sadm/bin/mofreg -u tag [file] </pre>
DESCRIPTION	The mofreg command is used by package and patch install scripts, or by any applications that wish to register managed object format (MOF) classes with Sun The Web-Based Enterprise Management (WBEM) services. The WBEM services daemon (Common Information Model or CIM object manager) processes at start up the files that are specified by mofreg commands. Files are processed in the order that the individual mofreg commands are executed. As an alternative to using the mofreg command, MOFs can be registered or unregistered by manipulating directories in /var/sadm/wbem/logr. Instead of running the mofreg -r tag file version of the command you can create a directory named tag under /var/sadm/wbem/logr/preReg and copy file to the tag directory. Similarly, instead of running the mofreg -u tag [file] command, you can create a directory named tag under /var/sadm/wbem/logr/preUnreg and copy the optional file to the tag directory. The entries are processed in increasing order of last modification time of the tag directories. If you issue mofreg commands in rapid succession, the timestamps might be the same. If you have a situation where the timestamp order is critical, you can place appropriate sleeps between the successive registration or unregistration operations. As with the mofreg command, processing is done at next restart or by using the -s option. This alternative mechanism is typically used in package install scripts which do not have access to /usr, and therefore do not have access to the mofreg command. This case arises when packages are installed for diskless clients.
OPTIONS	The following options are supported: -r tag file The <i>file</i> argument is the actual MOF registration file. Its form is identical to the MOF syntax as defined by the Distributed Management Task Force (DMTF). The only difference is the addition of the following 3 new pseudo-pragmas, which are variations of the namespace pragma. The name of file cannot end in .unreg. <pre> #pragma namespace("__create") #pragma namespace("__delete") #pragma namespace("__modify") </pre>

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	These three pragmas are used specify if the elements following the pragmas should be created, deleted, or modified by the CIM object manager. The <code>__delete</code> pragma can currently only be applied for a <code>mofreg -u</code> command. The <i>tag</i> argument is a unique string that specifies the identity of the registry action. This tag can be set to the package name or the patch number if the <code>mofreg</code> script is being invoked through packages/patches, though any tag can be specified. Errors and warnings that are encountered when the CIM object manager handles the <code>mofreg</code> script are logged. Processing of the <code>mofreg</code> script stops at the first error. Specific warnings include: Element already defined - the element already exists and cannot be created. Element not found - the element does not exist and cannot be modified. The error conditions are: Key modification - A class cannot be modified if its keys are being changed. Other mod compilation errors.				
-s	Forces the CIM object manager to immediately process outstanding registry requests, instead of at the next restart. This currently requires Java.				
-u <i>tag</i> [<i>file</i>]	Undoes the operations performed during <code>mof</code> registry. The <i>tag</i> argument must correspond to the value set during the original <code>mofreg</code> invocation. If no <code>mofreg</code> was done with the original <i>tag</i>, the command does not succeed. If required, an <i>unreg</i> file can be specified. If no <i>unreg</i> file is specified, the CIM object manager automatically undoes the actions of the registry. Any class created by the registry process is removed and any classes modified by the registry revert to the old state. The <code>mofreg</code> command does not take care of cases where packages and patches make conflicting changes to classes. This should be taken care of by the standard patch and package conflict resolution.				
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>1</td><td>An error occurred. The reason for error is displayed.</td></tr></table>	0	Successful completion.	1	An error occurred. The reason for error is displayed.
0	Successful completion.				
1	An error occurred. The reason for error is displayed.				

mofreg(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwbcou

SEE ALSO init.wbem(1M), mofcomp(1M), wbemadmin(1M), wbemlogviewer(1M),
attributes(5), wbem(5)

monitor(1M)

NAME	monitor – SPARC system PROM monitor
SYNOPSIS	STOP-A BREAK initial system power-on exit from a client program, e.g., the Operating System
DESCRIPTION	The CPU board of a workstation contains one or more EPROMs or EEPROMs. The program which executes from the PROMs is referred to as “the monitor”. Among other things, the monitor performs system initialization at power-on and provides a user interface.
Monitor Prompt	The monitor of earlier workstations was known as the SunMON monitor and displayed the > for its prompt. See the SunMON MONITOR USAGE section for further details. Existing workstations use a monitor which is known as the OpenBoot monitor. The OpenBoot monitor typically displays ok as its prompt, but it may also display the > prompt under certain circumstances. If the ‘auto-boot?’ NVRAM parameter is set to ‘false’ when the workstation is powered on, the system does not attempt to boot and the monitor issues its prompt. If ‘auto-boot’ is set to ‘true’, the system initiates the boot sequence. The boot sequence can be aborted by simultaneously pressing two keys on the system’s keyboard: L1 and A (on older keyboards), or Stop and A (on newer keyboards). Either a lower case a or an upper case A works for the keyboard abort sequence. If a console has been attached by way of one of the system’s serial ports then the abort sequence can be accomplished by sending a BREAK. See tip(1). When the NVRAM ‘security-mode’ parameter has been turned on, or when the value of the ‘sunmon-compat?’ parameter is true, then the OpenBoot monitor displays the message: Type b (boot), c (continue), or n (new command mode) and the > prompt appears.
OPENBOOT PROM USAGE	Some of the more useful commands that can be issued from OpenBoot’s ok prompt are described here. Refer to the <i>OpenBoot 2.x Command Reference Manual</i> book for a complete list of commands.
Help	Help for various functional areas of the OpenBoot monitor can be obtained by typing help. The help listing provides a number of other key words which can then be used in the help command to provide further details.
NVRAM Parameters	Each workstation contains one or more NVRAM devices which contains unique system ID information, as well as a set of user-configurable parameters. The NVRAM parameters allow the user a certain level of flexibility in configuring the system to act in a given manner under a specific set of circumstances.

See `eeeprom(1M)` for a description of the parameters and information regarding setting the parameters from the OS level.

The following commands can be used at the OpenBoot monitor to access the NVRAM parameters.

`printenv` Used to list the NVRAM parameters, along with their default values and current values.

`setenv pn pv` Used to set or modify a parameter. The *pn* represents the parameter name, and *pv* represents the parameter value.

`set-default pn` Used to set an individual parameter back to its default value.

`set-defaults` Used to reset all parameters to their default values. (Note that 'set-defaults' only affects parameters that have assigned default values.)

Security Parameters

Newer OpenBoot monitors contain user interfaces that support the storage and listing of keys for later use by client programs.

`list-security-keys`

Lists the names of keys currently stored on a machine.

`set-security-key keyname [ keydata ]`

Stores key data *keydata* in a key named *keyname*. Actual key data can be up to 32 bytes in length. The maximum length of *keyname* is 64 bytes, which allows for the hex-formatted ASCII used to present the key data. If *keydata* is not present, *keyname* and its corresponding data is deleted.

Hardware Checks and Diagnostics

The following commands are available for testing or checking the system's hardware. If the 'diag-switch?' NVRAM parameter is set to true when the system is powered on, then a Power-On Self Test (POST) diagnostic is run, if present, sending its results messages to the system's serial port A. Not all of the commands shown are available on all workstations.

`test-all` Run the diagnostic tests on each device which has provided a self-test.

`test floppy` Run diagnostics on the system's floppy device.

`test /memory` Run the main memory tests. If the NVRAM parameter 'diag-switch?' is set to true, then all of main memory is tested. If the parameter is false then only the amount of memory specified in the 'selftest-#megs' NVRAM parameter is tested.

`test net` Test the network connection for the on-board network controller.

`watch-net` Monitor the network attached to the on-board net controller.

`watch-net-all` Monitor the network attached to the on-board net controller, as well as the network controllers installed in SBus slots.

`watch-clock` Test the system's clock function.

monitor(1M)

System Information	The following commands are available for displaying information about the system. Not all commands are available on all workstations.
banner	Display the power-on banner.
.enet-addr	Display the system's Ethernet address.
.idprom	Display the formatted contents of the IDPROM.
module-info	Display information about the system's processor(s).
probe-scsi	Identify the devices attached to the on-board SCSI controller.
probe-scsi-all	Identify the devices attached to the on-board SCSI controller as well as those devices which are attached to SBus SCSI controllers.
show-disks	Display a list of the device paths for installed SCSI disk controllers.
show-displays	Display a list of the device paths for installed display devices.
show-nets	Display a list of the device paths for installed Ethernet controllers.
show-sbus	Display list of installed SBus devices.
show-tapes	Display a list of the device paths for installed SCSI tape controllers.
show-ttys	Display a list of the device paths for tty devices.
.traps	Display a list of the SPARC trap types.
.version	Display the version and date of the OpenBoot PROM.
Emergency Commands	These commands must be typed from the keyboard, they do not work from a console which is attached by way of the serial ports. With the exception of the Stop-A command, these commands are issued by pressing and holding down the indicated keys on the keyboard immediately after the system has been powered on. The keys must be held down until the monitor has checked their status. The Stop-A command can be issued at any time after the console display begins, and the keys do not need to be held down once they've been pressed. The Stop-D, Stop-F and Stop-N commands are not allowed when one of the security modes has been set. Not all commands are available on all workstations.
Stop (L1)	Bypass the Power-On Self Test (POST). This is only effective if the system has been placed into the diagnostic mode.
Stop-A (L1-A)	Abort the current operation and return to the monitor's default prompt.

**Line Editor
Commands**

Stop-D (L1-D)	Set the system's 'diag-switch?' NVRAM parameter to 'true', which places the system in diagnostic mode. POST diagnostics, if present, are run, and the messages are displayed by way of the system's serial port A.
Stop-F (L1-F)	Enter the OpenBoot monitor before the monitor has probed the system for devices. Issue the 'fexit' command to continue with system initialization.
Stop-N (L1-N)	Causes the NVRAM parameters to be reset to their default values. Note that not all parameters have default values.
The following commands can be used while the monitor is displaying the ok prompt. Not all of these editing commands are available on all workstations.	
CTRL-A	Place the cursor at the start of line.
CTRL-B	Move the cursor backward one character.
ESC-B	Move the cursor backward one word.
CTRL-D	Erase the character that the cursor is currently highlighting.
ESC-D	Erase the portion of word from the cursor's present position to the end of the word.
CTRL-E	Place the cursor at the end of line.
CTRL-F	Move the cursor forward one character.
ESC-F	Move the cursor forward one word.
CTRL-H	Erase the character preceding the cursor (also use Delete or Back Space)
ESC-H	Erase the portion of the word which precedes the cursor (use also CTRL-W)
CTRL-K	Erase from the cursor's present position to the end of the line.
CTRL-L	Show the command history list.
CTRL-N	Recall the next command from the command history list
CTRL-P	Recall a previous command from the command history list.
CTRL-Q	Quote the next character (used to type a control character).
CTRL-R	Retype the current line.
CTRL-U	Erase from the cursor's present position to the beginning of the line.
CTRL-Y	Insert the contents of the memory buffer into the line, in front (to the left) of the cursor.

monitor(1M)

nvrामrc	The nvrामrc is an area of the system's NVRAM where users may store Forth programs. The programs which are stored in the nvrामrc are executed each time the system is reset, provided that the 'use-nvrामrc?' NVRAM parameter has been set to 'true'. Refer to the <i>OpenBoot 2.x Command Reference Manual</i> book for information on how to edit and use the nvrामrc.												
Restricted Monitor	The command 'old-mode' is used to move OpenBoot into a restricted monitor mode, causing the > prompt to be displayed. Only three commands are allowed while in the restricted monitor; the 'go' command (to resume a program which was interrupted with the Stop-A command), the 'n' command (to return to the normal OpenBoot monitor), and boot commands. The restricted monitor's boot commands approximate the older SunMON monitor's boot command syntax. If a 'security-mode' has been turned on then the restricted monitor becomes the default monitor environment. The restricted monitor may also become the default environment if the 'sunmon-compat?' NVRAM parameter is set to true. Not all workstations have the 'sunmon-compat?' parameter.												
SunMON PROM USAGE	The following commands are available systems with older SunMON-based PROM: + - Increment or decrement the current address and display the contents of the new location. ^C <i>source destination n</i> (caret-C) Copy, byte-by-byte, a block of length <i>n</i> from the <i>source</i> address to the <i>destination</i> address. ^I <i>program</i> (caret-I) Display the compilation date and location of <i>program</i>. ^T <i>virtual_address</i> (caret-T) Display the physical address to which <i>virtual_address</i> is mapped. b [!] [<i>device</i> [(<i>c, u, p</i>)]] [<i>pathname</i>] [<i>arguments_list</i>] b[?] Reset appropriate parts of the system and bootstrap a program. A '!' (preceding the <i>device</i> argument) prevents the system reset from occurring. Programs can be loaded from various devices (such as a disk, tape, or Ethernet). 'b' with no arguments causes a default boot, either from a disk, or from an Ethernet controller. 'b?' displays all boot devices and their <i>devices</i>. <table><thead><tr><th><i>device</i></th><th>one of</th></tr></thead><tbody><tr><td>le</td><td>Lance Ethernet</td></tr><tr><td>ie</td><td>Intel Ethernet</td></tr><tr><td>sd</td><td>SCSI disk, CDROM</td></tr><tr><td>st</td><td>SCSI 1/4" or 1/2" tape</td></tr><tr><td>fd</td><td>Diskette</td></tr></tbody></table>	<i>device</i>	one of	le	Lance Ethernet	ie	Intel Ethernet	sd	SCSI disk, CDROM	st	SCSI 1/4" or 1/2" tape	fd	Diskette
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fd	Diskette												

	<i>id</i>	IPI disk
	<i>mt</i>	Tape Master 9-track 1/2" tape
	<i>xd</i>	Xylogics 7053 disk
	<i>xt</i>	Xylogics 1/2" tape
	<i>xy</i>	Xylogics 440/450 disk
<i>c</i>		A controller number (0 if only one controller),
<i>u</i>		A unit number (0 if only one driver), and
<i>p</i>		A partition.
<i>pathname</i>		A pathname for a program such as <i>/stand/diag</i> .
<i>arguments_list</i>		A list of up to seven arguments to pass to the program being booted.
<i>c</i>	<i>[virtual_address]</i>	Resume execution of a program. When given, <i>virtual_address</i> is the address at which execution resumes. The default is the current PC. Registers are restored to the values shown by the <i>d</i> , and <i>r</i> commands.
<i>d</i>	<i>[window_number]</i>	Display (dump) the state of the processor. The processor state is observable only after: ■ An unexpected trap was encountered. ■ A user program dropped into the monitor (by calling <i>abortent</i>). ■ The user manually entered the monitor by typing L1-A or BREAK. The display consists of the following: ■ The special registers: PSR, PC, nPC, TBR, WIM, and Y ■ Eight global registers ■ 24 window registers (8 <i>in</i>, 8 <i>local</i>, and 8 <i>out</i>), corresponding to one of the 7 available windows. If a Floating-Point Unit is on board, its status register along with 32 floating-point registers are also shown. <i>window_number</i> Display the indicated <i>window_number</i>, which can be any value between 0 and 6, inclusive. If no window is specified and the PSR's current window pointer contains a valid window number, registers from the window that was active just prior to entry into the monitor are displayed. Otherwise, registers from window 0 are displayed.
<i>e</i>	<i>[virtual_address] [action] . . .</i>	Open the 16-bit word at <i>virtual_address</i> (default zero). The address is interpreted in the address space defined by the <i>s</i> command. See the <i>a</i> command for a description of <i>action</i> .

monitor(1M)

f *virtual_address1 virtual_address2 pattern [size]*

Fill the bytes, words, or long words from *virtual_address1* (lower) to *virtual_address2* (higher) with the constant, *pattern*. The *size* argument can take one of the following values:

b	byte format (the default)
w	word format
l	long word format

For example, the following command fills the address block from 0x1000 to 0x2000 with the word pattern, 0xABCD:

```
f 1000 2000 ABCD W
```

g [*vector*] [*argument*]

g [*virtual_address*] [*argument*]

Goto (jump to) a predetermined or default routine (first form), or to a user-specified routine (second form). The value of *argument* is passed to the routine. If the *vector* or *virtual_address* argument is omitted, the value in the PC is used as the address to jump to.

To set up a predetermined routine to jump to, a user program must, prior to executing the monitor's **g** command, set the variable `*romp->v_vector_cmd` to be equal to the virtual address of the desired routine. Predetermined routines need not necessarily return control to the monitor.

The default routine, defined by the monitor, prints the user-supplied *vector* according to the format supplied in *argument*. This format can be one of:

%x	hexadecimal
%d	decimal

g0

Force a panic and produce a crash dump when the monitor is running as a result of the system being interrupted,

g4

(Sun-4 systems only) Force a kernel stack trace when the monitor is running as a result of the system being interrupted,

h

Display the help menu for monitor commands and their descriptions. To return to the monitor's basic command level, press ESCAPE or **q** before pressing RETURN.

i [*cache_data_offset*] [*action*] . . .

Modify cache data RAM command. Display and/or modify one or more of the cache data addresses. See the **a** command for a description of *action*.

j *[cache_tag_offset] [action] . . .*

Modify cache tag RAM command. Display and/or modify the contents of one or more of the cache tag addresses. See the a command for a description of *action*.

k *[reset_level]*

Reset the system, where *reset_level* is:

- 0 Reset VMEbus, interrupt registers, video monitor (Sun-4 systems). This is the default.
- 1 Software reset.
- 2 Power-on reset. Resets and clears the memory. Runs the EPROM-based diagnostic self test, which can take several minutes, depending upon how much memory is being tested.

kb

Display the system banner.

l *[virtual_address] [action] . . .*

Open the long word (32 bit) at memory address *virtual_address* (default zero). The address is interpreted in the address space defined by the s command (below). See the a command for a description of *action*.

m *[virtual_address] [action] . . .*

Open the segment map entry that maps *virtual_address* (default zero). The address is interpreted in the address space defined by the s command. See the a command for a description of *action*.

ne

ni

Disable, enable, or invalidate the cache, respectively.

o *[virtual_address] [action] . . .*

Open the byte location specified by *virtual_address* (default zero). The address is interpreted in the address space defined by the s command. See the a command for a description of *action*.

p *[virtual_address] [action] . . .*

Open the page map entry that maps *virtual_address* (default zero) in the address space defined by the s command. See the a command for a description of *action*.

q *[eeprom_offset] [action] . . .*

Open the EEPROM *eeprom_offset* (default zero) in the EEPROM address space. All addresses are referenced from the beginning or base of the EEPROM in physical address space, and a limit check is performed to insure that no address beyond the EEPROM physical space is accessed. This command is used to display or modify configuration parameters, such as: the amount of memory to test during self test, whether to display a standard or custom banner, if a serial port (A or B) is to be the system console, etc. See the a command for a description of *action*.

r *[register_number]*

r *[register_type]*

monitor(1M)

r [*w window_number*]

Display and/or modify one or more of the IU or FPU registers. A hexadecimal *register_number* can be one of:

0x00–0x0f	window(0,i0)–window(0,i7), window(0,i0)—window(0,i7)
0x16–0x1f	window(1,i0)–window(1,i7), window(1,i0)—window(1,i7)
0x20–0x2f	window(2,i0)–window(2,i7), window(2,i0)—window(2,i7)
0x30–0x3f	window(3,i0)–window(3,i7), window(3,i0)—window(3,i7)
0x40–0x4f	window(4,i0)–window(4,i7), window(4,i0)—window(4,i7)
0x50–0x5f	window(5,i0)–window(5,i7), window(5,i0)—window(5,i7)
0x60–0x6f	window(6,i0)–window(6,i7), window(6,i0)—window(6,i7)
0x70–0x77	g0, g1, g2, g3, g4, g5, g6, g7
0x78–0x7d	PSR, PC, nPC, WIM, TBR, Y.
0x7e–0x9e	FSR, f0–f31

Register numbers can only be displayed after an unexpected trap, a user program has entered the monitor using the *abortent* function, or the user has entered the monitor by manually typing L1–A or BREAK.

If a *register_type* is given, the first register of the indicated type is displayed. *register_type* can be one of:

f	floating-point
g	global
s	special

If *w* and a *window_number* (0—6) are given, the first *in*-register within the indicated window is displayed. If *window_number* is omitted, the window that was active just prior to entering the monitor is used. If the PSR's current window pointer is invalid, window 0 is used.

s [*asi*]

Set or display the Address Space Identifier. With no argument, *s* displays the current Address Space Identifier. The *asi* value can be one of:

0x2	control space

0x3	segment table
0x4	Page table
0x8	user instruction
0x9	supervisor instruction
0xa	user data
0xb	supervisor data
0xc	flush segment
0xd	flush page
0xe	flush context
0xf	cache data
u [echo]	
u [port] [options] [baud_rate]	
u [u] [virtual_address]	
With no arguments, display the current I/O device characteristics including: current input device, current output device, baud rates for serial ports A and B, an input-to-output echo indicator, and virtual addresses of mapped UART devices. With arguments, set or configure the current I/O device. With the u argument (uu. . .), set the I/O device to be the <i>virtual_address</i> of a UART device currently mapped.	
echo	Can be either e to enable input to be echoed to the output device, or ne, to indicate that input is not echoed.
port	Assign the indicated <i>port</i> to be the current I/O device. <i>port</i> can be one of:
a	serial port A
b	serial port B
k	the workstation keyboard
s	the workstation screen
baud_rate	Any legal baud rate.
options	can be any combination of:
i	input
o	output
u	UART
e	echo input to output
ne	do not echo input

monitor(1M)

r reset indicated serial port (a and b ports only)

If either a or b is supplied, and no *options* are given, the serial port is assigned for both input and output. If k is supplied with no options, it is assigned for input only. If s is supplied with no options, it is assigned for output only.

v *virtual_address1 virtual_address2 [size]*

Display the contents of *virtual_address1* (lower) *virtual_address2* (higher) in the format specified by *size*:

b byte format (the default)

w word format

l long word format

Enter return to pause for viewing; enter another return character to resume the display. To terminate the display at any time, press the space bar.

For example, the following command displays the contents of virtual address space from address 0x1000 to 0x2000 in word format:

```
v 1000 2000 W
```

w [*virtual_address*] [*argument*]

Set the execution vector to a predetermined or default routine. Pass *virtual_address* and *argument* to that routine.

To set up a predetermined routine to jump to, a user program must, prior to executing the monitor's w command, set the variable **romp->v_vector_cmd* to be equal to the virtual address of the desired routine. Predetermined routines need not necessarily return control to the monitor.

The default routine, defined by the monitor, prints the user-supplied *vector* according to the format supplied in *argument*. This format can be one of:

%x hexadecimal

%d decimal

x

Display a menu of extended tests. These diagnostics permit additional testing of such things as the I/O port connectors, video memory, workstation memory and keyboard, and boot device paths.

y *c context_number*

y *p | s context_number virtual_address*

Flush the indicated context, context page, or context segment.

c flush context *context_number*

monitor(1M)

- p flush the page beginning at *virtual_address* within context *context_number*
- s flush the segment beginning at *virtual_address* within context *context_number*

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	SPARC

SEE ALSO tip(1), boot(1M), eeprom(1M), attributes(5)
OpenBoot 2.x Command Reference Manual

mount(1M)

NAME	mount, umount – mount or unmount file systems and remote resources
SYNOPSIS	mount [-p -v] mount [-F <i>FSType</i>] [<i>generic_options</i>] [-o <i>specific_options</i>] [-O] <i>special</i> <i>mount_point</i> mount [-F <i>FSType</i>] [<i>generic_options</i>] [-o <i>specific_options</i>] [-O] <i>special</i> <i>mount_point</i> mount -a [-F <i>FSType</i>] [-V] [<i>current_options</i>] [-o <i>specific_options</i>] [<i>mount_point...</i>] umount [-f] [-V] [-o <i>specific_options</i>] <i>special</i> <i>mount_point</i> umount -a [-f] [-V] [-o <i>specific_options</i>] [<i>mount_point...</i>]
DESCRIPTION	mount attaches a file system to the file system hierarchy at the <i>mount_point</i>, which is the pathname of a directory. If <i>mount_point</i> has any contents prior to the mount operation, these are hidden until the file system is unmounted. umount unmounts a currently mounted file system, which may be specified either as a <i>mount_point</i> or as <i>special</i>, the device on which the file system resides. The table of currently mounted file systems can be found by examining the mounted file system information file. This is provided by a file system that is usually mounted on <i>/etc/mnttab</i>. The mounted file system information is described in <i>mnttab(4)</i>. Mounting a file system adds an entry to the mount table; a umount removes an entry from the table. When invoked with both the <i>special</i> and <i>mount_point</i> arguments and the -F option, mount validates all arguments except for <i>special</i> and invokes the appropriate <i>FSType</i>-specific mount module. If invoked with no arguments, mount lists all the mounted file systems recorded in the mount table, <i>/etc/mnttab</i>. If invoked with a partial argument list (with only one of <i>special</i> or <i>mount_point</i>, or with both <i>special</i> or <i>mount_point</i> specified but not <i>FSType</i>), mount will search <i>/etc/vfstab</i> for an entry that will supply the missing arguments. If no entry is found, and the special argument starts with "/", the default local file system type specified in <i>/etc/default/fs</i> will be used. Otherwise the default remote file system type will be used. The default remote file system type is determined by the first entry in the <i>/etc/dfs/fstypes</i> file. After filling in missing arguments, mount will invoke the <i>FSType</i>-specific mount module. Only a super-user can mount or unmount file systems using mount and umount. However, any user can use mount to list mounted file systems and resources.
OPTIONS	-F <i>FSType</i> Used to specify the <i>FSType</i> on which to operate. The <i>FSType</i> must be specified or must be determinable from <i>/etc/vfstab</i>, or by consulting <i>/etc/default/fs</i> or <i>/etc/dfs/fstypes</i>. -a [<i>mount_points. . .</i>] Perform mount or umount operations in parallel, when possible.

If mount points are not specified, `mount` will mount all file systems whose `/etc/vfstab` "mount at boot" field is "yes". If mount points are specified, then `/etc/vfstab` "mount at boot" field will be ignored.

If mount points are specified, `umount` will only unmount those mount points. If none is specified, then `umount` will attempt to unmount all file systems in `/etc/mnttab`, with the exception of certain system required file systems: `/`, `/usr`, `/var`, `/var/adm`, `/var/run`, `/proc`, `/dev/fd` and `/tmp`.

-f

Forcibly unmount a file system.

Without this option, `umount` does not allow a file system to be unmounted if a file on the file system is busy. Using this option can cause data loss for open files; programs which access files after the file system has been unmounted will get an error (EIO).

-p

Print the list of mounted file systems in the `/etc/vfstab` format. Must be the only option specified. See BUGS.

-v

Print the list of mounted file systems in verbose format. Must be the only option specified.

-V

Echo the complete command line, but do not execute the command. `umount` generates a command line by using the options and arguments provided by the user and adding to them information derived from `/etc/mnttab`. This option should be used to verify and validate the command line.

generic_options

Options that are commonly supported by most *FSType*-specific command modules. The following options are available:

-m

Mount the file system without making an entry in `/etc/mnttab`.

-g

Globally mount the file system. On a clustered system, this globally mounts the file system on all nodes of the cluster. On a non-clustered system this has no effect.

-o

Specify *FSType*-specific options in a comma separated (without spaces) list of suboptions and keyword-attribute pairs for interpretation by the *FSType*-specific module of the command. (See `mount_ufs(1M)`.) When you use `-o` with a file system that has an entry in `/etc/vfstab`, any `mount` options entered for that file system in `/etc/vfstab` are ignored.

mount(1M)

-O

Overlay mount. Allow the file system to be mounted over an existing mount point, making the underlying file system inaccessible. If a mount is attempted on a pre-existing mount point without setting this flag, the mount will fail, producing the error “device busy”.

-r

Mount the file system read-only.

USAGE See `largefile(5)` for the description of the behavior of `mount` and `umount` when encountering files greater than or equal to 2 Gbyte (2³¹ bytes).

FILES

<code>/etc/mnttab</code>	Table of mounted file systems.
<code>/etc/default/fs</code>	Default local file system type. Default values can be set for the following flags in <code>/etc/default/fs</code> . For example: <code>LOCAL=ufs</code> <code>LOCAL:</code> The default partition for a command if no <code>FSType</code> is specified.
<code>/etc/vfstab</code>	List of default parameters for each file system.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `mount_cachefs(1M)`, `mount_hsfcs(1M)`, `mount_nfs(1M)`, `mount_pcfs(1M)`, `mount_tmpfs(1M)`, `mount_ufs(1M)`, `mountall(1M)`, `umountall(1M)`, `mnttab(4)`, `vfstab(4)`, `attributes(5)`, `largefile(5)`, `lofs(7FS)`, `pcfs(7FS)`

NOTES If the directory on which a file system is to be mounted is a symbolic link, the file system is mounted on the directory to which the symbolic link refers, rather than on top of the symbolic link itself.

BUGS The `mount -p` output is incorrect for `cachefs`.

NAME	mountall, umountall – mount, unmount multiple file systems	
SYNOPSIS	mountall [-F <i>FSType</i>] [-l -r] [<i>file_system_table</i>]	
	umountall [-k] [-s] [-F <i>FSType</i>] [-l -r]	
	umountall [-k] [-s] [-h <i>host</i>]	
DESCRIPTION	mountall is used to mount file systems specified in a file system table. The file system table must be in <i>vfstab</i>(4) format. If no <i>file_system_table</i> is specified, <i>/etc/vfstab</i> is used. If – is specified as <i>file_system_table</i>, mountall reads the file system table from the standard input. mountall mounts only those file systems with the mount at boot field set to <i>yes</i> in the <i>file_system_table</i>. For each file system in the file system table, the following logic is executed: if there exists a file <i>/usr/lib/fs/FSType/fscall</i>, where <i>FSType</i> is the type of the file system, save that file system in a list to be passed later, and all at once, as arguments to the <i>/usr/lib/fs/FSType/fscall</i> script. The <i>/usr/lib/fs/FSType/fscall</i> script checks all of the file systems in its argument list to determine whether they can be safely mounted. If no <i>/usr/lib/fs/FSType/fscall</i> script exists for the <i>FSType</i> of the file system, the file system is individually checked using <i>fsck</i>(1M). If the file system does not appear mountable, it is fixed using <i>fsck</i> before the mount is attempted. File systems with a – entry in the <i>fsckdev</i> field are mounted without first being checked. umountall causes all mounted file systems except <i>root</i>, <i>/usr</i>, <i>/var</i>, <i>/var/adm</i>, <i>/var/run</i>, <i>/proc</i>, and <i>/dev/fd</i> to be unmounted. If the <i>FSType</i> is specified, mountall and umountall limit their actions to the <i>FSType</i> specified. There is no guarantee that umountall unmounts <i>busy</i> file systems, even if the <i>-k</i> option is specified.	
OPTIONS	The following options are supported:	
	-F	Specify the <i>FSType</i> of the file system to be mounted or unmounted.
	-h <i>host</i>	Unmount all file systems listed in <i>/etc/mnttab</i> that are remote-mounted from host.
	-k	Use the <i>fuser -k mount-point</i> command. See the <i>fuser</i> (1M) for details. The <i>-k</i> option sends the <i>SIGKILL</i> signal to each process using the file. As this option spawns kills for each process, the kill messages might not show up immediately. There is no guarantee that umountall unmounts <i>busy</i> file systems, even if the <i>-k</i> option is specified.
	-l	Limit the action to local file systems.
	-r	Limit the action to remote file system types.
	-s	Do not perform the umount operation in parallel.
FILES	<i>/etc/mnttab</i>	Mounted file system table
	<i>/etc/vfstab</i>	Table of file system defaults

mountall(1M)

/usr/lib/fs/*FSType*/fsckall

Script called by mountall to perform the file system check of all file systems of type *FSType*

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

fsck(1M), fuser(1M), mount(1M), mnttab(4), vfstab(4), attributes(5)

DIAGNOSTICS

No messages are printed if the file systems are mountable and clean.

Error and warning messages come from fsck(1M) and mount(1M).

NAME	mount_cachefs – mount CacheFS file systems
SYNOPSIS	<pre>mount -F cachefs [generic_options] -o backfstype=file_system_type [specific_options] [-O] special mount_point</pre>
DESCRIPTION	The CacheFS-specific version of the <code>mount</code> command mounts a cached file system; if necessary, it NFS-mounts its back file system. It also provides a number of CacheFS-specific options for controlling the caching process. For more information regarding back file systems, refer to the <i>System Administration Guide: Basic Administration</i>.
OPTIONS	To mount a CacheFS file system, use the generic <code>mount</code> command with the <code>-F</code> option followed by the argument <code>cachefs</code>. See <code>mount(1M)</code> for a list of supported <i>generic_options</i>. <code>-o specific_options</code> Specify CacheFS file system specific options in a comma-separated list with no intervening spaces. <code>acdirmax=<i>n</i></code> Specifies that cached attributes are held for no more than <i>n</i> seconds after directory update. After <i>n</i> seconds, all directory information is purged from the cache. The default value is 30 seconds. <code>acdirmin=<i>n</i></code> Specifies that cached attributes are held for at least <i>n</i> seconds after directory update. After <i>n</i> seconds, CacheFS checks to see if the directory modification time on the back file system has changed. If it has, all information about the directory is purged from the cache and new data is retrieved from the back file system. The default value is 30 seconds. <code>acregmax=<i>n</i></code> Specifies that cached attributes are held for no more than <i>n</i> seconds after file modification. After <i>n</i> seconds, all file information is purged from the cache. The default value is 30 seconds. <code>acregmin=<i>n</i></code> Specifies that cached attributes are held for at least <i>n</i> seconds after file modification. After <i>n</i> seconds, CacheFS checks to see if the file modification time on the back file system has changed. If it has, all information about the file is purged from the cache and new data is retrieved from the back file system. The default value is 30 seconds. <code>actimeo=<i>n</i></code> Sets <code>acregmin</code>, <code>acregmax</code>, <code>acdirmin</code>, and <code>acdirmax</code> to <i>n</i>. <code>backfstype=file_system_type</code> The file system type of the back file system (can be <code>nfs</code> or <code>hsfs</code>).

mount_cachefs(1M)

backpath=path

Specifies where the back file system is already mounted. If this argument is not supplied, CacheFS determines a mount point for the back file system. The back file system must be read-only.

cachedir=directory

The name of the cache directory.

cacheid=ID

ID is a string specifying a particular instance of a cache. If you do not specify a cache ID, CacheFS will construct one.

demandconst

Verifies cache consistency only when explicitly requested, rather than the periodic checking that is done by default. A consistency check is requested by using the *-s* option of the *cfsadmin(1M)* command. This option is useful for back file systems that change infrequently, for example, */usr/openwin*. *demandconst* and *noconst* are mutually exclusive.

local-access

Causes the front file system to interpret the mode bits used for access checking instead of having the back file system verify access permissions. Do not use this argument with secure NFS.

noconst

Disables cache consistency checking. By default, periodic consistency checking is enabled. Specify *noconst* only when you know that the back file system will not be modified. Trying to perform cache consistency check using *cfsadmin -s* will result in error. *demandconst* and *noconst* are mutually exclusive.

ro | rw

Read-only or read-write (default).

suid | nosuid

Allow (default) or disallow *setuid* execution.

write-around | non-shared

Write modes for CacheFS. The *write-around* mode (the default) handles writes the same as NFS does; that is, writes are made to the back file system, and the affected file is purged from the cache. You can use the *non-shared* mode when you are sure that no one else will be writing to the cached file system. In this mode, all writes are made to both the front and the back file system, and the file remains in the cache.

-O

Overlay mount. Allows the filesystem to be mounted over an existing mount point, making the underlying filesystem inaccessible. If a mount is attempted on a pre-existing mount point without setting this flag, mount will fail with the error:
mount -F cachefs: mount failed Device busy.

EXAMPLES **EXAMPLE 1** CacheFS-mounting a File System

The following example CacheFS-mounts the file system `server1:/user2`, which is already NFS-mounted on `/usr/abc` as `/xyz`.

```
example# mount -F cachefs -o backfstype=nfs,backpath=/usr/abc,
        cachedir=/cache1 server1:/user2 /xyz
```

The lines similar to the following appear in the `/etc/mnttab` file after the mount command is executed:

```
server1:/user2  /usr/abc      nfs
/usr/abc       /cache1/xyz  cachefs      backfstype=nfs
```

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `cfsadmin(1M)`, `fsck_cachefs(1M)`, `mount(1M)`, `attributes(5)` *System Administration Guide: Basic Administration***BUGS** The output for the *generic_option* `-p` output is incorrect for `cachefs`.

mountd(1M)

NAME	mountd – server for NFS mount requests and NFS access checks				
SYNOPSIS	<code>/usr/lib/nfs/mountd [-v] [-r]</code>				
DESCRIPTION	mountd is an RPC server that answers requests for NFS access information and file system mount requests. It reads the file <code>/etc/dfs/sharetab</code> to determine which file systems are available for mounting by which remote machines. See <code>sharetab(4)</code>. <code> nfsd</code> running on the local server will contact mountd the first time an NFS client tries to access the file system to determine whether the client should get read-write, read-only, or no access. This access can be dependent on the security mode used in the remotd procedure call from the client. See <code>share_nfs(1M)</code>. The command also provides information as to what file systems are mounted by which clients. This information can be printed using the <code>showmount(1M)</code> command. The mountd daemon is automatically invoked in run level 3. Only super user can run the mountd daemon.				
OPTIONS	The following options are supported: <code>-r</code> Reject mount requests from clients. Clients that have file systems mounted will not be affected. <code>-v</code> Run the command in verbose mode. Each time mountd determines what access a client should get, it will log the result to the console, as well as how it got that result.				
FILES	<code>/etc/dfs/sharetab</code> shared file system table				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWnfssu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnfssu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWnfssu				
SEE ALSO	<code> nfsd(1M)</code> , <code>share_nfs(1M)</code> , <code>showmount(1M)</code> , <code>sharetab(4)</code> , <code>attributes(5)</code>				
NOTES	If <code> nfsd</code> is running, mountd must also be running in order to be assured that the NFS server can respond to requests, otherwise, the NFS service can hang. Some routines that compare hostnames use case-sensitive string comparisons; some do not. If an incoming request fails, verify that the case of the hostname in the file to be parsed matches the case of the hostname called for, and attempt the request again.				

NAME	mount_hfs – mount hfs file systems
SYNOPSIS	<pre> mount -F hfs [generic_options] [-o FSType-specific_options] [-O] special mount_point mount -F hfs [generic_options] [-o FSType-specific_options] [-O] special mount_point </pre>
DESCRIPTION	mount attaches a High Sierra file system (hfs) to the file system hierarchy at the <i>mount_point</i>, which is the pathname of a directory. If <i>mount_point</i> has any contents prior to the mount operation, these are hidden until the file system is unmounted. If mount is invoked with <i>special</i> or <i>mount_point</i> as the only arguments, mount will search <i>/etc/vfstab</i> to fill in the missing arguments, including the <i>FSType-specific_options</i>; see mount(1M) for more details. If the file system being mounted contains Rock Ridge extensions, by default they will be used, enabling support of features not normally available under High Sierra file systems such as symbolic links, and special files.
OPTIONS	<i>generic_options</i> See mount(1M) for the list of supported options. -o Specify hfs file system specific options. If invalid options are specified, a warning message is printed and the invalid options are ignored. The following options are available: global noglobal If global is specified and supported on the file system, and the system in question is part of a cluster, the file system will be globally visible on all nodes of the cluster. If noglobal is specified, the mount will not be globally visible. The default behavior is noglobal. ro Mount the file system read-only. This option is required. nrr no Rock Ridge: if Rock Ridge extensions are present in the file system, ignore them; interpret it as a regular High Sierra file system. notraildot File names on High Sierra file systems consist of a proper name and an extension separated by a '.' (dot) character. By default, the separating dot is always considered part of the file's name for all file access operations, even if there is no extension present. Specifying notraildot makes it optional to specify the trailing dot to access a file whose name lacks an extension. <i>Exceptions:</i> This option is effective only on file systems for which Rock Ridge extensions are not active, either because they are not present on the CD-ROM, or they are explicitly ignored via the nrr option. If Rock Ridge extensions are active, hfs quietly ignores this option.

mount_hfs(1M)

nomaplcas

File names on High Sierra cdroms with no Rock Ridge extensions present should be uppercase characters only. By default, `hfs` maps file names read from a non-Rock Ridge disk to all lowercase characters. `nomaplcas` turns off this mapping. The exceptions for `notraildot` discussed above apply to `nomaplcas`.

nosuid

By default the file system is mounted with `setuid` execution allowed. Specifying `nosuid` causes the file system to be mounted with `setuid` execution disallowed.

-O

Overlay mount. Allow the file system to be mounted over an existing mount point, making the underlying file system inaccessible. If a mount is attempted on a pre-existing mount point without setting this flag, the mount will fail, producing the error device busy.

FILES

`/etc/mnttab` table of mounted file systems
`/etc/vfstab` list of default parameters for each file system

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

`mount(1M)`, `mountall(1M)`, `mount(2)`, `mnttab(4)`, `vfstab(4)`, `attributes(5)`

NOTES

If the directory on which a file system is to be mounted is a symbolic link, the file system is mounted on the directory to which the symbolic link refers, rather than on top of the symbolic link itself.

NAME	mount_nfs – mount remote NFS resources
SYNOPSIS	mount [-F nfs] [<i>generic_options</i>] [-o <i>specific_options</i>] [-O] <i>resource</i> mount [-F nfs] [<i>generic_options</i>] [-o <i>specific_options</i>] [-O] <i>mount_point</i> mount [-F nfs] [<i>generic_options</i>] [-o <i>specific_options</i>] [-O] <i>resource mount_point</i>
DESCRIPTION	The mount utility attaches a named <i>resource</i> to the file system hierarchy at the pathname location <i>mount_point</i>, which must already exist. If <i>mount_point</i> has any contents prior to the mount operation, the contents remain hidden until the <i>resource</i> is once again unmounted. If the resource is listed in the <i>/etc/vfstab</i> file, the command line can specify either <i>resource</i> or <i>mount_point</i>, and mount consults <i>/etc/vfstab</i> for more information. If the -F option is omitted, mount takes the file system type from <i>/etc/vfstab</i>. If the resource is not listed in the <i>/etc/vfstab</i> file, then the command line must specify both the <i>resource</i> and the <i>mount_point</i>. <i>host</i> can be an IPv4 or IPv6 address string. As IPv6 addresses already contain colons, enclose <i>host</i> in a pair of square brackets when specifying an IPv6 address string. Otherwise the first occurrence of a colon can be interpreted as the separator between the host name and path, for example, [1080::8:800:200C:417A]:tmp/file. See <i>inet(7P)</i> and <i>inet6(7P)</i>. <i>host:pathname</i> Where <i>host</i> is the name of the NFS server host, and <i>pathname</i> is the path name of the directory on the server being mounted. The path name is interpreted according to the server's path name parsing rules and is not necessarily slash-separated, though on most servers, this is the case. <i>nfs://host[:port]/pathname</i> This is an NFS URL and follows the standard convention for NFS URLs as described in <i>NFS URL Scheme</i>, RFC 2224. See the discussion of URL's and the public option under NFS FILE SYSTEMS for a more detailed discussion. A comma-separated list of <i>host:pathname</i> and/or <i>nfs://host[:port]/pathname</i> resources See the discussion of replicated file systems and failover under NFS FILE SYSTEMS for a more detailed discussion. A comma-separated list of hosts followed by a <i>:pathname</i> suffix See the discussion of replicated file systems and failover under NFS FILE SYSTEMS for a more detailed discussion. The mount command maintains a table of mounted file systems in <i>/etc/mnttab</i>, described in <i>mnttab(4)</i>.
OPTIONS	See <i>mount(1M)</i> for the list of supported <i>generic_options</i>. -o <i>specific_options</i> Set file system specific options according to a comma-separated list with no intervening spaces.

mount_nfs(1M)

`acdirmax=n`

Hold cached attributes for no more than *n* seconds after directory update. The default value is 60.

`acdirmin=n`

Hold cached attributes for at least *n* seconds after directory update. The default value is 30.

`acregmax=n`

Hold cached attributes for no more than *n* seconds after file modification. The default value is 60.

`acregmin=n`

Hold cached attributes for at least *n* seconds after file modification. The default value is 3.

`actimeo=n`

Set *min* and *max* times for regular files and directories to *n* seconds.

`bg | fg`

If the first attempt fails, retry in the background, or, in the foreground. The default is `fg`.

`forcedirectio | noforcedirectio`

If `forcedirectio` is specified, then for the duration of the mount, forced direct I/O is used. If the filesystem is mounted using `forcedirectio`, data is transferred directly between client and server, with no buffering on the client. If the filesystem is mounted using `noforcedirectio`, data is buffered on the client. `forcedirectio` is a performance option that is of benefit only in large sequential data transfers. The default behavior is `noforcedirectio`.

`grpuid`

By default, the GID associated with a newly created file obeys the System V semantics; that is, the GID is set to the effective GID of the calling process. This behavior may be overridden on a per-directory basis by setting the set-GID bit of the parent directory; in this case, the GID of a newly created file is set to the GID of the parent directory (see `open(2)` and `mknod(2)`). Files created on file systems that are mounted with the `grpuid` option obeys BSD semantics independent of whether the set-GID bit of the parent directory is set; that is, the GID is unconditionally inherited from that of the parent directory.

`hard | soft`

Continue to retry requests until the server responds (`hard`) or give up and return an error (`soft`). The default value is `hard`.

`intr | nointr`

Allow (do not allow) keyboard interrupts to kill a process that is hung while waiting for a response on a hard-mounted file system. The default is `intr`, which makes it possible for clients to interrupt applications that may be waiting for a remote mount.

noac

Suppress data and attribute caching. The data caching that is suppressed is the write-behind. The local page cache is still maintained, but data copied into it is immediately written to the server.

nocto

Do not perform the normal close-to-open consistency. When a file is closed, all modified data associated with the file is flushed to the server and not held on the client. When a file is opened the client sends a request to the server to validate the client's local caches. This behavior ensures a file's consistency across multiple NFS clients. When **-nocto** is in effect, the client does not perform the flush on close and the request for validation, allowing the possibility of differences among copies of the same file as stored on multiple clients.

This option can be used where it can be guaranteed that accesses to a specified file system are made from only one client and only that client. Under such a condition, the effect of **-nocto** can be a slight performance gain.

port=*n*

The server IP port number. The default is `NFS_PORT`. If the **port** option is specified, and if the resource includes one or more NFS URLs, and if any of the URLs include a port number, then the port number in the option and in the URL must be the same.

posix

Request POSIX.1 semantics for the file system. Requires a mount Version 2 `mountd(1M)` on the server. See `standards(5)` for information regarding POSIX.

proto=<*netid*>

<*netid*> is a value of `network_id` field from entry in the `/etc/netconfig` file. By default, the transport protocol used for the NFS mount is the first available connection oriented transport supported on both the client and the server. If no connection oriented transport is found, then the first available connectionless transport is used. This default behavior can be overridden with the **proto=<*netid*>** option.

public

The **public** option forces the use of the public file handle when connecting to the NFS server. The resource specified may or may not have an NFS URL. See the discussion of URL's and the **public** option under `NFS FILE SYSTEMS` for a more detailed discussion.

quota | noquota

Enable or prevent `quota(1M)` to check whether the user is over quota on this file system; if the file system has quotas enabled on the server, quotas are still checked for operations on this file system.

remount

Remounts a read-only file system as read-write (using the **rw** option). This option cannot be used with other **-o** options, and this option works only on currently mounted read-only file systems.

mount_nfs(1M)

`retrans=n`

Set the number of NFS retransmissions to *n*. The default value is 5. For connection-oriented transports, this option has no effect because it is assumed that the transport performs retransmissions on behalf of NFS.

`retry=n`

The number of times to retry the mount operation. The default for the mount command is 10000.

The default for the automounter is 0, in other words, do not retry. You might find it useful to increase this value on heavily loaded servers, where automounter traffic is dropped, causing unnecessary “server not responding” errors.

`ro | rw`

resource is mounted read-only or read-write. The default is rw.

`rsize=n`

Set the read buffer size to *n* bytes. The default value is 32768 when using Version 3 of the NFS protocol. The default can be negotiated down if the server prefers a smaller transfer size. When using Version 2, the default value is 8192.

`sec=mode`

Set the security *mode* for NFS transactions. If `sec=` is not specified, then the default action is to use AUTH_SYS over NFS Version 2 mounts, or to negotiate a *mode* over NFS Version 3 mounts. NFS Version 3 mounts negotiate a security mode when the server returns an array of security modes. The client picks the first mode in the array that is supported on the client. Only one mode can be specified with the `sec=` option. See `nfssec(5)` for the available *mode* options.

`secure`

This option has been deprecated in favor of the `sec=dh` option.

`suid | nosuid`

Allow or disallow `setuid` execution. The default is `suid`.

`timeo=n`

Set the NFS timeout to *n* tenths of a second. The default value is 11 tenths of a second for connectionless transports, and 600 tenths of a second for connection-oriented transports.

`vers=<NFS version number>`

By default, the version of NFS protocol used between the client and the server is the highest one available on both systems. If the NFS server does not support NFS Version 3 protocol, then the NFS mount uses NFS Version 2 protocol.

`wsize=n`

Set the write buffer size to *n* bytes. The default value is 32768 when using Version 3 of the NFS protocol. The default can be negotiated down if the server prefers a smaller transfer size. When using Version 2, the default value is 8192.

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SYSTEMS

xattr | noxattr

Allow or disallow the creation and manipulation of extended attributes. The default is xattr. See `fsattr(5)` for a description of extended attributes.

-O

Overlay mount. Allow the file system to be mounted over an existing mount point, making the underlying file system inaccessible. If a mount is attempted on a pre-existing mount point without setting this flag, the mount fails, producing the error “device busy.”

Background versus Foreground

File systems mounted with the `bg` option indicate that `mount` is to retry in the background if the server's mount daemon (`mountd(1M)`) does not respond. `mount` retries the request up to the count specified in the `retry=n` option. (Note that the default value for `retry` differs between `mount` and `automount`. See the description of `retry`, above.) Once the file system is mounted, each NFS request made in the kernel waits `timeo=n` tenths of a second for a response. If no response arrives, the time-out is multiplied by 2 and the request is retransmitted. When the number of retransmissions has reached the number specified in the `retrans=n` option, a file system mounted with the `soft` option returns an error on the request; one mounted with the `hard` option prints a warning message and continues to retry the request.

Hard versus Soft

File systems that are mounted read-write or that contain executable files should always be mounted with the `hard` option. Applications using `soft` mounted file systems may incur unexpected I/O errors, file corruption, and unexpected program core dumps. The `soft` option is not recommended.

Authenticated requests

The server may require authenticated NFS requests from the client. `sec=dh` authentication might be required. See `nfssec(5)`.

URLs and the public option

If the `public` option is specified, or if the *resource* includes an NFS URL, `mount` attempts to connect to the server using the public file handle lookup protocol. See *WebNFS Client Specification*, RFC 2054. If the server supports the public file handle, the attempt is successful; `mount` does not need to contact the server's `rpcbind(1M)`, and the `mountd(1M)` daemons to get the port number of the `mount` server and the initial file handle of *pathname*, respectively. If the NFS client and server are separated by a firewall that allows all outbound connections through specific ports, such as `NFS_PORT`, then this enables NFS operations through the firewall. The `public` option and the NFS URL can be specified independently or together. They interact as specified in the following matrix:

mount_nfs(1M)

	resource style	
	<i>host:pathname</i>	NFS URL
public option	Force public file handle and fail mount if not supported. Use Native paths.	Force public file handle and fail mount if not supported. Use Canonical paths.
default	Use MOUNT protocol.	Try public file handle with Canonical paths. Fall back to MOUNT protocol if not supported.

A Native path is a path name that is interpreted according to conventions used on the native operating system of the NFS server. A Canonical path is a path name that is interpreted according to the URL rules. See *Uniform Resource Locators (URL)*, RFC 1738. See EXAMPLES for uses of Native and Canonical paths.

Replicated file systems and failover

resource can list multiple read-only file systems to be used to provide data. These file systems should contain equivalent directory structures and identical files. It is also recommended that they be created by a utility such as `rdist(1)`. The file systems may be specified either with a comma-separated list of *host:pathname* entries and/or NFS URL entries, or with a comma-separated list of hosts, if all file system names are the same. If multiple file systems are named and the first server in the list is down, failover uses the next alternate server to access files. If the read-only option is not chosen, replication is disabled. File access is blocked on the original if NFS locks are active for that file.

File Attributes

To improve NFS read performance, files and file attributes are cached. File modification times get updated whenever a write occurs. However, file access times may be temporarily out-of-date until the cache gets refreshed.

The attribute cache retains file attributes on the client. Attributes for a file are assigned a time to be flushed. If the file is modified before the flush time, then the flush time is extended by the time since the last modification (under the assumption that files that changed recently are likely to change soon). There is a minimum and maximum flush time extension for regular files and for directories. Setting `actimeo=n` sets flush time to *n* seconds for both regular files and directories.

Setting `actimeo=0` disables attribute caching on the client. This means that every reference to attributes is satisfied directly from the server though file data is still cached. While this guarantees that the client always has the latest file attributes from the server, it has an adverse effect on performance through additional latency, network load, and server load.

mount_nfs(1M)

Setting the noac option also disables attribute caching, but has the further effect of disabling client write caching. While this guarantees that data written by an application is written directly to a server, where it can be viewed immediately by other clients, it has a significant adverse effect on client write performance. Data written into memory-mapped file pages (mmap(2)) are not written directly to this server.

EXAMPLES

EXAMPLE 1 Mounting an NFS File System

To mount an NFS file system:

```
example# mount serv:/usr/src /usr/src
```

EXAMPLE 2 Mounting An NFS File System Read-Only With No suid Privileges

To mount an NFS file system read-only with no suid privileges:

```
example# mount -r -o nosuid serv:/usr/src /usr/src
```

EXAMPLE 3 Mounting An NFS File System Over Version 2, with the UDP Transport

To mount an NFS file system over Version 2, with the UDP transport:

```
example# mount -o vers=2,proto=udp serv:/usr/src /usr/src
```

EXAMPLE 4 Mounting an NFS File System Using An NFS URL

To mount an NFS file system using an NFS URL (a canonical path):

```
example# mount nfs://serv/usr/man /usr/man
```

EXAMPLE 5 Mounting An NFS File System Forcing Use Of The Public File Handle

To mount an NFS file system and force the use of the public file handle and an NFS URL (a canonical path) that has a non 7-bit ASCII escape sequence:

```
example# mount -o public nfs://serv/usr/%A0abc /mnt/test
```

EXAMPLE 6 Mounting an NFS File System Using a Native Path

To mount an NFS file system using a native path (where the server uses colons (":") as the component separator) and the public file handle:

```
example# mount -o public serv:C:doc:new /usr/doc
```

EXAMPLE 7 Mounting a Replicated Set of NFS File Systems with the Same Pathnames

To mount a replicated set of NFS file systems with the same pathnames:

```
example# mount serv-a,serv-b,serv-c:/usr/man /usr/man
```

EXAMPLE 8 Mounting a Replicated Set of NFS File Systems with Different Pathnames

To mount a replicated set of NFS file systems with different pathnames:

```
example# mount serv-x:/usr/man,serv-y:/var/man,nfs://serv-z/man /usr/man
```

mount_nfs(1M)

FILES	/etc/mnttab	table of mounted file systems
	/etc/dfs/fstypes	default distributed file system type
	/etc/vfstab	table of automatically mounted resources

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnfsu

SEE ALSO rdist(1), mountall(1M), mountd(1M), quota(1M), mkdir(2), mmap(2), mount(2), open(2), umount(2), mnttab(4), attributes(5), fsattr(5), nfssec(5), standards(5), inet(7P), inet6(7P), lofs(7FS)

Callaghan, Brent, *WebNFS Client Specification*, RFC 2054, October 1996.

Callaghan, Brent, *NFS URL Scheme*, RFC 2224, October 1997.

Berners-Lee, Masinter & McCahill, *Uniform Resource Locators (URL)*, RFC 1738, December 1994.

NOTES An NFS server should not attempt to mount its own file systems. See lofs(7FS).

If the directory on which a file system is to be mounted is a symbolic link, the file system is mounted on *the directory to which the symbolic link refers*, rather than being mounted on top of the symbolic link itself.

SunOS 4.x used the biod maintenance procedure to perform parallel read-ahead and write-behind on NFS clients. SunOS 5.x made biod obsolete with multi-threaded processing, which transparently performs parallel read-ahead and write-behind.

Since the root (/) file system is mounted read-only by the kernel during the boot process, only the remount option (and options that can be used in conjunction with remount) affect the root (/) entry in the /etc/vfstab file.

NAME	mount_pcfs – mount pcfs file systems				
SYNOPSIS	mount -F pcfs [<i>generic_options</i>] [-o <i>FSType-specific_options</i>] <i>special</i> <i>mount_point</i> mount -F pcfs [<i>generic_options</i>] [-o <i>FSType-specific_options</i>] <i>special mount_point</i>				
DESCRIPTION	mount attaches an MS-DOS file system (pcfs) to the file system hierarchy at the <i>mount_point</i>, which is the pathname of a directory. If <i>mount_point</i> has any contents prior to the mount operation, these are hidden until the file system is unmounted. If mount is invoked with <i>special</i> or <i>mount_point</i> as the only arguments, mount will search /etc/vfstab to fill in the missing arguments, including the <i>FSType-specific_options</i>; see mount(1M) for more details. The <i>special</i> argument can be one of two special device file types: ■ A floppy disk, such as /dev/diskette0 or /dev/diskette1. ■ A DOS logical drive on a hard disk expressed as <i>device-name:logical-drive</i>, where <i>device-name</i> specifies the special block device-file for the whole disk and <i>logical-drive</i> is either a drive letter (c through z) or a drive number (1 through 24). Examples are /dev/dsk/c0t0d0p0:c and /dev/dsk/c0t0d0p0:1. The <i>special</i> device file type must have a formatted MS-DOS file system with either a 12-bit, 16-bit, or 32-bit File Allocation Table.				
OPTIONS	<i>generic_options</i> See mount(1M) for the list of supported options. -o Specify pcfs file system specific options. The following options are available: rw ro Mount the file system read/write or read-only. The default is rw. foldcase nofoldcase Force uppercase characters in filenames to lowercase when reading them from the filesystem. This is for compatibility with the previous behavior of pcfs. The default is nofoldcase.				
FILES	/etc/mnttab table of mounted file systems /etc/vfstab list of default parameters for each file system				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWesu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWesu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWesu				
SEE ALSO	mount(1M), mountall(1M), mount(2), mnttab(4), vfstab(4), attributes (5), pcfs(7FS)				

mount_pcfs(1M)

NOTES	If the directory on which a file system is to be mounted is a symbolic link, the file system is mounted on the directory to which the symbolic link refers, rather than on top of the symbolic link itself.

NAME	mount_tmpfs – mount tmpfs file systems		
SYNOPSIS	mount [-F tmpfs] [-o <i>specific_options</i>] [-O] <i>special mount_point</i>		
DESCRIPTION	tmpfs is a memory based file system which uses kernel resources relating to the VM system and page cache as a file system. mount attaches a tmpfs file system to the file system hierarchy at the pathname location <i>mount_point</i>, which must already exist. If <i>mount_point</i> has any contents prior to the mount operation, these remain hidden until the file system is once again unmounted. The attributes (mode, owner, and group) of the root of the tmpfs filesystem are inherited from the underlying <i>mount_point</i>, provided that those attributes are determinable. If not, the root's attributes are set to their default values. The <i>special</i> argument is usually specified as <i>swap</i> but is in fact disregarded and assumed to be the virtual memory resources within the system.		
OPTIONS	-o <i>specific_options</i>	Specify tmpfs file system specific options in a comma-separated list with no intervening spaces. If invalid options are specified, a warning message is printed and the invalid options are ignored. The following options are available:	
	size=sz	The sz argument controls the size of this particular tmpfs file system. If the argument is has a 'k' suffix, the number will be interpreted as a number of kilobytes. An 'm' suffix will be interpreted as a number of megabytes. No suffix is interpreted as bytes. In all cases, the actual size of the file system is the number of bytes specified, rounded up to the physical pagesize of the system.	
	suid nosuid	Allow or disallow setuid execution. The default is suid.	
	xattr noxattr	Allow or disallow the creation and manipulation of extended attributes. The default is xattr. See fsattr(5) for a description of extended attributes.	
	-O	Overlay mount. Allow the file system to be mounted over an existing mount point, making the underlying file system inaccessible. If a mount is attempted on a pre-existing mount point without setting this flag, the mount will fail, producing the error device busy.	
FILES	/etc/mnttab	Table of mounted file systems	

mount_tmpfs(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO mount(1M), mkdir(2), mount(2), open(2), umount(2), mnttab(4), attributes(5), fsattr(5), tmpfs(7FS)

NOTES If the directory on which a file system is to be mounted is a symbolic link, the file system is mounted on the directory to which the symbolic link refers, rather than on top of the symbolic link itself.

NAME	mount_udfs – mount a udfs file system																
SYNOPSIS	mount -F udfs [<i>generic_options</i>] [-o <i>specific_options</i>] [-O] <i>special mount_point</i> mount -F udfs [<i>generic_options</i>] [-o <i>specific_options</i>] [-O] <i>special</i> <i>mount_point</i>																
DESCRIPTION	The mount utility attaches a udfs file system to the file system hierarchy at the <i>mount_point</i>, which is the pathname of a directory. If <i>mount_point</i> has any contents prior to the mount operation, these are hidden until the file system is unmounted. If mount is invoked with either <i>special</i> or <i>mount_point</i> as the only arguments, mount searches <i>/etc/vfstab</i> to fill in the missing arguments, including the <i>specific_options</i>. See mount(1M). If <i>special</i> and <i>mount_point</i> are specified without any <i>specific_options</i>, the default is <i>rw</i>. If the directory on which a file system is to be mounted is a symbolic link, the file system is mounted on the directory to which the symbolic link refers, rather than on top of the symbolic link itself.																
OPTIONS	See mount(1M) for the list of supported <i>generic_options</i>. The following options are supported: <table> <tr> <td>-o <i>specific_options</i></td><td>Specify udfs file system specific options in a comma-separated list with no intervening spaces. The following <i>specific_options</i> are available:</td></tr> <tr> <td>m</td><td>Mount the file system without making an entry in <i>/etc/mnttab</i>.</td></tr> <tr> <td>nosuid</td><td>Mount the file system with <i>setuid</i> execution disallowed. You can also use <i>nosuid</i> to disallow <i>setuid</i> when mounting devices.</td></tr> <tr> <td></td><td>By default, the file system is mounted with <i>setuid</i> execution allowed.</td></tr> <tr> <td>remount</td><td>Remount the file system as read-write. The option is used in conjunction with the <i>rw</i> option.</td></tr> <tr> <td></td><td>A file system mounted read-only can be remounted as read-write. This option fails if the file system is not currently mounted.</td></tr> <tr> <td>rw ro</td><td>Read-write (<i>rw</i>) or read-only (<i>ro</i>). <i>rw</i> is the default.</td></tr> <tr> <td>-O</td><td>Overlay mount. Allow the file system to be mounted over an existing mount point, making the underlying</td></tr> </table>	-o <i>specific_options</i>	Specify udfs file system specific options in a comma-separated list with no intervening spaces. The following <i>specific_options</i> are available:	m	Mount the file system without making an entry in <i>/etc/mnttab</i> .	nosuid	Mount the file system with <i>setuid</i> execution disallowed. You can also use <i>nosuid</i> to disallow <i>setuid</i> when mounting devices.		By default, the file system is mounted with <i>setuid</i> execution allowed.	remount	Remount the file system as read-write. The option is used in conjunction with the <i>rw</i> option.		A file system mounted read-only can be remounted as read-write. This option fails if the file system is not currently mounted.	rw ro	Read-write (<i>rw</i>) or read-only (<i>ro</i>). <i>rw</i> is the default.	-O	Overlay mount. Allow the file system to be mounted over an existing mount point, making the underlying
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-O	Overlay mount. Allow the file system to be mounted over an existing mount point, making the underlying																

mount_udfs(1M)

	file system inaccessible. If a mount is attempted on a pre-existing mount point without setting this flag, the mount fails, producing the error device busy.				
FILES	/etc/mnttab Table of mounted file systems /etc/vfstab List of default parameters for each file system				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWudf</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWudf
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWudf				
SEE ALSO	fsck(1M), fsck_udfs(1M), mount(1M), mountall(1M), mount(2), mnttab(4), vfstab(4), attributes(5)				
DIAGNOSTICS	not super user The command is run by a non-root user. Run as root. no such device The device name specified does not exist. not a directory The specified mount point is not a directory. is not an udfs file system The device specified does not contain a udf 1.50 file system or the udfs file system module is not available. is already mounted The specified device is already in use. not a block device The device specified is not a block device. Use block device to mount. write-protected The device is read-only. is corrupted. needs checking The file system is in an inconsistent state. Run <code>fsck</code>.				
NOTES	Copy-protected files can be stored on DVD-ROM media using Universal Disk Format (UDF). Reading these copy-protected files is not possible as this involves an authentication process. Unless an authentication process between the host and the drive is completed, reading these copy-protected files after mounting and before the authentication process, returns an error.				

NAME	mount_ufs – mount ufs file systems
SYNOPSIS	mount -F ufs [<i>generic_options</i>] [-o <i>specific_options</i>] [-O] <i>special</i> <i>mount_point</i> mount -F ufs [<i>generic_options</i>] [-o <i>specific_options</i>] [-O] <i>special mount_point</i>
DESCRIPTION	The mount utility attaches a ufs file system to the file system hierarchy at the <i>mount_point</i>, which is the pathname of a directory. If <i>mount_point</i> has any contents prior to the mount operation, these are hidden until the file system is unmounted. If mount is invoked with <i>special</i> or <i>mount_point</i> as the only arguments, mount will search <i>/etc/vfstab</i> to fill in the missing arguments, including the <i>specific_options</i>. See mount(1M). If <i>special</i> and <i>mount_point</i> are specified without any <i>specific_options</i>, the default is <i>rw</i>. If the directory on which a file system is to be mounted is a symbolic link, the file system is mounted on the directory to which the symbolic link refers, rather than on top of the symbolic link itself.
OPTIONS	See mount(1M) for the list of supported <i>generic_options</i>. The following options are supported: -o <i>specific_options</i> Specify ufs file system specific options in a comma-separated list with no intervening spaces. If invalid options are specified, a warning message is printed and the invalid options are ignored. The following options are available: dfratime nodfratime By default, writing access time updates to the disk may be deferred (<i>dfratime</i>) for the file system until the disk is accessed for a reason other than updating access times. <i>nodfratime</i> disables this behavior. If power management is enabled on the system, do not set <i>nodfratime</i> unless <i>noatime</i> is also set. If you set <i>nodfratime</i> without setting <i>noatime</i>, the disk is spun up every time a file within a file system on the disk is accessed - even if the file is not modified. forcedirectio noforcedirectio If <i>forcedirectio</i> is specified and supported by the file system, then for the duration of the mount, forced direct I/O will be used. If the filesystem is mounted using <i>forcedirectio</i>, data is transferred directly between user address space and the disk. If the filesystem is mounted using <i>noforcedirectio</i>, data is buffered in kernel address space when data is transferred between user address space and the disk. <i>forcedirectio</i> is a performance option that is of benefit only in large sequential data transfers. The default behavior is <i>noforcedirectio</i>. global noglobal If <i>global</i> is specified and supported on the file system, and the system in question is part of a cluster, the file system will be globally visible on all nodes of

mount_ufs(1M)

the cluster. If `noglobal` is specified, the mount will not be globally visible. The default behavior is `noglobal`. The `global` option is mutually exclusive of the `nbmand` option, described below.

`intr | nointr`

Allow (do not allow) keyboard interrupts to kill a process that is waiting for an operation on a locked file system. The default is `intr`.

`largefiles | nolargefiles`

If `nolargefiles` is specified and supported by the file system, then for the duration of the mount it is guaranteed that all regular files in the file system have a size that will fit in the smallest object of type `off_t` supported by the system performing the mount. The mount will fail if there are any files in the file system not meeting this criterion. If `largefiles` is specified, there is no such guarantee. The default behavior is `largefiles`.

If `nolargefiles` is specified, mount will fail for `ufs` if the file system to be mounted has contained a large file (a file whose size is greater than or equal to 2 Gbyte) since the last invocation of `fsck` on the file system. The large file need not be present in the file system at the time of the mount for the mount to fail; it could have been created previously and destroyed. Invoking `fsck` (see `fsck_ufs(1M)`) on the file system will reset the file system state if no large files are present. After invoking `fsck`, a successful mount of the file system with `nolargefiles` specified indicates the absence of large files in the file system; an unsuccessful mount attempt indicates the presence of at least one large file.

`logging | nologging`

If `logging` is specified, then logging is enabled for the duration of the mounted file system. Logging is the process of storing transactions (changes that make up a complete UFS operation) in a log before the transactions are applied to the file system. Once a transaction is stored, the transaction can be applied to the file system later. This prevents file systems from becoming inconsistent, therefore eliminating the need to run `fsck`. And, because `fsck` can be bypassed, logging reduces the time required to reboot a system if it crashes, or after an unclean halt.

The default behavior is `nologging` for file systems less than 1 terabyte. The default behavior is `logging` for file systems greater than 1 terabyte and for file systems created with the `-T` option of the `newfs` command or the `mtb=y` option to the `mkfs_ufs` command.

The log is allocated from free blocks on the file system, and is sized approximately 1 Mbyte per 1 Gbyte of file system, up to a maximum of 64 Mbytes. Logging can be enabled on any UFS, including root (/). The log created by UFS logging is continually flushed as it fills up. The log is totally flushed when the file system is unmounted or as a result of the `lockfs -f` command.

`m`

Mount the file system without making an entry in `/etc/mnttab`.

nbmand | nonbmand

This option specifies that non-blocking mandatory locking semantics should be allowed on this file system. Non-blocking mandatory locking is disallowed by default. If the file system is mounted with the `nbmand` option, then applications can use the `fcntl(2)` interface to place non-blocking mandatory locks on files and the system will enforce those semantics. Enabling this option can cause standards conformant applications to see unexpected errors.

Do not use the `nbmand` option with `/`, `/var` and `/usr`.

The `remount` option should not be used to change the `nbmand` disposition of the file system. The `nbmand` option is mutually exclusive of the `global` option, described above.

noatime

By default, the file system is mounted with normal access time (`atime`) recording. If `noatime` is specified, the file system will ignore access time updates on files, except when they coincide with updates to the `ctime` or `mtime`. See `stat(2)`. This option reduces disk activity on file systems where access times are unimportant (for example, a Usenet news spool).

`noatime` turns off access time recording regardless of `dfratime` or `nodfratime`.

The POSIX standard requires that access times be marked on files. `-noatime` ignores them unless the file is also modified.

onerror = *action*

This option specifies the action that UFS should take to recover from an internal inconsistency on a file system. Specify *action* as `panic`, `lock`, or `umount`. These values cause a forced system shutdown, a file system lock to be applied to the file system, or the file system to be forcibly unmounted, respectively. The default is `panic`.

quota

Quotas are turned on for the file system.

remount

Remounts a file system with a new set of options. All options not explicitly set with `remount` revert to their default values.

rq

Read-write with quotas turned on. Equivalent to `rw`, `quota`.

ro | rw

Read-only or read-write. Default is `rw`.

suid | nosuid

Allow or disallow `setuid`/`setgid` execution. The default is `suid`. This option also allows/disallows opening any device-special entries that appear within the filesystem.

mount_ufs(1M)

This option is highly recommended whenever the file system is shared via NFS with the `root=` option, because, without it, NFS clients could add `setuid` programs to the server, or create devices that could open security holes.

-O

Overlay mount. Allow the file system to be mounted over an existing mount point, making the underlying file system inaccessible. If a mount is attempted on a pre-existing mount point without setting this flag, the mount will fail, producing the error "device busy".

The `mount_ufs` command supports the `xattr` flag, to allow the creation and manipulation of extended attributes. See `fsattr(5)` for a description of extended attributes. The `xattr` flag is always on.

FILES

`/etc/mnttab` table of mounted file systems

`/etc/vfstab` list of default parameters for each file system

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

`fsck(1M)`, `fsck_ufs(1M)`, `mount(1M)`, `mountall(1M)`, `fctl(2)`, `mount(2)`, `stat(2)`, `mnttab(4)`, `vfstab(4)`, `attributes(5)`, `fsattr(5)`, `largefile(5)`

NOTES

Since the root (/) file system is mounted read-only by the kernel during the boot process, only the `remount` option (and options that can be used in conjunction with `remount`) affect the root (/) entry in the `/etc/vfstab` file.

NAME	mount_xmemfs – mount xmemfs file systems		
SYNOPSIS	mount -F xmemfs [<i>generic_options</i>] -o[<i>largebsize</i> ,] <i>size=sz</i> [-O] <i>special mount_point</i>		
DESCRIPTION	xmemfs is an extended memory file system which provides file system semantics to manage and access large amounts of physical memory which can exceed 4 GB in size. mount attaches a xmemfs file system to the file system hierarchy at the pathname location <i>mount_point</i>, which must already exist. If <i>mount_point</i> has any contents prior to the mount operation, these remain hidden until the file system is once again unmounted. The attributes (mode, owner, and group) of the root of the xmemfs filesystem are inherited from the underlying <i>mount_point</i>, provided that those attributes are determinable. If not, the root's attributes are set to their default values. The special argument is not currently used by xmemfs but a placeholder, (such as <i>xmem</i>), needs to be specified nevertheless.		
OPTIONS	See mount(1M) for the list of supported <i>generic_options</i> .		
	-o <i>specific_options</i>	Specify xmemfs file system specific options in a comma-separated list with <i>no intervening spaces</i> . If invalid options are specified, a warning message is printed and the invalid options are ignored.	
		The <i>size=sz specific option</i> is required.	
		The following options are available:	
	size=sz	The <i>sz</i> argument specifies the desired size of this particular xmemfs file system. If the <i>sz</i> argument has a <i>k</i> suffix, the number is interpreted as kilobytes. An <i>m</i> suffix is interpreted as megabytes and <i>g</i> is interpreted as gigabytes. A <i>sz</i> specified with no suffix is interpreted as bytes.	
		In all cases, the actual size of the file system is the number of bytes specified, rounded up to the physical <i>pagesize</i> of the system or to the large page size if <i>largebsize</i> is specified.	
		This <i>specific_option</i> is required.	
	largebsize	If <i>largebsize</i> is specified, xmemfs uses the large memory page size as the file system block	

mount_xmemfs(1M)

size. On IA32, the large memory page size with mmu36 which supports PAE (Physical Address Extension) is 2 MB. The large memory page size without mmu36/PAE is 4 MB. If there is no large page support, the file system block size is `PAGESIZE`.

`-O` Overlay mount. Allow the file system to be mounted over an existing mount point, making the underlying file system inaccessible. If a mount is attempted on a pre-existing mount point without setting this flag, the mount fails, producing the error device busy.

FILES `/etc/mnttab`

table of mounted file systems

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Architecture	i386
Interface Stability	Evolving

SEE ALSO `mount(1M)`, `mount(2)`, `mkdir(2)`, `open(2)`, `umount(2)`, `mnttab(4)`, `attributes(5)`, `xmemfs(7FS)`

NOTES If the directory on which a file system is to be mounted is a symbolic link, the file system is mounted on the directory to which the symbolic link refers, rather than on top of the symbolic link itself.

The only file types allowed on `xmemfs` are directories and regular files. The execution of object files resident in `xmemfs` is not supported. Execution is prevented by not allowing users to set execute permissions on regular files.

NAME	mpstat – report per-processor or per-processor-set statistics																																				
SYNOPSIS	<code>/usr/bin/mpstat [-a] [-p -P set] [interval [count]]</code>																																				
DESCRIPTION	mpstat reports processor statistics in tabular form. Each row of the table represents the activity of one processor. The first table summarizes all activity since boot; each subsequent table summarizes activity for the preceding interval. All values are rates (events per second) unless otherwise noted. During execution of this kernel status command, the "state" of the kernel can change. An example would be CPUs going online or offline. mpstat reports this as State change. mpstat reports the following information: <table> <tr> <td>CPU or SET</td><td>Without the -a option, mpstat reports CPU, the processor ID. With the -a option, mpstat reports SET, the processor set ID.</td></tr> <tr> <td>minf</td><td>minor faults</td></tr> <tr> <td>mjf</td><td>major faults</td></tr> <tr> <td>xcal</td><td>inter-processor cross-calls</td></tr> <tr> <td>intr</td><td>interrupts</td></tr> <tr> <td>ithr</td><td>interrupts as threads (not counting clock interrupt)</td></tr> <tr> <td>csw</td><td>context switches</td></tr> <tr> <td>icsw</td><td>involuntary context switches</td></tr> <tr> <td>migr</td><td>thread migrations (to another processor)</td></tr> <tr> <td>smtx</td><td>spins on mutexes (lock not acquired on first try)</td></tr> <tr> <td>srw</td><td>spins on readers/writer locks (lock not acquired on first try)</td></tr> <tr> <td>syscl</td><td>system calls</td></tr> <tr> <td>usr</td><td>percent user time</td></tr> <tr> <td>sys</td><td>percent system time</td></tr> <tr> <td>wt</td><td>percent wait time</td></tr> <tr> <td>idl</td><td>percent idle time</td></tr> </table> With the -a option, mpstat also reports: <table> <tr> <td>size</td><td>number of processors in the set</td></tr> </table> With the -p option, mpstat also reports: <table> <tr> <td>set</td><td>processor set membership of the CPU</td></tr> </table>	CPU or SET	Without the -a option, mpstat reports CPU, the processor ID. With the -a option, mpstat reports SET, the processor set ID.	minf	minor faults	mjf	major faults	xcal	inter-processor cross-calls	intr	interrupts	ithr	interrupts as threads (not counting clock interrupt)	csw	context switches	icsw	involuntary context switches	migr	thread migrations (to another processor)	smtx	spins on mutexes (lock not acquired on first try)	srw	spins on readers/writer locks (lock not acquired on first try)	syscl	system calls	usr	percent user time	sys	percent system time	wt	percent wait time	idl	percent idle time	size	number of processors in the set	set	processor set membership of the CPU
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size	number of processors in the set																																				
set	processor set membership of the CPU																																				
OPTIONS	The following options are supported:																																				

mpstat(1M)

-a	Aggregate output by processor set. Sort the output by set. The default output is sorted by CPU number.
-p	Report processor set membership of each CPU. Sort the output by <i>set</i> . The default output is sorted by CPU number.
-P <i>set</i>	Display only those processors in the specified <i>set</i> .
<i>interval</i>	Report once each <i>interval</i> seconds.
<i>count</i>	Only print <i>count</i> reports.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO sar(1), iostat(1M), sar(1M), vmstat(1M), attributes(5)

NOTES The sum of CPU utilization might vary slightly from 100 because of rounding errors in the production of a percentage figure.

NAME	msgid – generate message IDs				
SYNOPSIS	<code>/usr/sbin/msgid</code>				
DESCRIPTION	The <code>msgid</code> utility generates message IDs. A message ID is a numeric identifier that, with a high probability, uniquely identifies a message. The probability of two distinct messages having the same ID is about one in a million. Specifically, the message ID is a hash signature on the message's unexpanded format string, generated by <code>STRLOG_MAKE_MSGID()</code> as defined in <code><sys/strlog.h></code>. <code>syslogd(1M)</code> is a simple filter that takes strings as input and produces those same strings, preceded by their message IDs, as output. Every message logged by <code>syslogd(1M)</code> includes the message ID. The message ID is intended to serve as a small, language-independent identifier.				
EXAMPLES	EXAMPLE 1 Using the <code>msgid</code> command to generate a message ID The following example uses the <code>msgid</code> command to generate a message ID for the <code>echo</code> command. <pre>example# echo hello msgid205790 hello</pre> EXAMPLE 2 Using the <code>msgid</code> command to generate a message catalog The following example uses the <code>msgid</code> command to enumerate all of the messages in the binary <code>ufs</code>, to generate a message catalog. <pre>example# strings /kernel/fs/ufs msgid137713 free: freeing free frag, dev:0x%lx, blk:%ld, cg:%d, ino:%lu, fs:%s 567420 iallocg: block not in mapfs = %s 845546 alloc: %s: file system full ...</pre>				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>syslogd(1M)</code> , <code>attributes(5)</code> , <code>log(7d)</code>				

```
mvdir(1M)
```

mvdir – move a directory

```
/usr/sbin/mvdir dirname name
```

`mkdir` moves directories within a file system. `dirname` must be a directory. If `name` does not exist, it will be created as a directory. If `name` does exist, and is a directory, `dirname` will be created as `name/dirname`. `dirname` and `name` may not be on the same path; that is, one may not be subordinate to the other. For example:

```
example% mvdir x/y x/z
```

is legal, but

```
example% mvdir x/y x/y/z
```

is not.

<code>dirname</code>	The name of the directory that is to be moved to another directory in the filesystem.

name The name of the directory into which `dirname` is to be moved. If *name* does not exist, it will be created. It may not be on the same path as `dirname`.

See `largefile(5)` for the description of the behavior of `mkdir` when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).

0	Successful operation.
>0	Operation failed.

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

```
mkdir(1), mv(1), attributes(5), largefile(5)
```

NAME	named-bootconf – convert name server configuration files						
SYNOPSIS	named-bootconf						
DESCRIPTION	named-bootconf converts named configuration files from BIND 4 format to BIND 8 format. Comments from the source file will not always appear at the appropriate place in the target file.						
EXAMPLES	EXAMPLE 1 Using named-bootconf The following command shows conversion of the named.boot file: <pre>example# named-bootconf < named.boot > named.conf</pre>						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> <tr> <td>Interface Stability</td><td>Standard BIND 8.2.4</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu	Interface Stability	Standard BIND 8.2.4
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWcsu						
Interface Stability	Standard BIND 8.2.4						
SEE ALSO	in.named(1M), named.conf(4), attributes(5)						

named-xfer(1M)

NAME	named-xfer – ancillary agent for inbound zone transfers				
SYNOPSIS	named-xfer -z <i>zone_to_transfer</i> -f <i>db_file</i> -s <i>serial_no</i> [-d <i>debuglevel</i>] [-l <i>debug_log_file</i>] [-t <i>trace_file</i>] [-p <i>port#</i>] [-S] <i>nameserver...</i>				
DESCRIPTION	The named-xfer program is an ancillary program executed by <code>in.named</code> to perform an inbound zone transfer. It is rarely executed directly, and only by system administrators who are trying to debug a zone transfer problem. See RFC's 1033, 1034, and 1035 for more information on the Internet name-domain system.				
OPTIONS	-z Specifies the name of the zone to be transferred. -f Specifies the name of the file into which the zone should be dumped when it is received from the primary server. -s Specifies the serial number of the current copy of this zone. If the SOA RR from the primary server does not have a serial number higher than this, the transfer will be aborted. -d Print debugging information. A number after the "d" determines the level of messages printed. -l Specifies a log file for debugging messages. The default is system-dependent but is usually in <i>/var/tmp</i> or <i>/usr/tmp</i>. Note that this only applies if -d is also specified. -t Specifies a trace file which will contain a protocol trace of the zone transfer. This is probably only of interest to those debugging the name server itself. -p Use a different port number. The default is the standard port number as returned by <code>getservbyname(3SOCKET)</code> for service "domain". -S Perform a restricted transfer of only the SOA, NS records and glue A records for the zone. The SOA record will not be loaded by named but will be used to determine when to verify the NS records. See the "stubs" directive in <code>in.named(1M)</code> for more information. Additional arguments are taken as name server addresses in so-called "dotted-quad" syntax only; no host names are allowed. At least one address must be specified. If the first one fails to transfer successfully, the additional addresses will be tried in the order given.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWinamd</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWinamd
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWinamd				
SEE ALSO	<code>in.named(1M)</code> , <code>resolver(3RESOLV)</code> , <code>resolv.conf(4)</code> , <code>hostname(1)</code> , <i>RFC 882</i>				

named-xfer(1M)

RFC 883

RFC 973

RFC 974

RFC 1033

RFC 1034

RFC 1035

RFC 1123

Name Server Operations Guide for BIND

ncaconfd(1M)

NAME	ncaconfd – Solaris Network Cache and Accelerator (NCA) configuration daemon				
SYNOPSIS	/usr/lib/inet/ncaconfd				
DESCRIPTION	Use the <code>ncaconfd</code> utility to set up NCA on a system. At boot time, the <code>ncakmod</code> initialization script reads in <code>nca.if(4)</code> to determine on which interface(s) NCA should run. <code>ncaconfd</code> then sets up the interface. <code>ncaconfd</code> also operates as a daemon if the <code>nca_active</code> key is set to enabled in <code>ncakmod.conf(4)</code> file. In this case, <code>ncaconfd</code> will continue as a daemon after all the NCA interfaces have been set up, listening for routing changes. The changes are then passed to NCA to control which interface NCA should use to make active outgoing TCP connections.				
FILES	<code>/etc/nca/ncakmod.conf</code>				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:				
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWncau</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWncau
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWncau				
SEE ALSO	<code>nca(1)</code> , <code>ncakmod(1)</code> , <code>nca.if(4)</code> , <code>ncakmod.conf(4)</code> , <code>attributes(5)</code>				

NAME	ncheck – generate a list of path names versus i-numbers	
SYNOPSIS	ncheck [-F <i>FSType</i>] [-V] [<i>generic_options</i>] [-o <i>FSType-specific_options</i>] [<i>special...</i>]	
DESCRIPTION	ncheck with no options generates a path-name versus i-number list of all files on <i>special</i> . If <i>special</i> is not specified on the command line the list is generated for all <i>specials</i> in /etc/vfstab which have a numeric fsckpass. <i>special</i> is the raw device on which the file system exists.	
OPTIONS	-F Specify the <i>FSType</i> on which to operate. The <i>FSType</i> should either be specified here or be determinable from /etc/vfstab by finding an entry in the table that has a numeric fsckpass field and an fsckdev that matches <i>special</i>. -V Echo the complete command line, but do not execute the command. The command line is generated by using the options and arguments provided by the user and adding to them information derived from /etc/vfstab. This option may be used to verify and validate the command line. <i>generic_options</i> Options that are commonly supported by most <i>FSType</i>-specific command modules. The following options are available: -i <i>i-list</i> Limit the report to the files on the <i>i-list</i> that follows. The <i>i-list</i> must be separated by commas with no intervening spaces. -a Print the names “.” and “. .” which are ordinarily suppressed. -s Report only special files and files with set-user-ID mode. This option may be used to detect violations of security policy. -o Specify <i>FSType-specific_options</i> in a comma separated (without spaces) list of suboptions and keyword-attribute pairs for interpretation by the <i>FSType</i>-specific module of the command.	
USAGE	See largefile(5) for the description of the behavior of ncheck when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).	
FILES	/etc/vfstab	list of default parameters for each file system

ncheck(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `vfstab(4)`, `attributes(5)`, `largefile(5)` Manual pages for the FSType-specific modules of `ncheck`

NOTES This command may not be supported for all *FSTypes*.

NAME	ncheck_ufs – generate pathnames versus i-numbers for ufs file systems				
SYNOPSIS	ncheck -F ufs [<i>generic_options</i>] [-o m] [<i>special...</i>]				
DESCRIPTION	ncheck -F ufs generates a pathname versus i-number list of files for the ufs file system residing on <i>special</i> . Names of directory files are followed by '/.'.				
OPTIONS	See ncheck(1M) for the list of <i>generic_options</i> supported. -o Specify ufs file system specific options. The available option is: m Print mode information.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1" data-bbox="457 728 1430 819"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	ff(1M), ncheck(1M), attributes(5)				
DIAGNOSTICS	When the file system structure is improper, '??' denotes the "parent" of a parentless file and a pathname beginning with './.' denotes a loop.				

ndc(1M)

NAME	ndc – name daemon control program
SYNOPSIS	ndc [-c <i>channel</i>] [-l <i>localsock</i>] [-p <i>pidfile</i>] [-d] [-q] [-s] [-t] [<i>command</i>]
DESCRIPTION	System administrators use the <i>ndc</i> utility to control the operation of a name server. If the system administrator fails to list a command, <i>ndc</i> will prompt for one until it reads EOF.
OPTIONS	The <i>ndc</i> command supports the following options: -c <i>channel</i> Specify the rendezvous point for the control channel. The default value for <i>channel</i> is <i>/var/run/ndc</i>, a UNIX domain socket that is also the server's default control channel. If the desired control channel is a TCP/IP socket, then the format for the <i>channel</i> argument is <i>ipaddr/port</i>. For example, a value of <i>127.0.0.1/54</i> would be TCP port 54 on the local host. -d Turn on debugging mode. This option is mainly of interest to developers. -l <i>localsock</i> Bind the client side of the control channel to a specific address. Servers can be configured to reject connections that do not come from specific addresses. If the desired control channel is a TCP/IP socket, then the format for the <i>localsock</i> argument is <i>ipaddr/port</i>. -p <i>pidfile</i> Use for backwards compatibility with older name servers. It enables <i>ndc</i> to use UNIX signals for control communications. Optional with modern name servers, this capability may not be supported in future releases. The command set that is available is narrower when the signal interface is used. A likely value for the <i>pidfile</i> argument is <i>/var/run/named.pid</i>. -q Suppress prompt and result text. -s Suppress non-fatal error announcements. -t Turn on protocol and system tracing. Use this option in installation debugging.
COMMANDS	The following commands are built into the <i>ndc</i> utility. The full set of commands that the name server supports is dynamic. Use the <i>help</i> command for information on the available commands . /help Show help information for built in commands. /exit Exit from <i>ndc</i> command interpreter. /trace Toggle protocol and system tracing on and off. See -t. /debug Toggle debugging mode on and off. See -d. /quiet Toggle prompt and result information on and off. See -q.

ndc(1M)

/silent

Toggle announcement of non-fatal errors on and off.
See -s.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	Standard, BIND 8.2.4

SEE ALSO in.named(1M), execvp(2), attributes(5)

NOTES When the ndc utility is running in *pidfile* mode, pass any arguments to start and restart commands to the new name server on the command line. If the ndc utility is running in *channel* mode, there is no start command, and the restart command just tells the name server to execvp(2) itself.

ndd(1M)

NAME	ndd – get and set driver configuration parameters				
SYNOPSIS	ndd [-set] <i>driver parameter</i> [<i>value</i>]				
DESCRIPTION	ndd gets and sets selected configuration parameters in some kernel drivers. Currently, ndd only supports the drivers that implement the TCP/IP Internet protocol family. Each driver chooses which parameters to make visible using ndd. Since these parameters are usually tightly coupled to the implementation, they are likely to change from release to release. Some parameters may be read-only. If the -set option is omitted, ndd queries the named <i>driver</i>, retrieves the value associated with the specified <i>parameter</i>, and prints it. If the -set option is given, ndd passes <i>value</i>, which must be specified, down to the named <i>driver</i> which assigns it to the named <i>parameter</i>. By convention, drivers that support ndd also support a special read-only <i>parameter</i> named “?” which can be used to list the parameters supported by the driver.				
EXAMPLES	EXAMPLE 1 Getting Parameters Supported By The TCP Driver To see which parameters are supported by the TCP driver, use the following command: <pre>example% ndd /dev/tcp \?</pre> The parameter name “?” may need to be escaped with a backslash to prevent its being interpreted as a shell meta character. The following command sets the value of the parameter <i>ip_forwarding</i> in the dual stack IP driver to zero. This disables IPv4 packet forwarding. <pre>example% ndd -set /dev/ip ip_forwarding 0</pre> Similarly, in order to disable IPv6 packet forwarding, the value of parameter <i>ip6_forwarding</i> <pre>example% ndd -set /dev/ip ip6_forwarding 0</pre> To view the current IPv4 forwarding table, use the following command: <pre>example% ndd /dev/ip ipv4_ire_status</pre> To view the current IPv6 forwarding table, use the following command: <pre>example% ndd /dev/ip ipv6_ire_status</pre>				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				

SEE ALSO nca(1), ioctl(2), attributes(5), arp(7P), ip(7P), ip6(7P), tcp(7P), udp(7P)

NOTES The parameters supported by each driver may change from release to release. Like programs that read /dev/kmem, user programs or shell scripts that execute ndd should be prepared for parameter names to change.

The `ioctl()` command that ndd uses to communicate with drivers is likely to change in a future release. User programs should avoid making dependencies on it.

The meanings of many ndd parameters make sense only if you understand how the driver is implemented.

netstat(1M)

NAME	netstat – show network status				
SYNOPSIS	<pre> netstat [-anv] [-f <i>address_family</i>] [-P <i>protocol</i>] netstat -g [-n] [-f <i>address_family</i>] netstat -p [-n] [-f <i>address_family</i>] netstat -s [-f <i>address_family</i>] [-P <i>protocol</i>] netstat -m [-v] netstat -i [-I <i>interface</i>] [-an] [-f <i>address_family</i>] [<i>interval</i> [<i>count</i>]] netstat -r [-anv] [-f <i>address_family</i> <i>filter</i>] netstat -M [-ns] [-f <i>address_family</i>] netstat -D [-I <i>interface</i>] [-f <i>address_family</i>] </pre>				
DESCRIPTION	The netstat command displays the contents of certain network-related data structures in various formats, depending on the options you select. The netstat command has the several forms shown in the SYNOPSIS section, above, listed as follows: ■ The first form of the command (with no required arguments) displays a list of active sockets for each protocol. ■ The second, third, and fourth forms (-g, -p, and -s options) display information from various network data structures. ■ The fifth form (-m option) displays STREAMS memory statistics. ■ The sixth form (-i option) shows the state of the interfaces. ■ The seventh form (-r option) displays the routing table. ■ The eighth form (-M option) displays the multicast routing table. ■ The ninth form (-D option) displays the state of DHCP on one or all interfaces. These forms are described in greater detail below. With no arguments (the first form), netstat displays connected sockets for PF_INET, PF_INET6, and PF_UNIX, unless modified otherwise by the -f option.				
OPTIONS	<table> <tr> <td>-a</td><td>Show the state of all sockets, all routing table entries, or all interfaces, both physical and logical. Normally, listener sockets used by server processes are not shown. Under most conditions, only interface, host, network, and default routes are shown and only the status of physical interfaces is shown.</td></tr> <tr> <td>-f <i>address_family</i></td><td>Limit all displays to those of the specified <i>address_family</i>. The value of <i>address_family</i> can be one of the following:</td></tr> </table>	-a	Show the state of all sockets, all routing table entries, or all interfaces, both physical and logical. Normally, listener sockets used by server processes are not shown. Under most conditions, only interface, host, network, and default routes are shown and only the status of physical interfaces is shown.	-f <i>address_family</i>	Limit all displays to those of the specified <i>address_family</i> . The value of <i>address_family</i> can be one of the following:
-a	Show the state of all sockets, all routing table entries, or all interfaces, both physical and logical. Normally, listener sockets used by server processes are not shown. Under most conditions, only interface, host, network, and default routes are shown and only the status of physical interfaces is shown.				
-f <i>address_family</i>	Limit all displays to those of the specified <i>address_family</i> . The value of <i>address_family</i> can be one of the following:				

-f filter

inet For the AF_INET address family showing IPv4 information.

inet6 For the AF_INET6 address family showing IPv6 information.

unix For the AF_UNIX address family.

With **-r** only, limit the display of routes to those matching the specified filter. A filter rule consists of a "keyword:value" pair. The known keywords and the value syntax are:

af:{inet|inet6|unix|number}

Selects an address family. This is identical to **-f address_family** and both syntaxes are supported.

{inif|outif}:{name|ifIndex|any|none}

Selects an input or output interface. You can specify the interface by name (such as hme0) or by ifIndex number (for example, 2). If any is used, the filter matches all routes having a specified interface (anything other than null). If none is used, the filter matches all routes having a null interface. Note that you can view the index number (*ifIndex*) for an interface with the **-a** option of ifconfig(1M).

{src|dst}:{ip-address[/mask]|any|none}

Selects a source or destination IP address. If specified with a mask length, then any routes with matching or longer (more specific) masks are selected. If any is used, then all but addresses but 0 are selected. If none is used, then address 0 is selected.

flags:[+ -]?[ABDGHLSU]+

Selects routes tagged with the specified flags. By default, the flags as specified must be set in order to match. With a leading +, the flags specified must be set but others are ignored. With a leading -, the flags specified must not be set and others are permitted.

You can specify multiple instances of **-f** to specify multiple filters. For example:

```
% netstat -nr -f outif:hme0 -f outif:hme1 -f dst:10.0.0.0/8
```

The preceding command displays routes within network 10.0.0.0/8, with mask length 8 or greater, and an output interface of either hme0 or hme1, and excludes all other routes.

netstat(1M)

	-g	Show the multicast group memberships for all interfaces. See DISPLAYS, below.
	-i	Show the state of the interfaces that are used for IP traffic. Normally this shows statistics for the physical interfaces. When combined with the -a option, this will also report information for the logical interfaces. See ifconfig(1M).
	-m	Show the STREAMS memory statistics.
	-n	Show network addresses as numbers. netstat normally displays addresses as symbols. This option may be used with any of the display formats.
	-p	Show the net to media tables. See DISPLAYS, below.
	-r	Show the routing tables. Normally, only interface, host, network, and default routes are shown, but when this option is combined with the -a option, all routes will be displayed, including cache.
	-s	Show per-protocol statistics. When used with the -M option, show multicast routing statistics instead. When used with the -a option, per-interface statistics will be displayed, when available, in addition to statistics global to the system. See DISPLAYS, below.
	-v	Verbose. Show additional information for the sockets, STREAMS memory statistics, and the routing table.
	-I <i>interface</i>	Show the state of a particular interface. <i>interface</i> can be any valid interface such as hme0 or le0. Normally, the status and statistics for physical interfaces are displayed. When this option is combined with the -a option, information for the logical interfaces is also reported.
	-M	Show the multicast routing tables. When used with the -s option, show multicast routing statistics instead.
	-P <i>protocol</i>	Limit display of statistics or state of all sockets to those applicable to <i>protocol</i> . The protocol can be one of ip, ipv6, icmp, icmpv6, igmp, udp, tcp, rawip. rawip can also be specified as raw. The command accepts protocol options only as all lowercase.
	-D	Show the status of DHCP configured interfaces.
OPERANDS	<i>interval</i>	Display interface statistics accumulated since last display every <i>interval</i> seconds, repeating forever, unless <i>count</i> is specified. When invoked with <i>interval</i> , the first row of netstat output shows statistics accumulated since last reboot.

	<i>count</i>	Display interface statistics the number of times specified by <i>count</i> , at the interval specified by <i>interval</i> .
DISPLAYS		
Active Sockets (First Form)	The display for each active socket shows the local and remote address, the send and receive queue sizes (in bytes), the send and receive windows (in bytes), and the internal state of the protocol.	
	The symbolic format normally used to display socket addresses is either <i>hostname.port</i> when the name of the host is specified, or <i>network.port</i> if a socket address specifies a network but no specific host.	
	The numeric host address or network number associated with the socket is used to look up the corresponding symbolic hostname or network name in the <i>hosts</i> or <i>networks</i> database.	
	If the network or hostname for an address is not known, or if the -n option is specified, the numerical network address is shown. Unspecified, or "wildcard", addresses and ports appear as "*". For more information regarding the Internet naming conventions, refer to <i>inet(7P)</i> and <i>inet6(7P)</i> .	
	TCP Sockets	The possible state values for TCP sockets are as follows:
	BOUND	Bound, ready to connect or listen.
	CLOSED	Closed. The socket is not being used.
	CLOSING	Closed, then remote shutdown; awaiting acknowledgment.
	CLOSE_WAIT	Remote shutdown; waiting for the socket to close.
	ESTABLISHED	Connection has been established.
	FIN_WAIT_1	Socket closed; shutting down connection.
	FIN_WAIT_2	Socket closed; waiting for shutdown from remote.
	IDLE	Idle, opened but not bound.
	LAST_ACK	Remote shutdown, then closed; awaiting acknowledgment.
	LISTEN	Listening for incoming connections.
	SYN_RECEIVED	Initial synchronization of the connection under way.
	SYN_SENT	Actively trying to establish connection.
	TIME_WAIT	Wait after close for remote shutdown retransmission.
Network Data Structures (Second Through Fifth Forms)	The form of the display depends upon which of the -g, -m, -p, or -s options you select.	

netstat(1M)

- g Displays the list of multicast group membership.
- m Displays the memory usage, for example, STREAMS mblks.
- p Displays the net to media mapping table. For IPv4, the address resolution table is displayed. See arp(1M). For IPv6, the neighbor cache is displayed.
- s Displays the statistics for the various protocol layers.

The statistics use the MIB specified variables. The defined values for ipForwarding are:

- forwarding (1) Acting as a gateway.
- not-forwarding (2) Not acting as a gateway.

The IPv6 and ICMPv6 protocol layers maintain per-interface statistics. If the -a option is specified with the -s option, then the per-interface statistics as well as the total sums are displayed. Otherwise, just the sum of the statistics are shown.

For the second, third, and fourth forms of the command, you must specify at least -g, -p, or -s. You can specify any combination of these options. You can also specify -m (the fifth form) with any set of the -g, -p, and -s options. If you specify more than one of these options, netstat displays the information for each one of them.

Interface Status (Sixth Form)

The interface status display lists information for all current interfaces, one interface per line. If an interface is specified using the -I option, it displays information for only the specified interface.

The list consists of the interface name, mtu (maximum transmission unit, or maximum packet size)(see ifconfig(1M)), the network to which the interface is attached, addresses for each interface, and counter associated with the interface. The counters show the number of input packets, input errors, output packets, output errors, and collisions, respectively. For Point-to-Point interfaces, the Net/Dest field is the name or address on the other side of the link.

If the -a option is specified with either the -i option or the -I option, then the output includes names of the physical interface(s), counts for input packets and output packets for each logical interface, plus additional information.

If the -n option is specified, the list displays the IP address instead of the interface name.

If an optional *interval* is specified, the output will be continually displayed in *interval* seconds until interrupted by the user or until *count* is reached. See OPERANDS.

The physical interface is specified using the -I option. When used with the *interval* operand, output for the -I option has the following format:

input	le0	output	input	(Total)	output
packets	errs	packets errs	packets	packets	errs
227681	0	659471 1	502	261331	0
				99597	1
					502

	netstat(1M)									
	10	0	0	0	0	10	0	0	0	0
	8	0	0	0	0	8	0	0	0	0
	10	0	2	0	0	10	0	2	0	0
	If the input interface is not specified, the first interface of address family <code>inet</code> or <code>inet6</code> will be displayed.									
Routing Table (Seventh Form)	The routing table display lists the available routes and the status of each. Each route consists of a destination host or network, and a gateway to use in forwarding packets. The <i>flags</i> column shows the status of the route (U if "up"), whether the route is to a gateway (G), whether it is a redundant route established with the <code>-multirt</code> option (M), whether the route was established using the <code>-setsrc</code> option (S), and whether the route was created dynamically by a redirect (D). If the <code>-a</code> option is specified, there will be routing entries with flags for combined routing and address resolution entries (A), broadcast addresses (B), and the local addresses for the host (L).									
	Interface routes are created for each interface attached to the local host; the gateway field for such entries shows the address of the outgoing interface.									
	The <i>use</i> column displays the number of packets sent using a combined routing and address resolution (A) or a broadcast (B) route. For a local (L) route, this count is the number of packets received, and for all other routes it is the number of times the routing entry has been used to create a new combined route and address resolution entry.									
	The <i>interface</i> entry indicates the network interface utilized for the route.									
Multicast Routing Tables (Eighth Form)	The multicast routing table consists of the virtual interface table and the actual routing table.									
DHCP Interface Information (Ninth Form)	The DHCP interface information consists of the interface name, its current state, lease information, packet counts, and a list of flags.									
	The states correlate with the specifications set forth in <i>RFC 2131</i> .									
	Lease information includes:									
	■ when the lease began; ■ when lease renewal will begin; and ■ when the lease will expire.									
	The flags currently defined include:									
	BOOTP					The interface has a lease obtained through BOOTP.				
	BUSY					The interface is busy with a DHCP transaction.				
	PRIMARY					The interface is the primary interface. See <code>dhcpcinfo(1)</code> .				

netstat(1M)

FAILED The interface is in failure state and must be manually restarted.

Packet counts are maintained for the number of packets sent, the number of packets received, and the number of lease offers declined by the DHCP client. All three counters are initialized to zero and then incremented while obtaining a lease. The counters are reset when the period of lease renewal begins for the interface. Thus, the counters represent either the number of packets sent, received, and declined while obtaining the current lease, or the number of packets sent, received, and declined while attempting to obtain a future lease.

FILES /etc/default/inet_type DEFAULT_IP setting

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO arp(1M), dhcpinf(1), dhcpagent(1M), ifconfig(1M), iostat(1M), mibiisa(1M), savecore(1M), vmstat(1M), hosts(4), inet_type(4), networks(4), protocols(4), services(4), attributes(5), inet(7P), inet6(7P)

Droms, R., *RFC 2131, Dynamic Host Configuration Protocol*, Network Working Group, March 1997.

NOTES When displaying interface information, netstat honors the DEFAULT_IP setting in /etc/default/inet_type. If it is set to IP_VERSION4, then netstat will omit information relating to IPv6 interfaces, statistics, connections, routes and the like.

However, you can override the DEFAULT_IP setting in /etc/default/inet_type on the command-line. For example, if you have used the command-line to explicitly request IPv6 information by using the inet6 address family or one of the IPv6 protocols, it will override the DEFAULT_IP setting.

If you need to examine network status information following a kernel crash, use the mdb(1) utility on the savecore(1M) output.

The netstat utility obtains TCP statistics from the system by opening /dev/tcp and issuing queries. Because of this, netstat might display an extra, unused connection in IDLE state when reporting connection status.

NAME	newaliases – rebuild the data base for the mail aliases file																	
SYNOPSIS	newaliases																	
DESCRIPTION	newaliases rebuilds the random access data base for the mail aliases file /etc/mail/aliases. newaliases accepts all the flags that sendmail(1M) accepts. However, most of these flags have no effect, except for the -C option and three of the Processing Options that can be set from a configuration file with the -o option: <table><tr><td>-C /path/to/alt/config/file</td><td>Use alternate configuration file.</td></tr><tr><td>-oAfile</td><td>Specify possible alias files.</td></tr><tr><td>-oLn</td><td>Set the default log level to n. Defaults to 9.</td></tr><tr><td>-on</td><td>Validate the RHS of aliases when rebuilding the aliases(4) database.</td></tr></table> newaliases runs in verbose mode (-v option) automatically.		-C /path/to/alt/config/file	Use alternate configuration file.	-oAfile	Specify possible alias files.	-oLn	Set the default log level to n. Defaults to 9.	-on	Validate the RHS of aliases when rebuilding the aliases(4) database.								
-C /path/to/alt/config/file	Use alternate configuration file.																	
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-oLn	Set the default log level to n. Defaults to 9.																	
-on	Validate the RHS of aliases when rebuilding the aliases(4) database.																	
EXAMPLES	EXAMPLE 1 Running the newaliases Command The following command runs newaliases on an alias file different from the /etc/mail/aliases default in sendmail(1M): <pre>example% newaliases -oA/path/to/alternate/alias/file</pre>																	
EXIT STATUS	newaliases returns an exit status describing what it did. The codes are defined in /usr/include/sysexits.h. <table><tr><td>EX_OK</td><td>Successful completion on all addresses.</td></tr><tr><td>EX_NOUSER</td><td>User name not recognized.</td></tr><tr><td>EX_UNAVAILABLE</td><td>Catchall. Necessary resources were not available.</td></tr><tr><td>EX_SYNTAX</td><td>Syntax error in address.</td></tr><tr><td>EX_SOFTWARE</td><td>Internal software error, including bad arguments.</td></tr><tr><td>EX_OSERR</td><td>Temporary operating system error, such as “cannot fork”.</td></tr><tr><td>EX_NOHOST</td><td>Host name not recognized.</td></tr><tr><td>EX_TEMPFAIL</td><td>Message could not be sent immediately, but was queued.</td></tr></table>		EX_OK	Successful completion on all addresses.	EX_NOUSER	User name not recognized.	EX_UNAVAILABLE	Catchall. Necessary resources were not available.	EX_SYNTAX	Syntax error in address.	EX_SOFTWARE	Internal software error, including bad arguments.	EX_OSERR	Temporary operating system error, such as “cannot fork”.	EX_NOHOST	Host name not recognized.	EX_TEMPFAIL	Message could not be sent immediately, but was queued.
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FILES	/etc/aliases	Symbolic link to /etc/mail/aliases																
	/etc/mail/aliases.pag																	
	/etc/mail/aliases.dir	ndbm files maintained by newaliases																

newaliases(1M)

/etc/mail/aliases.db

Berkeley DataBase file maintained by
newaliases

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWsndmu

SEE ALSO sendmail(1M), aliases(4), attributes(5)

NAME	newfs – construct a new UFS file system
SYNOPSIS	newfs [-NTv] [<i>mkfs-options</i>] <i>raw-device</i>
DESCRIPTION	newfs is a "friendly" front-end to the mkfs(1M) program for making UFS file systems on disk partitions. newfs calculates the appropriate parameters to use and calls mkfs. If run interactively (that is, standard input is a tty), newfs prompts for confirmation before making the file system. If the -N option is not specified and the inodes of the device are not randomized, newfs calls fsirand(1M). You must be super-user to use this command, except when creating a UFS file system on a <i>diskette</i>. See EXAMPLES. Creating a Multiterabyte UFS File System Keep the following limitations in mind when creating a multiterabyte UFS file system: ■ <i>nbpi</i> is set to 1 Mbyte unless you specifically set it higher. You cannot set <i>nbpi</i> lower than 1 Mbyte on a multiterabyte UFS file system. ■ <i>fragsize</i> is set equal to <i>bsize</i>. ■ Logging is on by default.
OPTIONS	The following options are supported: -N Print out the file system parameters that would be used in creating the file system without actually creating the file system. fsirand(1M) is not called here. -T Set the parameters of the file system to allow eventual growth to over a terabyte in total file system size. This option sets <i>fragsize</i> to be the same as <i>bsize</i>, and sets <i>nbpi</i> to 1 Mbyte, unless the -i option is used to make it even larger. If you use the -f or -i options to specify a <i>fragsize</i> or <i>nbpi</i> that is incompatible with this option, the user-supplied value of <i>fragsize</i> or <i>nbpi</i> is ignored. Logging is enabled by default on all file systems created with this option. -v Verbose. newfs prints out its actions, including the parameters passed to mkfs. <i>mkfs-options</i> Options that override the default parameters are: -a <i>apc</i> The number of alternate sectors per cylinder (SCSI devices only) to reserve for bad block replacement. The default is 0. This option is not applicable for disks with EFI labels and is ignored.

newfs(1M)

-b <i>bsize</i>	The logical block size of the file system in bytes (either 4096 or 8192). The default is 8192. The sun4u architecture does not support the 4096 block size.
-c <i>cgsz</i>	The number of cylinders per cylinder group (ranging from 16 to 256). The default is calculated by dividing the number of sectors in the file system by the number of sectors in a gigabyte, and then multiplying the result by 32. The default value is always between 16 and 256. <code>mkfs</code> may override this value. See <code>mkfs_ufs(1M)</code> for details. This option is not applicable for disks with EFI labels and is ignored.
-C <i>maxcontig</i>	The maximum number of logical blocks, belonging to one file, that is allocated contiguously before inserting a rotational delay. The default is determined from the disk drive's maximum transfer rate. UFS supports no more than 1048576 byte (1MB) runs. With a logical block size of 4096, this gives a <i>maxcontig</i> limit of 256. With 8192, the limit is 128. This parameter can be subsequently changed using the <code>tunefs(1M)</code> command. This parameter also controls clustering. Regardless of the value of <i>gap</i>, clustering is enabled only when <i>maxcontig</i> is greater than 1. Clustering allows higher I/O rates for sequential I/O and is described in <code>tunefs(1M)</code>.
-d <i>gap</i>	Rotational delay. The expected time (in milliseconds) to service a transfer completion interrupt and initiate a new transfer on the same disk. It is used to decide how much rotational spacing to place between successive blocks in a file. This parameter can be subsequently changed using the <code>tunefs(1M)</code> command. The default is zero, indicating a disk drive with track readahead buffering.

This option is not applicable for disks with EFI labels and is ignored.

-f *fragsize*

The smallest amount of disk space in bytes to allocate to a file. The smallest amount of disk space in bytes to allocate to a file. If the logical block size is 4096, legal values are 512, 1024, 2048, and 4096. When the logical block size is 8192, legal values are 1024, 2048, 4096, and 8192. The default value is 1024.

For file systems greater than 1 terabyte or for file systems created with the **-T** option, *fragsize* is forced to match block size (*bsize*).

-i *nbpi*

The number of bytes per inode. This specifies the density of inodes in the file system. The number is divided into the total size of the file system to determine the fixed number of inodes to create. It should reflect the expected average size of files in the file system. If fewer inodes are desired, a larger number should be used; to create more inodes a smaller number should be given. The default for *nbpi* is as follows:

Disk size	Density
Less than 1GB	2048
Less than 2GB	4096
Less than 3GB	6144
3GB to 1 Tbyte	8192
Greater than 1 Tbyte or created with -T	1048576

-m *free*

The minimum percentage of free space to maintain in the file system (between 1% and 99%, inclusively). This space is off-limits to normal users. Once the file system is filled to this threshold, only the super-user can continue writing to the file system. This parameter can be subsequently changed using the **tunefs(1M)** command.

The default is ((64 Mbytes/partition size) * 100), rounded down to the nearest integer and limited between 1% and 10%, inclusively.

-n *nrpos*

The number of different rotational positions in which to divide a cylinder group. The default is 8.

newfs(1M)

		This option is not applicable for disks with EFI labels and is ignored.
	<code>-o <i>opt</i></code>	(space or time). The file system can either be instructed to try to minimize the time spent allocating blocks, or to try to minimize the space fragmentation on the disk. The default is time.
	<code>-r <i>rpm</i></code>	The speed of the disk in revolutions per minute. The default is driver- or device-specific.
		This option is not applicable for disks with EFI labels and is ignored.
		Note that you specify <i>rpm</i> for <i>newfs</i> and <i>rps</i> for <i>mkfs</i> .
	<code>-s <i>size</i></code>	The size of the file system in sectors. The default is to use the entire partition.
	<code>-t <i>ntrack</i></code>	The number of tracks per cylinder on the disk. The default is taken from the disk label.
		This option is not applicable for disks with EFI labels and is ignored.
OPERANDS	The following operands are supported:	
	<i>raw-device</i>	The name of a raw special device residing in <code>/dev/rdisk</code> (for example, <code>/dev/rdisk/c0t0d0s6</code>) on which to create the file system.
USAGE	See <code>largefile(5)</code> for the description of the behavior of <i>newfs</i> when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).	
EXAMPLES	EXAMPLE 1 Displaying the Parameters for the Raw Special Device The following example verbosely displays the parameters for the raw special device, <code>c0t0d0s6</code>. It does not actually create a new file system: <pre>example# newfs -Nv /dev/rdisk/c0t0d0s6 mkfs -F ufs -o N /dev/rdisk/c0t0d0s6 1112940 54 15 8192 1024 16 10 60 2048 t 0 -1 8 /dev/rdisk/c0t0d0s6: 1112940 sectors in 1374 cylinders of 15 tracks, 54 sectors 569.8MB in 86 cyl groups (16 c/g, 6.64MB/g, 3072 i/g) super-block backups (for fsck -b #) at: 32, 13056, 26080, 39104, 52128, 65152, 78176, 91200, 104224, . . .</pre>	

EXAMPLE 2 Creating a UFS File System

The following example creates a UFS file system on a diskette that is managed by Volume Manager.

```
example% newfs /vol/dev/aliases/floppy0
newfs: construct a new file system /vol/dev/aliases/floppy0: (y/n)? y
/vol/dev/aliases/floppy0: 2880 sectors in 80 cylinders of 2 tracks,
18 sectors 1.4MB in 5 cyl groups (16 c/g, 0.28MB/g, 128 i/g)
super-block backups (for fsck -F ufs -o b=#) at:
32, 640, 1184, 1792, 2336, . . .
```

EXAMPLE 3 Creating a UFS File System That Will Eventually Be Grown to a Multiterabyte UFS File System

The following example creates a UFS file system that will eventually be grown to a multiterabyte UFS file system.

This command creates a 800-Gbyte file system on the volume, /dev/md/rdsk/d99.

```
# newfs -T /dev/md/rdsk/d99
newfs: construct a new file system /dev/md/rdsk/d99: (y/n)? y
/dev/md/rdsk/d99: 1677754368 sectors in 45512 cylinders of
144 tracks, 256 sectors
819216.0MB in 1821 cyl groups (25 c/g, 450.00MB/g, 448 i/g) . . .
```

Then, if you increase the volume size for this file system, you can use the `growfs` command to expand the file system. The file system is grown to 1.2 terabytes in this example:

```
# growfs -v /dev/md/rdsk/d99
/usr/lib/fs/ufs/mkfs -G /dev/md/rdsk/d99 2516631552 /dev/md/rdsk/d99:
2516631552 sectors in 68268 cylinders of 144 tracks, 256 sectors
1228824.0MB in 2731 cyl groups (25 c/g, 450.00MB/g, 448 i/g) . . .
```

EXIT STATUS

The following exit values are returned:

0	The operation was successful.
1, 10	Usage error or internal error. A message is output to STDERR explaining the error.

Other exit values may be returned by `mkfs(1M)`, which is called by `newfs`.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

newfs(1M)

SEE ALSO *fsck*(1M), *fsck_ufs*(1M), *fsirand*(1M), *mkfs*(1M), *mkfs_ufs*(1M), *tunefs*(1M), *attributes*(5), *largefile*(5), *ufs*(7FS)

DIAGNOSTICS *newfs*: No such file or directory
The device specified does not exist, or a disk partition was not specified.

special: cannot open
You must be super-user to use this command.

NAME	newkey – create a new Diffie-Hellman key pair in the publickey database				
SYNOPSIS	<pre>newkey -h <i>hostname</i> [-s nisplus nis files ldap]</pre> <pre>newkey -u <i>username</i> [-s nisplus nis files ldap]</pre>				
DESCRIPTION	newkey establishes new public keys for users and machines on the network. These keys are needed when using secure RPC or secure NFS service. newkey prompts for a password for the given <i>username</i> or <i>hostname</i> and then creates a new public/secret Diffie-Hellman 192 bit key pair for the user or host. The secret key is encrypted with the given password. The key pair can be stored in the <code>/etc/publickey</code> file, the NIS publickey map, or the NIS+ <code>cred.org_dir</code> table. newkey consults the publickey entry in the name service switch configuration file (see <code>nsswitch.conf(4)</code>) to determine which naming service is used to store the secure RPC keys. If the publickey entry specifies a unique name service, newkey will add the key in the specified name service. However, if there are multiple name services listed, newkey cannot decide which source to update and will display an error message. The user is required to specify the source explicitly with the <code>-s</code> option. In the case of NIS, newkey should be run by the superuser on the master NIS server for that domain. In the case of NIS+, newkey should be run by the superuser on a machine which has permission to update the <code>cred.org_dir</code> table of the new user/host domain. In the case of NIS+, <code>nisaddcred(1M)</code> should be used to add new keys. newkey cannot be used to create keys other than 192-bit Diffie-Hellman.				
OPTIONS	<pre>-h <i>hostname</i></pre> Create a new public/secret key pair for the privileged user at the given <i>hostname</i> . Prompts for a password for the given <i>hostname</i> . <pre>-u <i>username</i></pre> Create a new public/secret key pair for the given <i>username</i> . Prompts for a password for the given <i>username</i> . <pre>-s nisplus</pre> <pre>-s nis</pre> <pre>-s files</pre> <pre>-s ldap</pre> Update the database in the specified source: <code>nisplus</code> (for NIS+), <code>nis</code> (for NIS), <code>files</code> , or <code>ldap</code> (LDAP). Other sources may be available in the future.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				

newkey(1M)

SEE ALSO chkey(1), keylogin(1), nisaddcred(1M), nisclient(1M), nsswitch.conf(4),
publickey(4), attributes(5)

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating
Environment. Tools to aid the migration from NIS+ to LDAP are available in the
Solaris 9 operating environment. For more information, visit
<http://www.sun.com/directory/nisplus/transition.html>.

NAME	nfsd – NFS daemon
SYNOPSIS	/usr/lib/nfs/nfsd [-a] [-c <i>#_conn</i>] [-l <i>listen_backlog</i>] [-p <i>protocol</i>] [-t <i>device</i>] [<i>nservers</i>]
DESCRIPTION	nfsd is the daemon that handles client file system requests. Only the super-user can run this daemon. The nfsd daemon is automatically invoked in run level 3 with the -a option, described below. By default, nfsd starts over the TCP and UDP transports. You can change this with the -p option, described below. A previously invoked nfsd daemon started with or without options must be stopped before invoking another nfsd command. Administrators wanting to change startup parameters for nfsd should, as root, make changes in the /etc/default/nfs file rather than editing the /etc/init.d/nfs.server file. See nfs(4).
OPTIONS	The following options are supported: -a Start a NFS daemon over all available connectionless and connection-oriented transports, including UDP and TCP. Equivalent of setting the NFSD_PROTOCOL parameter to ALL in the nfs file. -c <i>#_conn</i> This sets the maximum number of connections allowed to the NFS server over connection-oriented transports. By default, the number of connections is unlimited. Equivalent of the NFSD_MAX_CONNECTIONS parameter in the nfs file. -l Set connection queue length for the NFS TCP over a connection-oriented transport. The default value is 32 entries. Equivalent of the NFSD_LISTEN_BACKLOG parameter in the nfs file. -p <i>protocol</i> Start a NFS daemon over the specified protocol. Equivalent of the NFSD_PROTOCOL parameter in the nfs file. -t <i>device</i> Start a NFS daemon for the transport specified by the given device. Equivalent of the NFSD_DEVICE parameter in the nfs file.
OPERANDS	The following operands are supported: <i>nservers</i> This sets the maximum number of concurrent NFS requests that the server can handle. This concurrency is achieved by up to <i>nservers</i> threads created as needed in the kernel. <i>nservers</i> should be based on the load expected on this server. 16 is the usual number of <i>nservers</i>. If <i>nservers</i> is not specified, the maximum number of concurrent NFS requests will default to 1. Equivalent of the

nfsd(1M)

NFSD_MAX_CONNECTIONS parameter in the `nfs` file.

USAGE If the `NFS_PORTMON` variable is set in `/etc/system`, then clients are required to use privileged ports (ports < `IPPORT_RESERVED`) to get NFS services. This variable is equal to zero by default. This variable has been moved from the "nfs" module to the "nfssrv" module. To set the variable, edit the `/etc/system` file and add this entry:

```
set nfssrv:nfs_portmon = 1
```

EXIT STATUS

0	Daemon started successfully.
1	Daemon failed to start.

FILES

<code>.nfsXXX</code>	client machine pointer to an open-but-unlinked file
<code>/etc/default/nfs</code>	contains startup parameters for <code>nfsd</code>
<code>/etc/init.d/nfs.server</code>	shell script for starting <code>nfsd</code>
<code>/etc/system</code>	system configuration information file

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnfssu

SEE ALSO `ps(1)`, `mountd(1M)`, `nfs(4)`, `sharetab(4)`, `system(4)`, `attributes(5)`
System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)

NOTES Manually starting and restarting `nfsd` is not recommended. If it is necessary to do so, use the NFS server start/stop script (`/etc/init.d/nfs.server`). See *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)* for more information.

NAME	nfslogd – nfs logging daemon
SYNOPSIS	<code>/usr/lib/nfs/nfslogd</code>
DESCRIPTION	The <code>nfslogd</code> daemon provides operational logging to the Solaris NFS server. It is the <code>nfslogd</code> daemon's job to generate the activity log by analyzing the RPC operations processed by the the NFS server. The log will only be generated for file systems exported with logging enabled. This is specified at file system export time by means of the <code>share_nfs(1M)</code> command. Each record in the log file includes a time stamp, the IP address (or hostname if it can be resolved) of the client system, the file or directory name the operation was performed on, and the type of operation. In the basic format, the operation can either be an input (i) or output (o) operation. The basic format of the NFS server log is compatible with the log format generated by the Washington University FTPd daemon. The log format can be extended to include directory modification operations, such as <code>mkdir</code>, <code>rmdir</code>, and <code>remove</code>. The extended format is not compatible with the Washington University FTPd daemon format. See <code>nfslog.conf(4)</code> for details. The NFS server logging mechanism is divided in two phases. The first phase is performed by the NFS kernel module, which records raw RPC requests and their results in work buffers backed by permanent storage. The location of the work buffers is specified in the <code>/etc/nfs/nfslog.conf</code> file. Refer to <code>nfslog.conf(4)</code> for more information. The second phase involves the <code>nfslogd</code> user-level daemon, which periodically reads the work buffers, interprets the raw RPC information, groups related RPC operations into single transaction records, and generates the output log. The <code>nfslogd</code> daemon then sleeps waiting for more information to be logged to the work buffers. The amount of time that the daemon sleeps can be configured by modifying the <code>IDLE_TIME</code> parameter in <code>/etc/default/nfslogd</code>. The work buffers are intended for internal consumption of the <code>nfslogd</code> daemon. NFS operations use file handles as arguments instead of path names. For this reason the <code>nfslogd</code> daemon needs to maintain a database of file handle to path mappings in order to log the path name associated with an operation instead of the corresponding file handle. A file handle entry is added to the database when a client performs a lookup or other NFS operation that returns a file handle to the client. Once an NFS client obtains a file handle from a server, it can hold on to it for an indefinite time, and later use it as an argument for an NFS operation on the file or directory. The NFS client can use the file handle even after the server reboots. Because the database needs to survive server reboots, it is backed by permanent storage. The location of the database is specified by the <code>htable</code> parameter in the <code>/etc/nfs/nfslog.conf</code> file. This database is intended for the internal use of the <code>nfslogd</code> daemon. In order to keep the size of the file handle mapping database manageable, <code>nfslogd</code> prunes the database periodically. It removes file handle entries that have not been accessed in more than a specified amount of time. The <code>PRUNE_TIMEOUT</code> configurable parameter in <code>/etc/default/nfslogd</code> specifies the interval length between

nfslogd(1M)

successive runs of the pruning process. A file handle record will be removed if it has not been used since the last time the pruning process was executed. Pruning of the database can effectively be disabled by setting the `PRUNE_TIMEOUT` as high as `INT_MAX`.

When pruning is enabled, there is always a risk that a client may have held on to a file handle longer than the `PRUNE_TIMEOUT` and perform an NFS operation on the file handle after the matching record in the mapping database had been removed. In such case, the pathname for the file handle will not be resolved, and the log will include the file handle instead of the pathname.

There are various configurable parameters that affect the behavior of the `nfslogd` daemon. These parameters are found in `/etc/default/nfslogd` and are described below:

<code>UMASK</code>	Sets the file mode for the log files, work buffer files and file handle mapping database.
<code>MIN_PROCESSING_SIZE</code>	Specifies the minimum size, in bytes, that the buffer file must reach before processing the work information and writing to the log file. The value of <code>MIN_PROCESSING_SIZE</code> must be between 1 and <code>ulimit</code> .
<code>IDLE_TIME</code>	Specifies the amount of time, in seconds, the daemon should sleep while waiting for more information to be placed in the buffer file. <code>IDLE_TIME</code> also determines how often the configuration file will be reread. The value of <code>IDLE_TIME</code> must be between 1 and <code>INT_MAX</code> .
<code>MAX_LOGS_PRESERVE</code>	The <code>nfslogd</code> periodically cycles its logs. <code>MAX_LOGS_PRESERVE</code> specifies the maximum number of log files to save. When <code>MAX_LOGS_PRESERVE</code> is reached, the oldest files will be overwritten as new log files are created. These files will be saved with a numbered extension, beginning with <code>filename.0</code> . The oldest file will have the highest numbered extension up to the value configured for <code>MAX_LOGS_PRESERVE</code> . The value of <code>MAX_LOGS_PRESERVE</code> must be between 1 and <code>INT_MAX</code> .
<code>CYCLE_FREQUENCY</code>	Specifies how often, in hours, the log files are cycled. <code>CYCLE_FREQUENCY</code> is used to insure that the log files do not get too large.

		The value of <code>CYCLE_FREQUENCY</code> must be between 1 and <code>INT_MAX</code> .				
	<code>MAPPING_UPDATE_INTERVAL</code>	Specifies the time interval, in seconds, between updates of the records in the file handle to path mapping tables. Instead of updating the <code>atime</code> of a record each time that record is accessed, it is only updated if it has aged based on this parameter. The record access time is used by the pruning routine to determine whether the record should be removed from the database. The value of this parameter must be between 1 and <code>INT_MAX</code> .				
	<code>PRUNE_TIMEOUT</code>	Specifies when a database record times out, in hours. If the time that elapsed since the record was last accessed is greater than <code>PRUNE_TIMEOUT</code> then the record can be pruned from the database. The default value for <code>PRUNE_TIMEOUT</code> is 168 hours (7 days). The value of <code>PRUNE_TIMEOUT</code> must be between 1 and <code>INT_MAX</code> .				
EXIT STATUS	The following exit values are returned: 0 Daemon started successfully. 1 Daemon failed to start.					
FILES	<code>/etc/nfs/nfslogtab</code> <code>/etc/nfs/nfslog.conf</code> <code>/etc/default/nfslogd</code>					
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWnfssu</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnfssu
ATTRIBUTE TYPE	ATTRIBUTE VALUE					
Availability	SUNWnfssu					
SEE ALSO	<code>share_nfs(1M)</code> , <code>nfslog.conf(4)</code> , <code>attributes(5)</code>					

nfsstat(1M)

NAME	nfsstat – NFS statistics						
SYNOPSIS	nfsstat [-cnrsmza]						
DESCRIPTION	nfsstat displays statistical information about the NFS and RPC (Remote Procedure Call), interfaces to the kernel. It can also be used to reinitialize this information. If no options are given the default is <pre>nfsstat -csnra</pre> That is, display everything, but reinitialize nothing.						
OPTIONS	-a Display NFS_ACL information. -c Display client information. Only the client side NFS, RPC, and NFS_ACL information is printed. Can be combined with the -n, -r, and -a options to print client side NFS, RPC, and NFS_ACL information only. -m Display statistics for each NFS mounted file system. This includes the server name and address, mount flags, current read and write sizes, the retransmission count, the attribute cache timeout values, failover information, and the timers used for dynamic retransmission. Note that the dynamic retransmission timers are displayed only where dynamic retransmission is in use. By default, NFS mounts over the TCP protocols and NFS Version 3 mounts over either TCP or UDP do not use dynamic retransmission. If you specify the -m option, this is the only option nfsstat uses. Any options specified in addition to -m are checked for validity, then ignored. -n Display NFS information. NFS information for both the client and server side will be printed. Can be combined with the -c and -s options to print client or server NFS information only. -r Display RPC information. -s Display server information. -z Zero (reinitialize) statistics. This option is for use by the super user only, and can be combined with any of the above options to zero particular sets of statistics after printing them.						
DISPLAYS	The server RPC display includes the following fields: <table> <tr> <td>calls</td><td>The total number of RPC calls received.</td></tr> <tr> <td>badcalls</td><td>The total number of calls rejected by the RPC layer (the sum of badlen and xdr call as defined below).</td></tr> <tr> <td>nullrecv</td><td>The number of times an RPC call was not available when it was thought to be received.</td></tr> </table>	calls	The total number of RPC calls received.	badcalls	The total number of calls rejected by the RPC layer (the sum of badlen and xdr call as defined below).	nullrecv	The number of times an RPC call was not available when it was thought to be received.
calls	The total number of RPC calls received.						
badcalls	The total number of calls rejected by the RPC layer (the sum of badlen and xdr call as defined below).						
nullrecv	The number of times an RPC call was not available when it was thought to be received.						

badlen	The number of RPC calls with a length shorter than a minimum-sized RPC call.
xdr call	The number of RPC calls whose header could not be XDR decoded.
dupchecks	The number of RPC calls that looked up in the duplicate request cache.
dupreqs	The number of RPC calls that were found to be duplicates.
The server NFS display shows the number of NFS calls received (<code>calls</code>) and rejected (<code>badcalls</code>), and the counts and percentages for the various calls that were made.	
The server NFS_ACL display shows the counts and percentages for the various calls that were made.	
The client RPC display includes the following fields:	
<code>calls</code>	The total number of RPC calls made.
<code>badcalls</code>	The total number of calls rejected by the RPC layer.
<code>badxids</code>	The number of times a reply from a server was received which did not correspond to any outstanding call.
<code>timeouts</code>	The number of times a call timed out while waiting for a reply from the server.
<code>newcreds</code>	The number of times authentication information had to be refreshed.
<code>badverfs</code>	The number of times the call failed due to a bad verifier in the response.
<code>timers</code>	The number of times the calculated time-out value was greater than or equal to the minimum specified time-out value for a call.
<code>cantconn</code>	The number of times the call failed due to a failure to make a connection to the server.
<code>nomem</code>	The number of times the call failed due to a failure to allocate memory.
<code>interrupts</code>	The number of times the call was interrupted by a signal before completing.
<code>retrans</code>	The number of times a call had to be retransmitted due to a timeout while waiting for a reply from the server. Applicable only to RPC over connection-less transports.
<code>cant send</code>	The number of times a client was unable to send an RPC request over a connectionless transport when it tried to do so.

nfsstat(1M)

The client NFS display shows the number of calls sent and rejected, as well as the number of times a CLIENT handle was received (`clgets`), the number of times the CLIENT handle cache had no unused entries (`cltoomany`), as well as a count of the various calls and their respective percentages.

The client NFS_ACL display shows the counts and percentages for the various calls that were made.

The `-m` option includes information about mount flags set by mount options, mount flags internal to the system, and other mount information. See `mount_nfs(1M)`.

The following mount flags are set by mount options:

<code>sec</code>	sec has one of the following values:
<code>none</code>	No authentication.
<code>sys</code>	UNIX-style authentication (UID, GID).
<code>short</code>	Short hand UNIX-style authentication.
<code>dh</code>	des-style authentication (encrypted timestamps).
<code>krb5</code>	kerberos v5-style authentication.
<code>krb5i</code>	kerberos v5-style authentication with integrity.
<code>krb5p</code>	kerberos v5-style authentication with privacy.
<code>hard</code>	Hard mount.
<code>soft</code>	Soft mount.
<code>intr</code>	Interrupts allowed on hard mount.
<code>nointr</code>	No interrupts allowed on hard mount.
<code>noac</code>	Client is not caching attributes.
<code>rsize</code>	Read buffer size in bytes.
<code>wsiz</code>	Write buffer size in bytes.
<code>retrans</code>	NFS retransmissions.
<code>timeo</code>	Initial NFS timeout, in tenths of a second.
<code>nocto</code>	No close-to-open consistency.
<code>llock</code>	Local locking being used (no lock manager).
<code>grp</code>	System V group id inheritance.
<code>rpctimesync</code>	RPC time sync.

The following mount flags are internal to the system:

<code>printed</code>	"Not responding" message printed.

down	Server is down.
dynamic	Dynamic transfer size adjustment.
link	Server supports links.
symlink	Server supports symbolic links.
readdir	Use readdir instead of readdirplus.
acl	Server supports NFS_ACL.

The following flags relate to additional mount information:

vers	NFS version.
proto	Protocol.

The -m option also provides attribute cache timeout values. The following fields in -m output provide timeout values for attribute cache:

acregmin	Minimum seconds to hold cached file attributes.
acregmax	Maximum seconds to hold cached file attributes.
acdirmin	Minimum seconds to hold cached directory attributes.
acdirmax	Maximum seconds to hold cached directory attributes.

The following fields in -m output provide failover information:

noresponse	How many times servers have failed to respond.
failover	How many times a new server has been selected.
remap	How many times files have been re-evaluated to the new server.
currserver	Which server is currently providing NFS service. See the <i>System Administration Guide: IP Services</i> for additional details.

The fields in -m output shown below provide information on dynamic retransmissions. Note that these items are displayed only where dynamic retransmission is in use.

srtt	The value for the smoothed round-trip time, in milliseconds.
dev	Estimated deviation, in milliseconds.
cur	Current backed-off retransmission value, in milliseconds.

EXIT STATUS The following exit values are returned:

0	Successful completion.
>0	An error occurred.

nfsstat(1M)

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnfscu

SEE ALSO

`mount_nfs(1M)`, `attributes(5)`

Solaris 9 12/03 Installation Guide

System Administration Guide: IP Services

NAME	nisaddcred – create NIS+ credentials																				
SYNOPSIS	nisaddcred [-p <i>principal</i>] [-P <i>nis_principal</i>] [-l <i>login_password</i>] <i>auth_type</i> [<i>domain_name</i>] nisaddcred -r [<i>nis_principal</i>] [<i>domain_name</i>]																				
DESCRIPTION	The nisaddcred command is used to create security credentials for NIS+ principals. NIS+ credentials serve two purposes. The first is to provide authentication information to various services; the second is to map the authentication service name into a NIS+ principal name. When the nisaddcred command is run, these credentials get created and stored in a table named cred.org_dir in the default NIS+ domain. If <i>domain_name</i> is specified, the entries are stored in the cred.org_dir of the specified domain. The specified domain must either be the one to which you belong, or one in which you are authenticated and authorized to create credentials, that is, a subdomain. Note that the credentials of normal users must be stored in the same domain as their passwords. It is simpler to add credentials using nisclient(1M), because it obtains the required information itself. nispopulate(1M) is used for “bulk” updates and can also be used to add credentials for entries in the hosts and the passwd NIS+ tables. NIS+ principal names are used in specifying clients that have access rights to NIS+ objects. For more details, refer to the “Principal Names” subsection of the nis+(1) manual page. See nischmod(1), nischown(1), nis_objects(3NSL), and nis_groups(3NSL). Various other services can also implement access control based on these principal names. The cred.org_dir table is organized as follows: <table><tr><th>cname</th><th>auth_type</th><th>auth_name</th><th>public_data</th><th>private_data</th></tr><tr><td>user1.foo.com.</td><td>LOCAL</td><td>2990</td><td>10,102,44</td><td></td></tr><tr><td>user1.foo.com.</td><td>DES</td><td>unix.2990@foo.com</td><td>098...819</td><td>3b8...ab2</td></tr><tr><td>user1.foo.com.</td><td>DHmmm-n</td><td>unix.2990@foo.com</td><td>248...428</td><td>a42...f32</td></tr></table> The cname column contains a canonical representation of the NIS+ principal name. By convention, this name is the login name of a user, or the host name of a machine, followed by a dot (‘.’) followed by the fully qualified “home” domain of that principal. For users, the home domain is defined to be the domain where their DES credentials are kept. For hosts, their home domain is defined to be the domain name returned by the domainname(1M) command executed on that host. There are two basic types of <i>auth_type</i> entries in the cred.org_dir table, those with authentication type LOCAL, and those with authentication type DES, <i>auth_type</i>, specified on the command line in upper or lower case, should be either <i>local</i> or <i>des</i>.	cname	auth_type	auth_name	public_data	private_data	user1.foo.com.	LOCAL	2990	10,102,44		user1.foo.com.	DES	unix.2990@foo.com	098...819	3b8...ab2	user1.foo.com.	DHmmm-n	unix.2990@foo.com	248...428	a42...f32
cname	auth_type	auth_name	public_data	private_data																	
user1.foo.com.	LOCAL	2990	10,102,44																		
user1.foo.com.	DES	unix.2990@foo.com	098...819	3b8...ab2																	
user1.foo.com.	DHmmm-n	unix.2990@foo.com	248...428	a42...f32																	

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However, the `cred.org_dir` table may also be used to hold data for other values of *auth_type*. Currently, this is limited to the mechanisms listed on the `nisauthconf(1M)` man page, for which the `nisaddcred auth_type` argument is the same as the name of the mechanism. These mechanisms use a modified form of Secure RPC, and they are similar to the DES authentication type.

If the *auth_type* is `des`, and other authentication mechanisms are configured with `nisauthconf(1M)`, then credential entries are added or updated for each mechanism configured. To only add or update 1992-bit Diffie Hellman credentials, that is, those with the *auth_type* of DES, use `dh192-0` on the command line. If there are no authentication mechanisms configured, using `des` on the command line will only add or update 192-bit Diffie Hellman credentials.

Entries of type LOCAL are used by the NIS+ service to determine the correspondence between fully qualified NIS+ principal names and users identified by UIDs in the domain containing the `cred.org_dir` table. This correspondence is required when associating requests made using the `AUTH_SYS` RPC authentication flavor (see `rpc_clnt_auth(3NSL)`) to a NIS+ principal name. It is also required for mapping a UID in one domain to its fully qualified NIS+ principal name whose home domain may be elsewhere. The principal's credentials for any authentication flavor may then be sought for within the `cred.org_dir` table in the principal's home domain (extracted from the principal name). The same NIS+ principal may have LOCAL credential entries in more than one domain. Only users, and not machines, have LOCAL credentials. In their home domain, users of NIS+ should have both types of credentials.

The *auth_name* associated with the LOCAL type entry is a UID that is valid for the principal in the domain containing the `cred.org_dir` table. This may differ from that in the principal's home domain. The public information stored in *public_data* for this type contains a list of GIDs for groups in which the user is a member. The GIDs also apply to the domain in which the table resides. There is no private data associated with this type. Neither a UID nor a principal name should appear more than once among the LOCAL entries in any one `cred.org_dir` table.

The DES *auth_type* is used for Secure RPC authentication (see `secure_rpc(3NSL)`).

The authentication name associated with the DES *auth_type* is a Secure RPC *netname*. A Secure RPC *netname* has the form `unix.id@domain.com`, where *domain* must be the same as the domain of the principal. For principals that are users the *id* must be the UID of the principal in the principal's home domain. For principals that are hosts, the *id* is the host's name. In Secure RPC, processes running under effective UID 0 (root) are identified with the host principal. Unlike LOCAL, there cannot be more than one DES credential entry for one NIS+ principal in the NIS+ namespace.

The public information in an entry of authentication type DES is the public key for the principal. The private information in this entry is the private key of the principal encrypted by the principal's network password.

User clients of NIS+ should have credentials of both types in their home domain. In addition, a principal must have a LOCAL entry in the `cred.org_dir` table of each domain from which the principal wishes to make authenticated requests. A client of NIS+ that makes a request from a domain in which it does not have a LOCAL entry will be unable to acquire DES credentials. A NIS+ service running at security level 2 or higher will consider such users unauthenticated and assign them the name *nobody* for determining access rights.

This command can only be run by those NIS+ principals who are authorized to add or delete the entries in the `cred` table.

If credentials are being added for the caller itself, `nisaddcred` automatically performs a keylogin for the caller.

You can list the `cred` entries for a particular principal with `nismatch(1)`.

The `cred.org_dir` NIS+ table replaces the maps *publickey.byname* and *netid.byname* used in NIS (YP).

OPTIONS The following options are supported:

`-p principal`

The name *principal* specifies the name of the principal as defined by the naming rules for that specific mechanism. For example, LOCAL credential names are supplied with this option by including a string specifying a UID. For DES credentials, the name should be a Secure RPC netname of the form `unix.id@domain.com`, as described earlier. If the `-p` option is not specified, the *auth_name* field is constructed from the effective UID of the current process and the name of the local domain.

`-P nis_principal`

Use the NIS+ principal name *nis_principal*. This option should be used when creating LOCAL or DES credentials for users whose home domain is different than the local machine's default domain.

Whenever the `-P` option is not specified, `nisaddcred` constructs a principal name for the entry as follows. When it is not creating an entry of type LOCAL, `nisaddcred` calls `nis_local_principal`, which looks for an existing LOCAL entry for the effective UID of the current process in the `cred.org_dir` table and uses the associated principal name for the new entry. When creating an entry of authentication type LOCAL, `nisaddcred` constructs a default NIS+ principal name by taking the login name of the effective UID for its

nisaddcred(1M)

	own process, and appending to it a dot ('.') followed by the local machine's default domain. If the caller is a superuser, the machine name is used instead of the login name.
<code>-l login_password</code>	Use the <i>login_password</i> specified as the password to encrypt the secret key for the credential entry. This overrides the prompting for a password from the shell. This option is intended for administration scripts only. Prompting guarantees not only that no one can see your password on the command line using <code>ps(1)</code> but it also checks to make sure you have not made any mistakes. <i>login_password</i> does not really have to be the user's password but if it is, it simplifies logging in.
<code>-r [nis_principal]</code>	Remove all credentials associated with the principal <i>nis_principal</i> from the <code>cred.org_dir</code> table. This option can be used when removing a client or user from the system. If <i>nis_principal</i> is not specified the default is to remove credentials for the current <i>user</i> . If <i>domain_name</i> is not specified, the operation is executed in the default NIS+ domain.

EXAMPLES

EXAMPLE 1 Adding the LOCAL and DES Credentials

The following examples illustrate how to add the LOCAL and DES credentials for some user, *user1*, with a UID of 2990, who is an NIS+ user principal in the *some.domain.com*. NIS+ domain:

```
example% nisaddcred -p 2990 -P user1.some.domain.com. local
```

Note that credentials are always added in the `cred.org_dir` table in the domain where `nisaddcred` is run, unless *domain_name* is specified as the last parameter on the command line. If credentials are being added from the domain server for its clients, then *domain_name* should be specified. The caller should have adequate permissions to create entries in the `cred.org_dir` table.

The system administrator can add a DES credential for the same user, using the following example:

```
example% nisaddcred -p unix.2990@some.domain.com -P user1.some.domain.com. des
```

Please note that DES credentials can be added only after the LOCAL credentials have been added. Also, if the system is configured to use more than one authentication mechanism, credentials will be made for each mechanism configured. See `nisauthconf(1M)`.

Note that the secure RPC netname does not end with a dot ('.') while the NIS+ principal name, specified with the `-P` option, does. This command should be executed from a machine in the same domain as is the user.

EXAMPLE 1 Adding the LOCAL and DES Credentials (Continued)

The following example shows how to add a machine's DES credentials in the same domain:

```
example% nisaddcred -p unix.foo@some.domain.com -P foo.some.domain.com. des
```

Please note that no LOCAL credentials are needed in this case.

The following example illustrates how to add a NIS+ workstation's principal DES credential:

```
example% nisaddcred -p unix.host1@sub.some.domain.com \
-P newhost.sub.some.domain.com. des sub.some.domain.com.
```

This format is particularly useful if you are running this command from a server which is in a higher domain than sub.some.domain.com. Without the last option for domain name, `nisaddcred` would fail because it would attempt to use the default domain of some.domain.com.

The following example illustrates adding DES credentials without being prompted for the root login password:

```
example% nisaddcred -p unix.2990@some.domain.com \
-P user1.some.domain.com. -l login_password des
```

The following example shows how to add a credential for a user using a specific authentication mechanism that was previously configured with `nisauthconf(1M)`. See `nisauthconf(1M)` for a list of the valid values of *auth_type*:

```
example% nisaddcred -p unix.2990@some.domain.com \
-P user.1.some.domain.com dh640-0
```

The password should be the same for all the credentials that belong to the user. Otherwise, only the credentials encrypted with the user's password will be used at login, and the user will have to run `chkey(1)` using the `-p` option.

The following example shows how to add a DES credential when other authentication mechanisms are configured on the system:

```
example% nisaddcred -p unix.2990@some.domain.com \
-P user1.some.domain.com dh192-0
```

EXIT STATUS

The following exit values are returned:

- 0 Successful operation.
- 1 Operation failed.

nisaddcred(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO chkey(1), keylogin(1), nis+(1), nischmod(1), nischown(1), nismatch(1), nistbladm(1), ps(1), domainname(1M), nisclient(1M), nispopulate(1M), nis_groups(3NSL), nis_local_names(3NSL), nis_objects(3NSL), rpc_clnt_auth(3NSL), secure_rpc(3NSL), attributes(5)

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

NAME	<code>nisaddent</code> – create NIS+ tables from corresponding <code>/etc</code> files or NIS maps
SYNOPSIS	<pre> /usr/lib/nis/nisaddent [-D defaults] [-Paorv] [-t table] type [nisdomain] /usr/lib/nis/nisaddent [-D defaults] [-Paprmov] -f file [-t table] type [nisdomain] /usr/lib/nis/nisaddent [-D defaults] [-Parmv] [-t table] -y ypdomain [-Y map] type [nisdomain] /usr/lib/nis/nisaddent -d [-AMoq] [-t table] type [nisdomain] </pre>
DESCRIPTION	<code>nisaddent</code> creates entries in NIS+ tables from their corresponding <code>/etc</code> files and NIS maps. This operation is customized for each of the standard tables that are used in the administration of Solaris systems. The <code>type</code> argument specifies the type of the data being processed. Legal values for this <code>type</code> are one of <code>aliases</code>, <code>bootparams</code>, <code>ethers</code>, <code>group</code>, <code>hosts</code>, <code>ipnodes</code>, <code>netid</code>, <code>netmasks</code>, <code>networks</code>, <code>passwd</code>, <code>protocols</code>, <code>publickey</code>, <code>rpc</code>, <code>services</code>, <code>shadow</code>, or <code>timezone</code> for the standard tables, or <code>key-value</code> for a generic two-column (key, value) table. For a site specific table, which is not of <code>key-value</code> type, one can use <code>nistbladm(1)</code> to administer it. The NIS+ tables should have already been created by <code>nistbladm(1)</code>, <code>nissetup(1M)</code>, or <code>nisserver(1M)</code>. It is easier to use <code>nispopulate(1M)</code> instead of <code>nisaddent</code> to populate the system tables. By default, <code>nisaddent</code> reads from the standard input and adds this data to the NIS+ table associated with the <code>type</code> specified on the command line. An alternate NIS+ table may be specified with the <code>-t</code> option. For type <code>key-value</code>, a table specification is required. Note that the <code>data</code> type can be different than the table name (<code>-t</code>). For example, the automounter tables have <code>key-value</code> as the table type. Although, there is a <code>shadow</code> data type, there is no corresponding <code>shadow</code> table. Both the <code>shadow</code> and the <code>passwd</code> data is stored in the <code>passwd</code> table itself. Files may be processed using the <code>-f</code> option, and NIS version 2 (YP) maps may be processed using the <code>-y</code> option. The merge option is not available when reading data from standard input. When a <code>ypdomain</code> is specified, the <code>nisaddent</code> command takes its input from the dbm files for the appropriate NIS map (<code>mail.aliases</code>, <code>bootparams</code>, <code>ethers.byaddr</code>, <code>group.byname</code>, <code>hosts.byaddr</code>, <code>hosts.byname</code>, <code>ipnodes.byaddr</code>, <code>ipnodes.byname</code>, <code>netid.byname</code>, <code>netmasks.byaddr</code>, <code>networks.byname</code>, <code>passwd.byname</code>, <code>protocols.byname</code>, <code>publickey.byname</code>, <code>rpc.bynumber</code>, <code>services.byname</code>, or <code>timezone.byname</code>). An alternate NIS map may be specified with the <code>-Y</code> option. For type <code>key-value</code>, a map specification is required. The map must be in the <code>/var/yp/ypdomain</code> directory on the local machine. Note that <code>ypdomain</code> is case sensitive. <code>ypxfr(1M)</code> can be used to get the NIS maps.

nisaddent(1M)

If a *nisdomain* is specified, *nisaddent* operates on the NIS+ table in that NIS+ domain, otherwise the default domain is used.

In terms of performance, loading up the tables is fastest when done through the dbm files (-y).

To accommodate other credential entries used by other authentication mechanisms stored in the *cred.org_dir* table, the *publickey* dump output has been modified to include a special *algorithm type* field. This format is incompatible with older versions of *nisaddent*. To produce dumps that can be read by older versions of *nisaddent*, or to load dumps created by such older versions, use the -o option.

OPTIONS

The following options are supported:

-a	Add the file or map to the NIS+ table without deleting any existing entries. This option is the default. Note that this mode only propagates additions and modifications, not deletions.						
-A	All data. This option specifies that the data within the table and all of the data in tables in the initial table's concatenation path be returned.						
-d	Dump the NIS+ table to the standard output in the appropriate format for the given <i>type</i> . For tables of type <i>key-value</i> , use <i>niscat(1)</i> instead. To dump the <i>cred</i> table, dump the <i>publickey</i> and the <i>netid</i> types.						
-D <i>defaults</i>	This option specifies a different set of defaults to be used during this operation. The <i>defaults</i> string is a series of tokens separated by colons. These tokens represent the default values to be used for the generic object properties. All of the legal tokens are described below. <table><tr><td><i>t1l=time</i></td><td>This token sets the default time to live for objects that are created by this command. The value <i>time</i> is specified in the format as defined by the <i>nischtt1(1)</i> command. The default is 12 hours.</td></tr><tr><td><i>owner=ownername</i></td><td>This token specifies that the NIS+ principal <i>ownername</i> should own the created object. The default for this value is the principal who is executing the command.</td></tr><tr><td><i>group=groupname</i></td><td>This token specifies that the group <i>groupname</i> should be the group owner for the object that is created. The default is NULL.</td></tr></table>	<i>t1l=time</i>	This token sets the default time to live for objects that are created by this command. The value <i>time</i> is specified in the format as defined by the <i>nischtt1(1)</i> command. The default is 12 hours.	<i>owner=ownername</i>	This token specifies that the NIS+ principal <i>ownername</i> should own the created object. The default for this value is the principal who is executing the command.	<i>group=groupname</i>	This token specifies that the group <i>groupname</i> should be the group owner for the object that is created. The default is NULL.
<i>t1l=time</i>	This token sets the default time to live for objects that are created by this command. The value <i>time</i> is specified in the format as defined by the <i>nischtt1(1)</i> command. The default is 12 hours.						
<i>owner=ownername</i>	This token specifies that the NIS+ principal <i>ownername</i> should own the created object. The default for this value is the principal who is executing the command.						
<i>group=groupname</i>	This token specifies that the group <i>groupname</i> should be the group owner for the object that is created. The default is NULL.						

	<code>access=rights</code>	This token specifies the set of access rights that are to be granted for the given object. The value <i>rights</i> is specified in the format as defined by the <code>nischmod(1)</code> command. The default is - - - -rmcdr - - -r - - -
<code>-f file</code>	Specify that <code>file</code> should be used as the source of input (instead of the standard input).	
<code>-m</code>	Merge the file or map with the NIS+ table. This is the most efficient way to bring an NIS+ table up to date with a file or NIS map when there are only a small number of changes. This option adds entries that are not already in the database, modifies entries that already exist (if changed), and deletes any entries that are not in the source. Use the <code>-m</code> option whenever the database is large and replicated, and the map being loaded differs only in a few entries. This option reduces the number of update messages that have to be sent to the replicas. Also see the <code>-r</code> option.	
<code>-M</code>	Master server only. This option specifies that lookups should be sent to the master server. This guarantees that the most up-to-date information is seen at the possible expense that the master server may be busy, or that it may be made busy by this operation.	
<code>-o</code>	Use strictly conforming <code>publickey</code> files. Dumps will not add the <code>algorithm type</code> field used by additional authentication mechanisms that might be configured using <code>nisauthconf(1M)</code> . 192-bit keys that are dumped using this option can be read by previous versions of <code>nisaddent</code> . However, the <code>algorithm</code> field will be lost and assumed to be "0" when read. Use the <code>-o</code> option when reading <code>publickey</code> files from previous versions of <code>nisaddent</code> to avoid warnings about the missing <code>algorithm</code> field.	
<code>-p</code>	Process the password field when loading password information from a file. By default, the password field is ignored because it is usually not valid (the actual password appears in a shadow file).	
<code>-P</code>	Follow concatenation path. This option specifies that lookups should follow the concatenation path of a table if the initial search is unsuccessful.	
<code>-q</code>	Dump tables in "quick" mode. The default method for dumping tables processes each entry individually. For some tables, for example, <code>hosts</code> , multiple entries must be combined into a single line, so extra requests to the server must be made. In "quick" mode, all of the entries for a table are retrieved in one call to the server, so the table can be dumped more quickly. However, for	

nisaddent(1M)

	large tables, there is a chance that the process will run out of virtual memory and the table will not be dumped.
-r	Replace the file or map in the existing NIS+ table by first deleting any existing entries, and then add the entries from the source (<code>/etc</code> files, or NIS+ maps). This option has the same effect as the -m option. The use of this option is <i>strongly</i> discouraged due to its adverse impact on performance, unless there are a large number of changes.
-t table	Specify that <i>table</i> should be the NIS+ table for this operation. This should be a relative name as compared to your default domain or the <code>domainname</code> if it has been specified.
-v	Verbose.
-y ypdomain	Use the dbm files for the appropriate NIS map, from the NIS domain <i>ypdomain</i> , as the source of input. The files are expected to be on the local machine in the <code>/var/yp/ypdomain</code> directory. If the machine is not an NIS server, use <code>ypxfr(1M)</code> to get a copy of the dbm files for the appropriate map.
-Y map	Use the dbm files for <i>map</i> as the source of input.

EXAMPLES

EXAMPLE 1 Using `nisaddent`

This example adds the contents of `/etc/passwd` to the `passwd.org_dir` table:

```
example% cat /etc/passwd | nisaddent passwd
```

The next example adds the shadow information. Note that the table type here is “shadow”, not “passwd”, even though the actual information is stored in the `passwd` table:

```
example% cat /etc/shadow | nisaddent shadow
```

This example replaces the `hosts.org_dir` table with the contents of `/etc/hosts` (in verbose mode):

```
example% nisaddent -rv -f /etc/hosts hosts
```

This example merges the `passwd` map from `ypdomain` with the `passwd.org_dir.nisdomain` table (in verbose mode). The example assumes that the `/var/yp/myypdomain` directory contains the `yppasswd` map.

```
example% nisaddent -mv -y myypdomain passwd nisdomain
```

This example merges the `auto.master` map from `myypdomain` with the `auto_master.org_dir` table:

```
example% nisaddent -m -y myypdomain -Y auto.master \
    -t auto_master.org_dir key-value
```

EXAMPLE 1 Using `nisaddent` (Continued)

This example dumps the `hosts.org_dir` table:

```
example% nisaddent -d hosts
```

This example dumps the `ipnodes.org_dir` table:

```
example% nisaddent -d ipnodes
```

ENVIRONMENT VARIABLES

NIS_DEFAULTS This variable contains a default string that will override the NIS+ standard defaults. If the `-D` switch is used, those values will then override both the `NIS_DEFAULTS` variable and the standard defaults. To avoid security accidents, the access rights in the `NIS_DEFAULTS` variable are ignored for the `passwd` table (but access rights specified with `-D` are used).

NIS_PATH If this variable is set, and neither the *nisdomain* nor the *table* are fully qualified, each directory specified in `NIS_PATH` will be searched until the table is found (see `nisdefaults(1)`).

EXIT STATUS

The following exit values are returned:

- 0 Successful operation.
- 1 Failure caused by an error other than parsing.
- 2 A parsing error occurred on an entry. A parsing error does not cause termination; the invalid entries are simply skipped.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO

`niscat(1)`, `nischmod(1)`, `nischttl(1)`, `nisdefaults(1)`, `nistbladm(1)`, `nisauthconf(1M)`, `nispopulate(1M)`, `nisserver(1M)`, `nissetup(1M)`, `ypxfr(1M)`, `hosts(4)`, `ipnodes(4)`, `passwd(4)`, `shadow(4)`, `attributes(5)`

NOTES

NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

nisauthconf(1M)

NAME	nisauthconf – configure NIS+ security								
SYNOPSIS	nisauthconf [-v] [<i>mechanism</i> , ...]								
DESCRIPTION	nisauthconf controls which authentication flavors NIS+ should use when communicating with other NIS+ clients and servers. If the command is not executed, then NIS+ will default to the AUTH_DES authentication flavor when running security level 2. See <code>rpc.nisd(1M)</code>. nisauthconf takes a list of authentication <i>mechanism</i>'s in order of preference. An authentication <i>mechanism</i> may use one or more authentication flavors listed below. If <code>des</code> is the only specified mechanism, then NIS+ only use AUTH_DES with other NIS+ clients and servers. If <code>des</code> is the first mechanism, then other authentication <i>mechanism</i>'s after <code>des</code> will be ignored by NIS+, except for <code>nisaddcred(1M)</code>. After changing the mechanism configuration, the <code>keyserver(1M)</code> daemon must be restarted. Note that doing so will remove encryption keys stored by the running <code>keyserver</code> process. This means that a reboot usually is the safest option when the mechanism configuration has been changed. The following mechanisms are available: <table> <tr> <th>Authentication <i>mechanism</i></th><th>Authentication Flavor</th></tr> <tr> <td>des</td><td>AUTH_DES</td></tr> <tr> <td>dh640-0</td><td>RPCSEC_GSS using 640-bit Diffie-Hellman keys</td></tr> <tr> <td>dh1024-0</td><td>RPCSEC_GSS using 1024-bit Diffie-Hellman keys</td></tr> </table> If no mechanisms are specified, then a list of currently configured mechanisms is printed.	Authentication <i>mechanism</i>	Authentication Flavor	des	AUTH_DES	dh640-0	RPCSEC_GSS using 640-bit Diffie-Hellman keys	dh1024-0	RPCSEC_GSS using 1024-bit Diffie-Hellman keys
Authentication <i>mechanism</i>	Authentication Flavor								
des	AUTH_DES								
dh640-0	RPCSEC_GSS using 640-bit Diffie-Hellman keys								
dh1024-0	RPCSEC_GSS using 1024-bit Diffie-Hellman keys								
OPTIONS	-v Displays a verbose table listing the currently configured authentication mechanisms.								
EXAMPLES	EXAMPLE 1 Configuring a System with only RPCSEC_GSS Authentication Flavor To configure a system to use only the RPCSEC_GSS authentication flavor with 640-bit Diffie-Hellman keys, execute the following as root: <pre>example# /usr/lib/nis/nisauthconf dh640-0</pre> EXAMPLE 2 Configuring a System with both RPCSEC_GSS and AUTH_DES Authentication Flavors To configure a system to use both RPCSEC_GSS (with 640-bit Diffie-Hellman keys) and AUTH_DES authentication flavors: <pre>example# /usr/lib/nis/nisauthconf dh640-0 des</pre>								

EXAMPLE 3 Transitioning to Other Authentication Flavors

The following example can be used while adding credentials for a new mechanism before NIS+ is authenticating with the new mechanism:

```
example# /usr/lib/nis/nisauthconf des dh640-0
```

Note that except for nisaddcred(1M), NIS+ will not use mechanisms that follow 'des.'

EXIT STATUS The following exit values are returned:

0 Successful completion.
1 An error occurred.

FILES /etc/rpcsec/nisplussec.conf
NIS+ authentication configuration file. This file may change or be removed in future versions of Solaris.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO nis+(1), keyserv(1M), nisaddcred(1M), rpc.nisd(1M), attributes(5)

NOTES A NIS+ client of a server that is configured for either dh640-0 or dh1024-0 must run Solaris 7 or later, even if the server is also configured with des.

NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

nisbackup(1M)

NAME	nisbackup – backup NIS+ directories
SYNOPSIS	nisbackup [-v] <i>backup-dir</i> <i>directory</i> ... nisbackup [-v] -a <i>backup-dir</i>
DESCRIPTION	nisbackup backs up a NIS+ directory object on a NIS+ master server. Updates to the NIS+ database will be temporarily disabled while nisbackup is running. The <i>backup-dir</i> is a UNIX directory that must exist prior to running nisbackup. The nisbackup command can be used to backup an individual NIS+ directory object or all (-a) of the NIS+ directory objects served by a master server. The NIS+ directory objects being backed up will be placed into subdirectories under the <i>backup-dir</i> directory. These subdirectories are named according to the NIS+ directory object they contain. nisbackup operates on individual NIS+ directory objects (for example, <i>org_dir.wiz.com</i>). This allows an administrator to selectively backup specific directories. The <code>rpc.nisd(1M)</code> process must be running on the master server with a stable NIS+ database for nisbackup to complete. nisbackup will not attempt to correct any corruption in the NIS+ database, so it is important that backups be done regularly as part of the NIS+ administration. The first synopsis is used to backup a single NIS+ directory object or a list of NIS+ directory objects. The objects can be partially qualified or fully qualified. The machine on which the command is executing must be the master for the NIS+ directory objects specified. The second synopsis will backup all of the NIS+ directory objects that are served by this master. The -a option is the recommended method of backing up a master server, since it will backup all NIS+ directory objects that are served by this master. If this server is a master server for more than one domain, the backup will include NIS+ directories that belong to all of the domains served. Individual NIS+ directory objects can be selected for restoring from a <i>backup-dir</i> created with the -a option. See <code>nisrestore(1M)</code>. The -a option only includes directory objects for which this server is the master. It is possible, but not recommended, to configure a master server as a replica for other domains. The objects belonging to those replicated domains will not be backed up with the -a option. The backup of replicated objects must be run on the master server for those objects. Do not use the same <i>backup-dir</i> to backup different master servers. Each master server must have its own <i>backup-dir</i>. nisbackup will set the <code>rpc.nisd(1M)</code> to read only mode, which will disable updates to the NIS+ database. This is necessary to ensure the consistency of the backup. For this reason, nisbackup should not be run while large numbers of updates are being applied to the NIS+ database. Update utilities such as <code>nisaddent(1M)</code> should not be run simultaneously with nisbackup.

OPTIONS	-a	Creates a backup of all NIS+ directory objects for which this server is a master.
	-v	Verbose option. Additional output will be produced and sent to syslog(3C) upon execution of the command (see syslog.conf(4)).
OPERANDS	<i>backup-dir</i>	The directory into which the subdirectories containing the backed up objects are placed. This must be created prior to running nisbackup.
	<i>directory</i>	The NIS+ directory object(s) being backed up.
EXAMPLES	EXAMPLE 1 Backup of the <i>org_dir</i> NIS+ directory object of the domain <i>foo.com</i> on a master server to a directory named <i>/backup</i> To backup the <i>org_dir</i> NIS+ directory object of the domain <i>foo.com</i> on a master server to a directory named <i>/backup</i>: <pre>master_server# nisbackup /backup org_dir.foo.com.</pre>	
	EXAMPLE 2 Backup of the entire NIS+ domain <i>foo.com</i> to a directory named <i>/backup</i> To backup the entire NIS+ domain <i>foo.com</i> to a directory named <i>/backup</i>: <pre>master_server# nisbackup /backup foo.com. \ org_dir.foo.com. groups_dir.foo.com. \ ctx_dir.foo.com.</pre>	
	EXAMPLE 3 Backup of an entire NIS+ database to a backup directory named <i>/backup</i> To backup an entire NIS+ database to a backup directory named <i>/backup</i>: <pre>master_server# nisbackup -a /backup</pre>	
EXIT STATUS	0	Successful completion.
	1	An error occurred.
FILES	<i>/backup-dir/backup_list</i> This ascii file contains a list of all the objects contained in this <i>backup-dir</i> directory.	
	<i>/backup-dir/directory-object</i> A subdirectory that is created in the <i>backup-dir</i> that contains the NIS+ directory-object backup.	
	<i>/backup-dir/directory-object/data</i> A subdirectory that contains the data files that are part of the NIS+ directory-object backup.	
	<i>/backup-dir/directory-object/last.upd</i> This data file contains timestamp information about the directory-object.	

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/backup-dir/directory-object/data.dict

A NIS+ data dictionary for all of the objects contained in the NIS+ directory-object backup.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO `nis+(1)`, `nisdefaults(1)`, `nism(1)`, `nisrestore(1M)`, `rpc.nisd(1M)`, `syslog(3C)`, `xfn(3XFN)`, `nisfiles(4)`, `syslog.conf(4)`, `attributes(5)`

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

NAME	nis_cachemgr – NIS+ utility to cache location information about NIS+ servers		
SYNOPSIS	/usr/sbin/nis_cachemgr [-i] [-v]		
DESCRIPTION	The <code>nis_cachemgr</code> daemon maintains a cache of NIS+ directory objects and active servers for domains. It is responsible for locating servers for a domain on behalf of client processes. This improves performance because only one process has to search for servers. The cache contains location information necessary to contact the NIS+ servers. This includes transport addresses, information needed to authenticate the server, and a time to live field which gives a hint on how long the directory object can be cached. The cache helps to improve the performance of the clients that are traversing the NIS+ name space. <code>nis_cachemgr</code> should be running on all the machines that are using NIS+. However, it is not required that the <code>nis_cachemgr</code> program be running in order for NIS+ requests to be serviced. The cache maintained by this program is shared by all the processes that access NIS+ on a machine. The cache is maintained in a file that is memory mapped by all the processes. See <code>mmap(2)</code>. On start up, <code>nis_cachemgr</code> initializes the cache from the cold start file and preserves unexpired entries that already exist in the cache file. See <code>nisinit(1M)</code>. Thus, the cache survives machine reboots. The <code>nis_cachemgr</code> program is normally started from a system startup script. <code>nisshowcache(1M)</code> can be used to look at the cached objects and active servers. The <code>nisprefadm(1M)</code> command can be used to control which NIS+ servers the <code>nis_cachemgr</code> program will try to select. The <code>nis_cachemgr</code> program makes NIS+ requests under the NIS+ principal name of the host on which it runs. Before running <code>nis_cachemgr</code>, security credentials for the host should be added to the <code>cred.org_dir</code> table in the host's domain using <code>nisaddcred(1M)</code>. Credentials of type DES will be needed if the NIS+ service is operating at security level 2 (see <code>rpc.nisd(1M)</code>). See the DIAGNOSTICS section, below. Additionally, a "keylogin -r" should be done on the machine.		
OPTIONS	-i Force <code>nis_cachemgr</code> to ignore the previous cache file and reinitialize the cache from just the cold start file. By default, the cache manager initializes itself from both the cold start file and the old cache file, thereby maintaining the entries in the cache across machine reboots. -v This flag sets verbose mode. In this mode, the <code>nis_cachemgr</code> program logs not only errors and warnings, but also additional status messages. The additional messages are logged using <code>syslog(3C)</code> with a priority of <code>LOG_INFO</code>.		
FILES	<code>/var/nis/NIS_SHARED_DIRCACHE</code>	the shared cache file	
	<code>/var/nis/NIS_COLD_START</code>	the coldstart file	
	<code>/etc/init.d/rpc</code>	initialization scripts for NIS+	

nis_cachemgr(1M)

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

keylogin(1), nisaddcred(1M), nisinit(1M), nisprefadm(1M),
nisshowcache(1M), rpc.nisd(1M), mmap(2), rpc(3NSL), syslog(3C),
nisfiles(4), attributes(5)

DIAGNOSTICS

The nis_cachemgr daemon logs error messages and warnings using syslog(3C). Error messages are logged to the DAEMON facility with a priority of LOG_ERR . Warning messages are logged with a priority of LOG_WARNING. Additional status messages can be obtained using the -v option.

NOTES

NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

NAME	nisclient – initialize NIS+ credentials for NIS+ principals
SYNOPSIS	<pre> /usr/lib/nis/nisclient -c [-x] [-o] [-v] [-l <network_password>] [-d <NIS+_domain>] client_name... /usr/lib/nis/nisclient -i [-x] [-v] -h <NIS+_server_host> [-a <NIS+_server_addr>] [-k <key_domain>] [-d <NIS+_domain>] [-s 0 2] /usr/lib/nis/nisclient -u [-x] [-v] /usr/lib/nis/nisclient -r [-x] </pre>
DESCRIPTION	The nisclient shell script can be used to: ■ create NIS+ credentials for hosts and users ■ initialize NIS+ hosts and users ■ restore the network service environment NIS+ credentials are used to provide authentication information of NIS+ clients to NIS+ service. Use the first synopsis (-c option) to create individual NIS+ credentials for hosts or users. You must be logged in as a NIS+ principal in the domain for which you are creating the new credentials. You must also have write permission to the local "cred" table. The <i>client_name</i> argument accepts any valid host or user name in the NIS+ domain (for example, the <i>client_name</i> must exist in the hosts or passwd table). nisclient verifies each <i>client_name</i> against both the host and passwd tables, then adds the proper NIS+ credentials for hosts or users. Note that if you are creating NIS+ credentials outside of your local domain, the host or user must exist in the host or passwd tables in both the local and remote domains. By default, nisclient will not overwrite existing entries in the credential table for the hosts and users specified. To overwrite, use the -o option. After the credentials have been created, nisclient will print the command that must be executed on the client machine to initialize the host or the user. The -c option requires a network password for the client which is used to encrypt the secret key for the client. You can either specify it on the command line with the -l option or the script will prompt you for it. You can change this network password later with passwd(1) or chkey(1). nisclient -c is not intended to be used to create NIS+ credentials for all users and hosts which are defined in the passwd and hosts tables. To define credentials for all users and hosts, use nispopulate(1M). Use the second synopsis (-i option) to initialize a NIS+ client machine. The -i option can be used to convert machines to use NIS+ or to change the machine's domainname. You must be logged in as super-user on the machine that is to become a NIS+ client. Your administrator must have already created the NIS+ credential for this host by using nisclient -c or nispopulate -C. You will need the network password your administrator created. nisclient will prompt you for the network password to decrypt your secret key and then for this machine's root login password to generate a

`nisclient(1M)`

new set of secret/public keys. If the NIS+ credential was created by your administrator using `nisclient -c`, then you can simply use the initialization command that was printed by the `nisclient` script to initialize this host instead of typing it manually.

To initialize an unauthenticated NIS+ client machine, use the `-i` option with `-s 0`. With these options, the `nisclient -i` option will not ask for any passwords.

During the client initialization process, files that are being modified are backed up as `files.no_nisplus`. The files that are usually modified during a client initialization are: `/etc/defaultdomain`, `/etc/nsswitch.conf`, `/etc/inet/hosts`, and, if it exists, `/var/nis/NIS_COLD_START`. Notice that a file will not be saved if a backup file already exists.

The `-i` option does not set up a NIS+ client to resolve hostnames using DNS. Please refer to the DNS documentation for information on setting up DNS. (See `resolv.conf(4)`).

It is not necessary to initialize either NIS+ root master servers or machines that were installed as NIS+ clients using `suninstall(1M)`.

Use the third synopsis (`-u` option) to initialize a NIS+ user. You must be logged in as the user on a NIS+ client machine in the domain where your NIS+ credentials have been created. Your administrator should have already created the NIS+ credential for your username using `nisclient -c` or `nispopulate(1M)`. You will need the network password your administrator used to create the NIS+ credential for your username. `nisclient` will prompt you for this network password to decrypt your secret key and then for your login password to generate a new set of secret/public keys.

Use the fourth synopsis (`-r` option) to restore the network service environment to whatever you were using before `nisclient -i` was executed. You must be logged in as super-user on the machine that is to be restored. The restore will only work if the machine was initialized with `nisclient -i` because it uses the backup files created by the `-i` option.

Reboot the machine after initializing a machine or restoring the network service.

OPTIONS The following options are supported:

<code>-a <NIS+_server_addr></code>	Specifies the IP address for the NIS+ server. This option is used <i>only</i> with the <code>-i</code> option.
<code>-c</code>	Adds DES credentials for NIS+ principals.
<code>-d <NIS+_domain></code>	Specifies the NIS+ domain where the credential should be created when used in conjunction with the <code>-c</code> option. It specifies the name for the new NIS+ domain when used in conjunction with the <code>-i</code> option. The default is your current domainname.

-h <NIS+_server_host>	Specifies the NIS+ server's hostname. This option is used <i>only</i> with the -i option.
-i	Initializes a NIS+ client machine.
-l <network_password>	Specifies the network password for the clients. This option is used <i>only</i> with the -c option. If this option is not specified, the script will prompt you for the network password.
-k <key_domain>	This option specifies the domain where root's credentials are stored. If a domain is not specified, then the system default domain is assumed.
-o	Overwrites existing credential entries. The default is not to overwrite. This is used <i>only</i> with the -c option.
-r	Restores the network service environment.
-s 0 2	Specifies the authentication level for the NIS+ client. Level 0 is for unauthenticated clients and level 2 is for authenticated (DES) clients. The default is to set up with level 2 authentication. This is used <i>only</i> with the -i option. <code>nisclient</code> always uses level 2 authentication (DES) for both -c and -u options. There is no need to run <code>nisclient</code> with -u and -c for level 0 authentication. To configure authentication mechanisms other than DES at security level 2, use <code>nisauthconf(1M)</code> before running <code>nisclient</code> .
-u	Initializes a NIS+ user.
-v	Runs the script in verbose mode.
-x	Turns the "echo" mode on. The script just prints the commands that it would have executed. Notice that the commands are not actually executed. The default is off.

EXAMPLES**EXAMPLE 1** Adding the DES Credential in the Local Domain

To add the DES credential for host `sunws` and user `fred` in the local domain:

```
example% /usr/lib/nis/nisclient -c sunws fred
```

EXAMPLE 2 Adding the DES Credential in a Specified Domain

To add the DES credential for host `sunws` and user `fred` in domain `xyz.sun.com.`:

```
example% /usr/lib/nis/nisclient -c -d xyz.sun.com. sunws fred
```

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EXAMPLE 3 Initializing the Host in a Specific Domain

To initialize host sunws as a NIS+ client in domain xyz.sun.com. where nisplus_server is a server for the domain xyz.sun.com.:

```
example# /usr/lib/nis/nisclient -i -h nisplus_server -d xyz.sun.com
```

The script will prompt you for the IP address of nisplus_server if the server is not found in the /etc/hosts file. The -d option is needed only if your current domain name is different from the new domain name.

EXAMPLE 4 Initializing the Host as an Unauthenticated Client in a Specific Domain

To initialize host sunws as an unauthenticated NIS+ client in domain xyz.sun.com. where nisplus_server is a server for the domain xyz.sun.com:

```
example# /usr/lib/nis/nisclient -i -S 0 \  
-h nisplus_server -d xyz.sun.com. -a 129.140.44.1
```

EXAMPLE 5 Initializing the User as a NIS+ principal

To initialize user fred as a NIS+ principal, log in as user fred on a NIS+ client machine.

```
example% /usr/lib/nis/nisclient -u
```

FILES	/var/nis/NIS_COLD_START	This file contains a list of servers, their transport addresses, and their Secure RPC public keys that serve the machines default domain.
	/etc/defaultdomain	The system default domainname.
	/etc/nsswitch.conf	Configuration file for the name-service switch.
	/etc/inet/hosts	Local host name database.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO chkey(1), keylogin(1), nis+(1), passwd(1), keyserv(1M), nisaddcred(1M), nisauthconf(1M), nisinit(1M), nispopulate(1M), suninstall(1M), nsswitch.conf(4), resolv.conf(4), attributes(5)

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

nisinit(1M)

NAME	nisinit – NIS+ client and server initialization utility
SYNOPSIS	nisinit -r nisinit -pY D N <i>parent_domain</i> <i>host</i>... nisinit -c [-k <<i>key_domain</i>>] -H <i>host</i> -B -C <i>coldstart</i>
DESCRIPTION	nisinit initializes a machine to be a NIS+ client or an NIS+ root master server. It may be easier to use nisclient(1M) or nisserver(1M) to accomplish this same task.
OPTIONS	-r Initialize the machine to be a NIS+ root server. This option creates the file /var/nis/data/root.object and initialize it to contain information about this machine. It uses the sysinfo(2) system call to retrieve the name of the default domain. To initialize the machine as an NIS+ root server, it is advisable to use the “-r” option of nisserver(1M), instead of using “nisinit -r”. -p Y D N <i>parent_domain</i> <i>host</i> ... This option is used on a root server to initialize a /var/nis/data/parent.object to make this domain a part of the namespace above it. Only root servers can have parent objects. A parent object describes the namespace “above” the NIS+ root. If this is an isolated domain, this option should not be used. The argument to this option tells the command what type of name server is serving the domain above the NIS+ domain. When clients attempt to resolve a name that is outside of the NIS+ namespace, this object is returned with the error NIS_FOREIGNNS indicating that a name space boundary has been reached. It is up to the client to continue the name resolution process. The parameter <i>parent_domain</i> is the name of the parent domain in a syntax that is native to that type of domain. The list of host names that follow the domain parameter are the names of hosts that serve the parent domain. If there is more than one server for a parent domain, the first host specified should be the master server for that domain. Y Specifies that the parent directory is a NIS version 2 domain. D Specifies that the parent directory is a DNS domain. N Specifies that the parent directory is another NIS+ domain. This option is useful for connecting a pre-existing NIS+ subtree into the global namespace. Note that in the current implementation, the NIS+ clients do not take advantage of the -p feature. Also, since the parent object is currently not replicated on root replica servers, it is recommended that this option not be used. -C Initializes the machine to be a NIS+ client. There are three initialization options available: initialize by coldstart, initialize by hostname, and initialize by broadcast.

The most secure mechanism is to initialize from a trusted coldstart file. The second option is to initialize using a hostname that you specify as a trusted host. The third method is to initialize by broadcast and it is the least secure method.

- C *coldstart* Causes the file *coldstart* to be used as a prototype coldstart file when initializing a NIS+ client. This coldstart file can be copied from a machine that is already a client of the NIS+ namespace. For maximum security, an administrator can encrypt and encode (with `uuencode(1C)`) the coldstart file and mail it to an administrator bringing up a new machine. The new administrator would then decode (with `uudecode`), decrypt, and then use this file with the `nisinit` command to initialize the machine as an NIS+ client. If the coldstart file is from another client in the same domain, the `nisinit` command may be safely skipped and the file copied into the `/var/nis` directory as `/var/nis/NIS_COLD_START`.
- H *hostname* Specifies that the host *hostname* should be contacted as a trusted NIS+ server. The `nisinit` command will iterate over each transport in the `NETPATH` environment variable and attempt to contact `rpcbind(1M)` on that machine. This *hostname* *must* be reachable from the client without the name service running. For IP networks this means that there must be an entry in `/etc/hosts` for this host when `nisinit` is invoked.
- B Specifies that the `nisinit` command should use an IP broadcast to locate a NIS+ server on the local subnet. Any machine that is running the NIS+ service may answer. No guarantees are made that the server that answers is a server of the organization's namespace. If this option is used, it is advisable to check with your system administrator that the server and domain served are valid. The binding information can be dumped to the standard output using the `nisshowcache(1M)` command.

Note that `nisinit -c` will just enable navigation of the NIS+ name space from this client. To make NIS+ your name service, modify the file `/etc/nsswitch.conf` to reflect that. See `nsswitch.conf(4)` for more details.

-k <*key_domain*>

This option specifies the domain where root's credentials are stored. If it is not specified, then the system default domain is assumed. This domain name is used to create the `/var/nis/NIS_COLD_START` file.

RETURN VALUES

`nisinit` returns 0 on success and 1 on failure.

nisinit(1M)

EXAMPLES

EXAMPLE 1 Initializing the Machine as a NIS+ Client using the Host *freddy* as a Trusted Server

This example initializes the machine as an NIS+ client using the host *freddy* as a trusted server.

```
example# nisinit -cH freddy
```

EXAMPLE 2 Setting up a Client using a Trusted Coldstart File

This example sets up a client using a trusted coldstart file.

```
example# nisinit -cC /tmp/colddata
```

EXAMPLE 3 Setting up a Client Using an IP Broadcast

This example sets up a client using an IP broadcast.

```
example# nisinit -cB
```

EXAMPLE 4 Setting up a Root Server

This example sets up a root server.

```
example# nisinit -r
```

ENVIRONMENT VARIABLES

NETPATH This environment variable may be set to the transports to try when contacting the NIS+ server (see `netconfig(4)`). The client library will only attempt to contact the server using connection oriented transports.

FILES

<code>/var/nis/NIS_COLD_START</code>	This file contains a list of servers, their transport addresses, and their Secure RPC public keys that serve the machine's default domain.
<code>/var/nis/data/root.object</code>	This file describes the root object of the NIS+ namespace. It is a standard XDR-encoded NIS+ directory object that can be modified by authorized clients using the <code>nis_modify()</code> interface.
<code>/var/nis/data/parent.object</code>	This file describes the namespace that is logically above the NIS+ namespace. The most common type of parent object is a DNS object. This object contains contact information for a server of that domain.
<code>/etc/hosts</code>	Internet host table.

nisinit(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO nis+(1), uuencode(1C), nisclient(1M), nisserver(1M), nisshowcache(1M), sysinfo (2), hosts(4), netconfig(4), nisfiles(4), attributes(5)

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

`nisldapmaptest(1M)`

NAME	<code>nisldapmaptest</code> – test NIS+ and LDAP mapping configuration files																				
SYNOPSIS	<code>nisldapmaptest</code> <code>[-s -r -d] [-l -t <i>object</i>] [-v] [-i] [-o]</code> <code>[-m <i>conffile</i>] [-x attr=val...] [col=val...]</code>																				
DESCRIPTION	Use the <code>nisldapmaptest</code> utility to test NIS+ to LDAP mapping configuration files. See <code>NIS+LDAPmapping(4)</code>. The <code>nisldapmaptest</code> utility uses much of the same internal interface as the <code>rpc.nisd(1M)</code> does to read, add, modify, or delete LDAP data, as specified by the column name and value operand pairs. <code>nisldapmaptest</code> does not read or modify any of the <code>rpc.nisd(1M)</code> database files. See NOTES for details on important differences between the ways that <code>nisldapmaptest</code> and <code>rpc.nisd(1M)</code> operate on LDAP data.																				
OPTIONS	The <code>nisldapmaptest</code> utility supports the following options: <table><tr><td><code>-d</code></td><td>Delete data in LDAP.</td></tr><tr><td><code>-i</code></td><td>Ignore failures when obtaining information from the NIS+ server. This enables <code>nisldapmaptest</code> to work to some extent, even if the NIS+ server is unreachable, or if the system is not a NIS+ client. However, NIS+ lookups are still attempted, so there may be NIS+ error messages.</td></tr><tr><td></td><td>In this mode, <code>nisldapmaptest</code> also tries to guess things such as NIS+ object types and derives table column information from the mapping rules in the configuration files. Avoid using the <code>-i</code> option to add, modify, or delete, until you have determined that the <code>nisldapmaptest</code>'s guesses are adequate for your needs.</td></tr><tr><td><code>-l</code></td><td>Parse the configuration file into internal data structures, and then print out the configuration per those structures. Note that the printed data is not in configuration file format.</td></tr><tr><td></td><td>Either <code>-l</code> or <code>-t</code> must be specified. If both are present, <code>-l</code> is ignored.</td></tr><tr><td><code>-m <i>conffile</i></code></td><td>Specify the name of the <code>NIS+LDAPmapping(4)</code> configuration file. The default directory is <code>/var/nis</code>, and the default mapping file is <code>NIS+LDAPmapping</code>.</td></tr><tr><td><code>-o</code></td><td>For NIS+ tables, work on the NIS+ object itself, specified by means of the <code>-t</code> option, not on the table entries.</td></tr><tr><td><code>-r</code></td><td>Replace or add data in LDAP.</td></tr><tr><td><code>-s</code></td><td>Search for data in LDAP. This is the default.</td></tr><tr><td><code>-t <i>object</i></code></td><td>Specify the NIS+ object on which to operate. If the object name is not fully qualified, that is, it does not end in a dot, the value of the <code>nisplusLDAPbaseDomain</code> attribute is appended.</td></tr></table>	<code>-d</code>	Delete data in LDAP.	<code>-i</code>	Ignore failures when obtaining information from the NIS+ server. This enables <code>nisldapmaptest</code> to work to some extent, even if the NIS+ server is unreachable, or if the system is not a NIS+ client. However, NIS+ lookups are still attempted, so there may be NIS+ error messages.		In this mode, <code>nisldapmaptest</code> also tries to guess things such as NIS+ object types and derives table column information from the mapping rules in the configuration files. Avoid using the <code>-i</code> option to add, modify, or delete, until you have determined that the <code>nisldapmaptest</code> 's guesses are adequate for your needs.	<code>-l</code>	Parse the configuration file into internal data structures, and then print out the configuration per those structures. Note that the printed data is not in configuration file format.		Either <code>-l</code> or <code>-t</code> must be specified. If both are present, <code>-l</code> is ignored.	<code>-m <i>conffile</i></code>	Specify the name of the <code>NIS+LDAPmapping(4)</code> configuration file. The default directory is <code>/var/nis</code> , and the default mapping file is <code>NIS+LDAPmapping</code> .	<code>-o</code>	For NIS+ tables, work on the NIS+ object itself, specified by means of the <code>-t</code> option, not on the table entries.	<code>-r</code>	Replace or add data in LDAP.	<code>-s</code>	Search for data in LDAP. This is the default.	<code>-t <i>object</i></code>	Specify the NIS+ object on which to operate. If the object name is not fully qualified, that is, it does not end in a dot, the value of the <code>nisplusLDAPbaseDomain</code> attribute is appended.
<code>-d</code>	Delete data in LDAP.																				
<code>-i</code>	Ignore failures when obtaining information from the NIS+ server. This enables <code>nisldapmaptest</code> to work to some extent, even if the NIS+ server is unreachable, or if the system is not a NIS+ client. However, NIS+ lookups are still attempted, so there may be NIS+ error messages.																				
	In this mode, <code>nisldapmaptest</code> also tries to guess things such as NIS+ object types and derives table column information from the mapping rules in the configuration files. Avoid using the <code>-i</code> option to add, modify, or delete, until you have determined that the <code>nisldapmaptest</code> 's guesses are adequate for your needs.																				
<code>-l</code>	Parse the configuration file into internal data structures, and then print out the configuration per those structures. Note that the printed data is not in configuration file format.																				
	Either <code>-l</code> or <code>-t</code> must be specified. If both are present, <code>-l</code> is ignored.																				
<code>-m <i>conffile</i></code>	Specify the name of the <code>NIS+LDAPmapping(4)</code> configuration file. The default directory is <code>/var/nis</code> , and the default mapping file is <code>NIS+LDAPmapping</code> .																				
<code>-o</code>	For NIS+ tables, work on the NIS+ object itself, specified by means of the <code>-t</code> option, not on the table entries.																				
<code>-r</code>	Replace or add data in LDAP.																				
<code>-s</code>	Search for data in LDAP. This is the default.																				
<code>-t <i>object</i></code>	Specify the NIS+ object on which to operate. If the object name is not fully qualified, that is, it does not end in a dot, the value of the <code>nisplusLDAPbaseDomain</code> attribute is appended.																				

	-v Set the verbose flag. This flag produces extra diagnostic information. -x attr=val... Specify mapping attribute and value pairs to override those obtained by means of the configuration file. Although any attributes defined on <code>NIS+LDAPmapping(4)</code> or <code>rpc.nisd(4)</code> can be specified, the ones that control <code>rpc.nisd(1M)</code> operation have no effect on <code>nisldapmaptest</code>.
OPERANDS	The following operands are supported: col=val... NIS+ column and value pairs used to specify which entries should be looked up, added, modified, or deleted. For additions and modifications, use <code>col=val</code> to specify the new values.
EXAMPLES	EXAMPLE 1 Searching for a User Use the following example to search for the user <code>xyzzy</code> in the LDAP container specified for the <code>passwd.org_dir</code> table. <pre>example% nisldapmaptest -t passwd.org_dir name=xyzzy</pre> EXAMPLE 2 Listing Table Entries Use the following example to list all entries in the container specified for the <code>services.org_dir</code> table. <pre>example% nisldapmaptest -t services.org_dir</pre> EXAMPLE 3 Listing an Object Use the following example to list the <code>services.org_dir</code> object itself, as it is stored in LDAP. <pre>example% nisldapmaptest -o -t services.org_dir</pre> EXAMPLE 4 Modifying a Table Entry Use the following example to modify the membership list of the group <code>grp</code>, in the container specified for the <code>group.org_dir</code> table, to be <code>mem1</code>, <code>mem2</code>, and <code>mem3</code>. <pre>example% nisldapmaptest -r -t group.org_dir name=grp \ members=mem1,mem2,mem3</pre> EXAMPLE 5 Deleting a Table Entry Use the following example to delete the host called <code>bad</code> from the container specified for the <code>hosts.org_dir</code> table. <pre>example% nisldapmaptest -d -t hosts.org_dir name=bad</pre>

`nisldapmaptest(1M)`

EXIT STATUS

The following exit values are returned:

0 The requested operation was successful.
!= 0 An error occurred.

FILES

`/var/nis/NIS+LDAPmapping.template`
`/etc/default/rpd.nisd`

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisd
Interface Stability	Obsolete

SEE ALSO

`rpc.nisd(1M)`, `NIS+LDAPmapping(4)`, `rpc.nisd(4)`, `attributes(5)`

NOTES

There are several differences between the ways that `nisldapmaptest` and `rpc.nisd` operate:

1. `nisldapmaptest` obtains information about NIS+ by means of the NIS+ API calls, while `rpc.nisd` looks in its internal database. Thus, if the NIS+ server is not available, `nisldapmaptest` may be unable to determine NIS+ object types or table column information.
2. While `nisldapmaptest` can add, modify, or delete LDAP data, it does not modify any NIS+ data.
3. When operating on table entries, if `nisldapmaptest` is unable to obtain the entry from NIS+, it composes LDAP operations using only the supplied `col=val` operands. Depending on the mapping used, this can result in extra LDAP operations, for example, attempting to obtain a DN for add, modify, or delete.
4. The default value for `nisplusLDAPbaseDomain` is the system domain name per `sysinfo(2)` in `nisldapmaptest`, but the internal notion of the domain it serves in `rpc.nisd`. While the two usually are the same, this is not necessarily always the case.
5. When more than one NIS+ entry maps to a single LDAP entry, `nisldapmaptest` may be unable to perform a complete update, unless you make sure that the `col=val` specification picks up all relevant NIS+ entries. For example, if you have the `services.org_dir` NIS+ entries:

cname	name	proto	port
x	x	tcp	12345
x	y	tcp	12345
x	z	tcp	12345

`nisldapmaptest(1M)`

then specifying `cname=x` will pick up all three entries and create or modify the corresponding LDAP entry to have three CN values: `x`, `y`, and `z`. However, specifying `name=x` will match just the first NIS+ entry, and create or modify the LDAP entry to have just one CN: `x`.

nislog(1M)

NAME	nislog – display the contents of the NIS+ transaction log						
SYNOPSIS	/usr/sbin/nislog [-h <i>num</i> -t <i>num</i>] [-v] [<i>directory...</i>]						
DESCRIPTION	nislog displays the contents of the NIS+ server transaction log on the standard output. This command can be used to track changes in the namespace. The <code>/var/nis/trans.log</code> file contains the transaction log maintained by the NIS+ server. When updates occur, they are logged to this file and then propagated to replicas as log transactions. When the log is checkpointed, updates that have been propagated to the replicas are removed. The <code>nislog</code> command can only be run on an NIS+ server by superuser. It displays the log entries for that server only. If <i>directory</i> is not specified, the entire log is searched. Otherwise, only those logs entries that correspond to the specified directories are displayed.						
OPTIONS	<table><tr><td>-h <i>num</i></td><td>Display <i>num</i> transactions from the “head” of the log. If the numeric parameter is 0, only the log header is displayed.</td></tr><tr><td>-t <i>num</i></td><td>Display <i>num</i> transactions from the “tail” of the log. If the numeric parameter is 0, only the log header is displayed.</td></tr><tr><td>-v</td><td>Verbose mode.</td></tr></table>	-h <i>num</i>	Display <i>num</i> transactions from the “head” of the log. If the numeric parameter is 0, only the log header is displayed.	-t <i>num</i>	Display <i>num</i> transactions from the “tail” of the log. If the numeric parameter is 0, only the log header is displayed.	-v	Verbose mode.
-h <i>num</i>	Display <i>num</i> transactions from the “head” of the log. If the numeric parameter is 0, only the log header is displayed.						
-t <i>num</i>	Display <i>num</i> transactions from the “tail” of the log. If the numeric parameter is 0, only the log header is displayed.						
-v	Verbose mode.						
FILES	<code>/var/nis/trans.log</code> transaction log						
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:						
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWnisu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnisu		
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWnisu						
SEE ALSO	<code>nis+(1)</code> , <code>rpc.nisd(1M)</code> , <code>nisfiles(4)</code> , <code>attributes(5)</code>						
NOTES	NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit http://www.sun.com/directory/nisplus/transition.html .						

NAME	nisping – send ping to NIS+ servers	
SYNOPSIS	<pre> /usr/lib/nis/nisping [-uf] [-H <i>hostname</i>] [-r <i>directory</i>] /usr/lib/nis/nisping -C [-a] [-H <i>hostname</i>] [<i>directory</i>] </pre>	
DESCRIPTION	In the first SYNOPSIS line, the <code>nisping</code> command sends a “ping” to all replicas of a NIS+ directory. Once a replica receives a ping, it will check with the master server for the directory to get updates. Prior to pinging the replicas, this command attempts to determine the last update “seen” by a replica and the last update logged by the master. If these two timestamps are the same, the ping is not sent. The <code>-f</code> (force) option will override this feature. Under normal circumstances, NIS+ replica servers get the new information from the master NIS+ server within a short time. Therefore, there should not be any need to use <code>nisping</code>. In the second SYNOPSIS line, the <code>nisping -C</code> command sends a checkpoint request to the servers. If no <i>directory</i> is specified, the home domain, as returned by <code>nisdefaults(1)</code>, is checkpointed. If all directories, served by a given server, have to be checkpointed, then use the <code>-a</code> option. On receiving a checkpoint request, the servers would commit all the updates for the given <i>directory</i> from the table log files to the database files. This command, if sent to the master server, will also send updates to the replicas if they are out of date. This option is needed because the database log files for NIS+ are not automatically checkpointed. <code>nisping</code> should be used at frequent intervals (such as once a day) to checkpoint the NIS+ database log files. This command can be added to the <code>crontab(1)</code> file. If the database log files are not checkpointed, their sizes will continue to grow. If the server specified by the <code>-H</code> option does not serve the directory, then no ping is sent. Per-server and per-directory access restrictions may apply; see <code>nisopaccess(1)</code>. <code>nisping</code> uses <code>NIS_CPTIME</code> and <code>NIS_PING</code> (resync (ping) of replicas), or <code>NIS_CHECKPOINT</code> (for checkpoint). Since the <code>NIS_PING</code> operation does not return a status, the <code>nisping</code> command is typically unable to indicate success or failure for resyncs.	
OPTIONS	-a Checkpoint all directories on the server. -C Send a request to checkpoint, rather than a ping, to each server. The servers schedule to commit all the transactions to stable storage. -H <i>hostname</i> Only the host <i>hostname</i> is sent the ping, checked for an update time, or checkpointed. -f Force a ping, even though the timestamps indicate there is no reason to do so. This option is useful for debugging.	

```
nisping(1M)
```

RETURN VALUES

EXAMPLE 1 Using nisping

example% nisping

This example pings the server *example* which is a replica of the *org_dir.foo.com*. directory:

```
example% nisping -H example org dir.foo.com.
```

This example checkpoints all servers of the *org_dir.bar.com.* directory.

```
example% nisping -C org dir.bar.com.
```

NIS_PATH	If this variable is set, and the NIS+ directory name is not fully qualified, each directory specified will be searched until the directory is found.

See `attributes(5)` for descriptions of the following attributes:

SEE ALSO

```
crontab(1),nisdefaults(1),nisopaccess(1),nislog(1M),nisfiles(4),
attributes(5)
```

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

nispopulate(1M)

NAME	nispopulate – populate the NIS+ tables in a NIS+ domain
SYNOPSIS	<pre>/usr/lib/nis/nispopulate -Y [-x] [-f] [-n] [-u] [-v] [-S 0 2] [-l <network_passwd>] [-d <NIS+_domain>] -h <NIS_server_host> [-a <NIS_server_addr>] -y <NIS_domain> [table] ... /usr/lib/nis/nispopulate -F [-x] [-f] [-u] [-v] [-S 0 2] [-d <NIS+_domain>] [-l <network_passwd>] [-p <directory_path>] [table] ... /usr/lib/nis/nispopulate -C [-x] [-f] [-v] [-d <NIS+_domain>] [-l <network_passwd>] [hosts passwd]</pre>
DESCRIPTION	The nispopulate shell script can be used to populate NIS+ tables in a specified domain from their corresponding files or NIS maps. nispopulate assumes that the tables have been created either through nisserver(1M) or nissetup(1M). The table argument accepts standard names that are used in the administration of Solaris systems and non-standard <i>key-value</i> type tables. See nisaddent(1M) for more information on <i>key-value</i> type tables. If the table argument is not specified, nispopulate will automatically populate each of the standard tables. These standard (default) tables are: auto_master, auto_home, ethers, group, hosts, ipnodes, networks, passwd, protocols, services, rpc, netmasks, bootparams, netgroup, aliases and shadow. Note that the shadow table is only used when populating from files. The non-standard tables that nispopulate accepts are those of <i>key-value</i> type. These tables must first be created manually with the nistbladm(1) command. Use the first synopsis (-Y) to populate NIS+ tables from NIS maps. nispopulate uses ypxfrr(1M) to transfer the NIS maps from the NIS servers to the /var/yp/<NIS_domain> directory on the local machine. Then, it uses these files as the input source. Note that <NIS_domain> is case sensitive. Make sure there is enough disk space for that directory. Use the second synopsis (-F) to populate NIS+ tables from local files. nispopulate will use those files that match the table name as input sources in the current working directory or in the specified directory. Note that when populating the hosts, ipnodes, and passwd tables, nispopulate will automatically create the NIS+ credentials for all users and hosts (ipnodes) that are defined in the hosts, ipnodes, and passwd tables, respectively. A network passwd is required to create these credentials. This network password is used to encrypt the secret key for the new users and hosts. This password can be specified using the -l option or it will use the default password, "nisplus". nispopulate will not overwrite any existing credential entries in the credential table. Use nisclient(1M) to overwrite the entries in the cred table. It creates both LOCAL and DES credentials for users, and only DES credentials for hosts. To disable automatic credential creation, specify the "-S 0" option. The third synopsis (-C) is used to populate NIS+ credential table with level 2 authentication (DES) from the hosts, ipnodes and passwd tables of the specified domain. The valid table arguments for this operation are hosts, ipnodes and

passwd. If this argument is not specified then it will use `hosts`, `ipnodes` and `passwd` as the input source. If other authentication mechanisms are configured using `nisauthconf(1M)`, the NIS+ credential table will be loaded with credentials for those mechanisms.

If `nispopulate` was earlier used with `"-S 0"` option, then no credentials were added for the hosts or the users. If later the site decides to add credentials for all users and hosts, then this `(-C)` option can be used to add credentials.

OPTIONS

<code>-a <NIS_server_addr></code>	Specifies the IP address for the NIS server. This option is only used with the <code>-Y</code> option.
<code>-C</code>	Populate the NIS+ credential table from <code>hosts</code> , <code>ipnodes</code> , and <code>passwd</code> tables using DES authentication (security level 2). If other authentication mechanisms are configured using <code>nisauthconf(1M)</code> , the NIS+ credential table will be populated with credentials for those mechanisms.
<code>-d <NIS+_domain.></code>	Specifies the NIS+ domain. The default is the local domain.
<code>-F</code>	Populates NIS+ tables from files.
<code>-f</code>	Forces the script to populate the NIS+ tables without prompting for confirmation.
<code>-h <NIS_server_host></code>	Specifies the NIS server hostname from where the NIS maps are copied from. This is only used with the <code>-Y</code> option. This hostname must be present in the NIS+ <code>hosts</code> or <code>ipnodes</code> table, or in the <code>/etc/hosts</code> or <code>/etc/inet/ipnodes</code> file. If the hostname is not defined, the script will prompt you for its IP address, or you can use the <code>-a</code> option to specify the address manually.
<code>-l <network_passwd></code>	Specifies the network password for populating the NIS+ credential table. This is only used when you are populating the <code>hosts</code> , <code>ipnodes</code> , and <code>passwd</code> tables. The default <code>passwd</code> is <code>"nisplus"</code> .
<code>-n</code>	Does not overwrite local NIS maps in <code>/var/yp/<NISdomain></code> directory if they already exist. The default is to overwrite the existing NIS maps in the local <code>/var/yp/<NISdomain></code> directory. This is only used with the <code>-Y</code> option.
<code>-p <directory_path></code>	Specifies the directory where the files are stored. This is only used with the <code>-F</code> option. The default is the current working directory.

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-s 0 2	Specifies the authentication level for the NIS+ clients. Level 0 is for unauthenticated clients and no credentials will be created for users and hosts in the specified domain. Level 2 is for authenticated (DES) clients and DES credentials will be created for users and hosts in the specified domain. The default is to set up with level 2 authentication (DES). There is no need to run <code>nispopulate</code> with <code>-C</code> for level 0 authentication. Also, if other authentication mechanisms are configured with <code>nisauthconf(1M)</code> , credentials for those mechanisms will also be populated for the NIS+ clients.
-u	Updates the NIS+ tables (ie., adds, deletes, modifies) from either files or NIS maps. This option should be used to bring an NIS+ table up to date when there are only a small number of changes. The default is to add to the NIS+ tables without deleting any existing entries. Also, see the <code>-n</code> option for updating NIS+ tables from existing maps in the <code>/var/yp</code> directory.
-v	Runs the script in verbose mode.
-x	Turns the "echo" mode on. The script just prints the commands that it would have executed. Note that the commands are not actually executed. The default is off.
-Y	Populate the NIS+ tables from NIS maps.
-y <NIS_domain>	Specifies the NIS domain to copy the NIS maps from. This is only used with the <code>-Y</code> option. The default domainname is the same as the local domainname.

EXAMPLES

EXAMPLE 1 Using `nispopulate`

To populate all the NIS+ standard tables in the domain *xyz.sun.com*. from NIS maps of the *yp.sun.COM* domain as input source where host *yp_host* is a YP server of *yp.sun.COM*:

```
nis_server# /usr/lib/nis/nispopulate -Y -y yp.sun.COM \  
-h yp_host -d xyz.sun.com.
```

To update all of the NIS+ standard tables from the same NIS domain and hosts shown above:

```
nis_server# /usr/lib/nis/nispopulate -Y -u -y yp.sun.COM -h yp_host \  
-d xyz.sun.com.
```

To populate the `hosts` table in domain *xyz.sun.com*. from the `hosts` file in the `/var/nis/files` directory and using "somepasswd" as the network password for key encryption:

EXAMPLE 1 Using nispopulate (Continued)

```
nis_server# /usr/lib/nis/nispopulate -F -p \
/var/nis/files -l somepasswd hosts
```

To populate the passwd table in domain *xyz.sun.com*. from the passwd file in the */var/nis/files* directory without automatically creating the NIS+ credentials:

```
nis_server# /usr/lib/nis/nispopulate -F -p /var/nis/files \
-d xys.sun.com. -S 0 passwd
```

To populate the credential table in *domain xyz.sun.com*. for all users defined in the passwd table.

```
nis_server# /usr/lib/nis/nispopulate -C -d xys.sun.com. passwd
```

To create and populate a non-standard key-value type NIS+ table, "private", from the file */var/nis/files/private*: (nispopulate assumes that the private.org_dirkey-value type table has already been created).

```
nis_server# /usr/bin/nistbladm -D access=og=rmcd,nw=r \
-c private key=S,nogw= value=,nogw= private.org.dir
nis_server# /usr/lib/nis/nispopulate -F -p /var/nis/files private
```

**ENVIRONMENT
VARIABLES**

nispopulate normally creates temporary files in the directory */tmp*. You may specify another directory by setting the environment variable *TMPDIR* to your chosen directory. If *TMPDIR* is not a valid directory, then nispopulate will use */tmp*.

FILES

<i>/etc/inet/hosts</i>	local host name database
<i>/etc/inet/ipnodes</i>	local database associating names of nodes with IP addresses
<i>/var/yp</i>	NIS (YP) domain directory
<i>/var/nis</i>	NIS+ domain directory
<i>/tmp</i>	

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO

nis+(1), nistbladm(1), nisaddcred(1M), nisaddent(1M), nisauthconf(1M), nisclient(1M), nisserver(1M), nissetup(1M), rpc.nisd(1M), ypxfr(1M), attributes(5)

nispopulate(1M)

NOTES	NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit http://www.sun.com/directory/nisplus/transition.html .

NAME	<code>nisprefadm</code> – NIS+ utility to set server preferences for NIS+ clients
SYNOPSIS	<pre> /usr/bin/nisprefadm -a {-L -G} [-o <i>opt-string</i>] [-d <i>domain</i>] [-C <i>client</i>] <i>server...</i> /usr/bin/nisprefadm -m {-L -G} [-o <i>opt-string</i>] [-d <i>domain</i>] [-C <i>client</i>] <i>oldserver=newserver...</i> /usr/bin/nisprefadm -r {-L -G} [-o <i>opt-string</i>] [-d <i>domain</i>] [-C <i>client</i>] <i>server...</i> /usr/bin/nisprefadm -u {-L -G} [-o <i>opt-string</i>] [-d <i>domain</i>] [-C <i>client</i>] <i>server...</i> /usr/bin/nisprefadm -x {-L -G} [-d <i>domain</i>] [-C <i>client</i>] /usr/bin/nisprefadm -l {-L -G} [-d <i>domain</i>] [-C <i>client</i>] /usr/bin/nisprefadm -F </pre>
DESCRIPTION	<code>nisprefadm</code> defines which servers are to be preferred by NIS+ clients. This information is used by <code>nis_cachemgr</code>(1M) to control the order in which it selects which server to use for a particular domain. On a client system, the cache manager first looks for a local preferred server list in <code>/var/nis</code>. If it doesn't find one, it looks for an entry with its host name in the NIS+ table. Finally, if it doesn't find it there, it looks for an entry for its subnet. By default, <code>nis_cachemgr</code> puts all servers that are on the same subnet as the client system (that is, local servers) are on the preferred server list. In some cases this default preferred server list is inadequate. For example, if all of the servers for a domain are remote, but some are <i>closer</i> than others, the cache manager should try to select the closer one. Because the cache manager has no reliable way to determine the distance to remote servers, <code>nisprefadm</code> is used to provide this information. The preferred server information is stored either globally in a NIS+ table (with the <code>-G</code> option) or locally in a file, <code>/var/nis/client_info</code> (with the <code>-L</code> option). It is preferable to store the information globally so that it can be used by all clients on a subnet. The <code>nis_cachemgr</code> process on a client machine reloads the preferred server information periodically, depending on the machine's setup. If the local file is used, the information is reloaded every 12 hours. If the global table is used, the information is reloaded based on the TTL value of the client information table. This TTL value can be changed using <code>nischttl</code>(1). If you want your changes to take effect immediately, use the <code>nisprefadm -F</code> command. When changing local information (<code>-L</code>), <code>nisprefadm</code> automatically forces <code>nis_cachemgr</code> to reload the information. The cache manager assigns weights to all of the servers on the preferred list. By default, local servers (that is, servers on the same subnet) are given a weight of 0. Other servers are given the weight, "infinite". This can be changed by using the <code>nisprefadm</code> command and giving a weight in parentheses after the server name. When selecting a server for a domain, the cache manager first tries to contact the

nisprefadm(1M)

servers with the lowest weight. If it doesn't get a response, it tries the servers with the next lowest weight, and so on. If it fails to get a response from any of the preferred servers, it tries to contact the non-preferred servers.

The use of weights gives fine control over the server selection process, but care must be given to avoid assigning too many different weights. For example, if weights 0, 1, 2, and 3 are used, but all of the servers with weight 0, 1, and 2, are unavailable, then there will be a noticeable delay in selecting a server. This is because the cache manager waits 5 seconds for a response at each weight level before moving on to the next one. As a general rule, one or two weight levels provides a good balance of server selection control and performance.

When specifying a server name, it is not necessary to fully qualify the name. When the cache manager tries to access a domain, it compares the list of servers for the domain with the list of preferred servers. It will find a match if a preferred server name is a prefix of the name of a server for the domain. If a domain is served by two servers with the same prefix, the preferred server name must include enough of the domain name to distinguish the two.

The `nis_cachemgr(1M)` process automatically adds local servers (same subnet as the client) to the preferred server list with a weight of 0. Thus, it is not necessary to specify them, though it does no harm.

If you specify a weight for a server, you probably should quote the parentheses to avoid having the shell interpret them. The following command illustrates this:

```
example% nisprefadm -G -a -C client1 "srv1(2)"
```

In general, `nis_cachemgr` does a fairly good job of selecting servers on its own. Therefore, the use of `nisprefadm` is not usually necessary. Some situations in which it is recommended are:

No local servers, many remote servers

In this case, `nis_cachemgr` needs to choose one of the remote servers. Because it doesn't have information on which is closest, it sends a ping to all of them and then selects the one that responds fastest. This may not always select the best server. If some of the servers are closer to the client than the others, they should be listed as preferred servers so that `nis_cachemgr` will try them first. This reduces the amount of network traffic for selecting a server.

Very remote servers

In some networks there are NIS+ servers that are only reachable through very slow network connections. It is usually best to avoid unnecessary traffic over that connection. If the `pref_type=pref_only` option is set along with preferred servers, then only the preferred servers are contacted for domains they serve. The non-preferred servers are not tried at all; even if all of the preferred servers are unavailable. For domains that are not served by any of the preferred servers, the `pref_only` option is ignored.

OPTIONS	In the SYNOPSIS, when several options are surrounded by braces (that is, by '{' and '}') one of the options must be specified.
-a	Add the specified servers to the preferred server list.
-C <i>client</i>	Store the preferred server information with the key, <i>client</i> . The <i>client</i> can be either a hostname or a subnet number. When a hostname is specified, the preferred server information applies to that host only. When a subnet is specified, the preferred server information applies to all clients on that subnet. The cache manager searches for host specific entries first. It only searches for subnet entries if no host entry is found. If this option is not specified, then the hostname of the machine on which the command is run is used.
-d <i>domain</i>	Specify the <i>domain</i> to which the command is to apply.
-F	Tells <code>nis_cachemgr(1M)</code> to refresh its preferred server information. The program periodically does this anyway, but this option forces it to do the refresh immediately. When updating the local information, <code>nis_cachemgr</code> automatically refreshes the preferred server information.
	This option must be executed as <code>root</code> .
-l	List the current preferred server information.
-L -G	Store the preferred server information locally in the file, <code>/var/nis/client_info</code> (the -L option), or globally in a NIS+ table <code>client.info.org-dir.domain</code> (the -G option). If the information is stored locally, then it only applies to the system on which the command is run. If it is stored globally then it can apply to all systems on a subnet (depending on the value of the -C option).
	The -L option must be run as <code>root</code> .
-m	Modify the preferred server list. The server specified by <i>oldserver</i> is replaced by <i>newserver</i> . This is typically used to change the weight for a server.
-o	Specify additional options to control server selection. Currently the only valid option is <i>pref_type</i> , which can have a value of either <code>all</code> (the default) or <code>pref_only</code> . If the value is <code>all</code> , then the cache manager tries to contact non-preferred servers if all of the preferred servers fail to respond. If <code>pref_only</code> is specified, then it won't try non-preferred servers. The only exception to this is when a domain is not served by any of the preferred servers. In this case, the cache manager ignores the option. This is to avoid requiring that preferred servers be defined for every domain.
-r	Remove the specified servers from the preferred server list.

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- u Clear the list of preferred servers and then add the specified servers to the preferred server list.
- x Remove the preferred server information completely.

RETURN VALUES nisprefadm returns the following values:

- 0 On success.
- 1 On failure.

EXAMPLES **EXAMPLE 1** Using nisprefadm

This command sets the preferred server list for the system on which it is run:

```
example% nisprefadm -L -a srv1 srv2
```

The information is stored in a file, `/var/nis/client_info`, so it will only affect this one system.

The following command has the same effect, but the information is stored in a NIS+ table in the default domain.

```
example% nisprefadm -G -a srv1 srv2
```

As a system administrator, you might want to set the preferred server information for a client system other than the one you are running the command on. The following command sets the preferred server information for a client system named *client1*:

```
example% nisprefadm -G -a -C client1 srv1 srv2
```

It is common for all client systems on a subnet to use the same set of preferred servers. The following command sets a preferred server list that applies to all clients on subnet, 192.85.18.0:

```
example% nisprefadm -G -a -C 192.85.18.0 srv1 srv2
```

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `nischttl(1)`, `nis_cachemgr(1M)`, `attributes(5)`

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

NAME	nisrestore – restore NIS+ directory backup
SYNOPSIS	nisrestore [-fv] <i>backup-dir</i> <i>directory...</i> nisrestore [-fv] -a <i>backup-dir</i> nisrestore -t <i>backup-dir</i>
DESCRIPTION	nisrestore restores an existing backup of a NIS+ directory object that was created using nisbackup(1M). The <i>backup-dir</i> is the UNIX directory that contains the NIS+ backup on the server being restored. The nisrestore command can be used to restore a NIS+ directory object or a complete NIS+ database. It also can be used as an "out of band" fast replication for a new replica server being initialized. The rpc.nisd(1M) daemon must be stopped before running nisrestore. The first synopsis is used to restore a single directory object or a specified list of directory objects. The directory can be partially qualified or fully qualified. The server being restored will be verified against the list of servers serving the directory. If this server is not configured to serve this object, nisrestore will exit with an error. The -f option will override this check and force the operation. The second synopsis will restore all of the directory objects contained in the <i>backup-dir</i>. Again, the server will be validated against the serving list for each of the directory objects in the <i>backup-dir</i>. If one of the objects in the <i>backup-dir</i> are not served by this server, nisrestore will exit with an error. The -f option will override this check and force the operation. The -a option will attempt to restore all NIS+ objects contained in the <i>backup-dir</i>. If any of these objects are not served by the server, nisrestore will exit with an error. If the <i>backup-dir</i> contains objects that are not served by the server, nisrestore must be executed without the -a option and the specific directory objects listed. The -f option will disable verification of the server being configured to serve the objects being restored. This option should be used with care, as data could be inadvertently restored to a server that doesn't serve the restored data. This option is required in the case of restoring a single server domain (master server only) or if the other NIS+ servers are unavailable for NIS+ lookups. The combination of options -f and -a should be used with caution, as no validation of the server serving the restored objects will be done. New replicas can be quickly added to a namespace with the nisrestore command. The steps are as follows. Configure the new replica on the master server (see nisserver(1M)): <pre>master# nisserver -R -h replica</pre> Kill the rpc.nisd server process on the new replica server: <pre>replica# kill rpc.nisd-pid</pre>

nisrestore(1M)

Create a backup of the NIS+ database on the master, which will include the new replica information. See `nisbackup(1M)`. The `/backup` will need to be exported to the new replica. See `share_nfs(1M)`.

```
master# nisbackup -a /backup
```

Restore the backup of the NIS+ database on the new replica. Use the `-f` option if `nisrestore` is unable to lookup the NIS+ objects being restored. The backup should be available through `nfs` or similar means. See `share_nfs(1M)`.

```
replica# nisrestore -f -a //nfs-mnt/backup
```

Restart the `rpc.nisd(1M)` process on the new replica, and the server will immediately be available for service.

OPTIONS	-a	Restores all directory objects included in the <i>backup-dir</i> partition.
	-f	Forces the restoration of a directory without the validation of the server in the directory object's serving list.
	-t	Lists all directory objects contained in <i>backup-dir</i> .
	-v	Verbose option. Additional output will be produced upon execution of the command.

OPERANDS	<i>backup-dir</i>	The UNIX directory that contains the data files for the NIS+ directory objects to be restored.
	<i>directory</i>	The NIS+ directory object(s) to be restored. This can be a fully or partially qualified name.

EXAMPLES

EXAMPLE 1 Restoring the Directory Object on a Replica Server from a Local UFS Partition

To restore the `org_dir` directory object of the domain `foo.com` on a replica server from a local `ufs` partition named `/var/backup`:

```
replica_server# nisrestore /var/backup org_dir.foo.com.
```

EXAMPLE 2 Forcing the Restore of a Backed up NIS+ Namespace to a Replica Server From the Backup Partition

To force the restore of an entire backed up NIS+ namespace to a replica server from the backup partition named `/var/backup`:

```
replica_server# nisrestore -f -a /var/backup
```

EXAMPLE 3 Restoring the Subdomain on a Master Server From a Backup that Includes Other Directory Objects

To restore the subdomain `sub.foo.com` on a master server, from a backup that includes other directory objects:

EXAMPLE 3 Restoring the Subdomain on a Master Server From a Backup that Includes Other Directory Objects (Continued)

```
master_server# nisrestore /var/backup sub.foo.com. \
    org_dir.sub.foo.com. groups_dir.sub.foo.com.
```

EXIT STATUS

0	Successful completion.
1	An error occurred.

FILES

- `/backup-dir/backup_list`
This ASCII file contains a list of all the objects contained in this *backup-dir* directory. This information can be displayed with the `-t` option.
- `/backup-dir/directory-object`
A subdirectory that is created in the *backup-dir* which contains the directory-object backup.
- `/backup-dir/directory-object/data`
A subdirectory that contains the data files that are part of the directory-object backup.
- `/backup-dir/directory-object/last.upd`
This data file contains timestamp information about the directory-object.
- `/backup-dir/directory-object/data.dict`
A NIS+ data dictionary for all of the objects contained in this directory-object backup.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO `nis+(1)`, `nisdefaults(1)`, `nisbackup(1M)`, `nissserver(1M)`, `rpc.nisd(1M)`, `share_nfs(1M)`, `nisfiles(4)`, `attributes(5)`

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

nisserver(1M)

NAME	nisserver – set up NIS+ servers	
SYNOPSIS	<pre> /usr/lib/nis/nisserver -r [-x] [-f] [-v] [-Y] [-d NIS+_domain] [-g NIS+_groupname] [-l network_passwd] /usr/lib/nis/nisserver -M [-x] [-f] [-v] [-Y] -d NIS+_domain [-g NIS+_groupname] [-h NIS+_server_host] /usr/lib/nis/nisserver -R [-x] [-f] [-v] [-Y] [-d NIS+_domain] [-h NIS+_server_host] </pre>	
DESCRIPTION	The nisserver shell script can be used to set up a root master, non-root master, and replica NIS+ server with level 2 security (DES). If other authentication mechanisms are configured with nisauthconf(1M), nisserver will set up a NIS+ server using those mechanisms. nisauthconf(1M) should be used before nisserver. When setting up a new domain, this script creates the NIS+ directories (including groups_dir and org_dir) and system table objects for the domain specified. It does not populate the tables. nispopulate(1M) must be used to populate the tables.	
OPTIONS	-d <i>NIS+_domain</i> Specifies the name for the NIS+ domain. The default is your local domain. -f Forces the NIS+ server setup without prompting for confirmation. -g <i>NIS+_groupname</i> Specifies the NIS+ group name for the new domain. This option is not valid with -R option. The default group is admin.<domain>. -h <i>NIS+_server_host</i> Specifies the hostname for the NIS+ server. It must be a valid host in the local domain. Use a fully qualified hostname (for example, <i>hostx.xyz.sun.com.</i>) to specify a host outside of your local domain. This option is <i>only</i> used for setting up non-root master or replica servers. The default for non-root master server setup is to use the same list of servers as the parent domain. The default for replica server setup is the local hostname. -l <i>network_password</i> Specifies the network password with which to create the credentials for the root master server. This option is <i>only</i> used for master root server setup (-r option). If this option is not specified, the script prompts you for the login password. -M Sets up the specified host as a master server. Make sure that rpc.nisd(1M) is running on the new master server before this command is executed. -R Sets up the specified host as a replica server. Make sure that rpc.nisd is running on the new replica server.	

<code>-r</code>	Sets up the server as a root master server. Use the <code>-R</code> option to set up a root replica server.
<code>-v</code>	Runs the script in verbose mode.
<code>-x</code>	Turns the echo mode on. The script just prints the commands that it would have executed. Note that the commands are not actually executed. The default is off.
<code>-Y</code>	Sets up a NIS+ server with NIS-compatibility mode. The default is to set up the server without NIS-compatibility mode.

USAGE Use the first synopsis of the command (`-r`) to set up a root master server. To run the command, you must be logged in as super-user on the server machine.

Use the second synopsis of the command (`-M`) to set up a non-root master server for the specified domain. To run the command, you must be logged in as a NIS+ principal on a NIS+ machine and have write permission to the parent directory of the domain that you are setting up. The new non-root master server machine must already be an NIS+ client (see `niscclient(1M)`) and have the `rpc.nisd(1M)` daemon running.

Use the third synopsis of the command (`-R`) to set up a replica server for both root and non-root domains. To run the command, you must be logged in as a NIS+ principal on a NIS+ machine and have write permission to the parent directory of the domain that you are replicating. The new non-root replica server machine must already be an NIS+ client and have the `rpc.nisd` daemon running.

EXAMPLES **EXAMPLE 1** Setting up Servers

To set up a root master server for domain `sun.com.`:

```
root_server# /usr/lib/nis/nisserver -r -d sun.com.
```

For the following examples make sure that the new servers are NIS+ clients and that `rpc.nisd` is running on these hosts before executing `nisserver`. To set up a replica server for the `sun.com.` domain on host *sunreplica*:

```
root_server# /usr/lib/nis/nisserver -R -d sun.com. -h sunrep
```

To set up a non-root master server for domain *xyz.sun.com.* on host *sunxyz* with the NIS+ groupname as *admin-mgr.xyz.sun.com.*:

```
root_server# /usr/lib/nis/nisserver -M -d xyz.sun.com. -h sunxyz \
-g admin-mgr.xyz.sun.com.
```

To set up a non-root replica server for domain *xyz.sun.com.* on host *sunabc*:

```
sunxyz# /usr/lib/nis/nisserver -R -d xyz.sun.com. -h sunabc
```

nisserver(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO nis+(1), nisgrpadm(1), nismkdir(1), nisaddcred(1M), nisauthconf(1M), nisclient(1M), nisinit(1M), nispopulate(1M), nisprefadm(1M), nissetup(1M), rpc.nisd(1M), attributes(5)

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

NAME	nissetup – initialize a NIS+ domain				
SYNOPSIS	<code>/usr/lib/nis/nissetup [-Y] [domain]</code>				
DESCRIPTION	nissetup is a shell script that sets up a NIS+ domain to service clients that wish to store system administration information in a domain named <i>domain</i>. This domain should already exist prior to executing this command. See <code>nismkdir(1)</code> and <code>nisinit(1M)</code>. A NIS+ domain consists of a NIS+ directory and its subdirectories: <code>org_dir</code> and <code>groups_dir</code>. <code>org_dir</code> stores system administration information and <code>groups_dir</code> stores information for group access control. nissetup creates the subdirectories <code>org_dir</code> and <code>groups_dir</code> in <i>domain</i>. Both subdirectories will be replicated on the same servers as the parent domain. After the subdirectories are created, nissetup creates the default tables that NIS+ serves. These are <code>auto_master</code>, <code>auto_home</code>, <code>bootparams</code>, <code>cred</code>, <code>ethers</code>, <code>group</code>, <code>hosts</code>, <code>mail_aliases</code>, <code>netmasks</code>, <code>networks</code>, <code>passwd</code>, <code>protocols</code>, <code>rpc</code>, <code>services</code>, and <code>timezone</code>. The nissetup script uses the <code>nistbladm(1)</code> command to create these tables. The script can be easily customized to add site specific tables that are created at setup time. This command is normally executed just once per domain. While this command creates the default tables, it does not initialize them with data. This is accomplished with the <code>nisaddent(1M)</code> command. It is easier to use the <code>nisserver(1M)</code> script to create subdirectories and the default tables.				
OPTIONS	<code>-Y</code> Specify that the domain will be served as both a NIS+ domain as well as an NIS domain using the backward compatibility flag. This will set up the domain to be less secure by making all the system tables readable by unauthenticated clients as well.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWnisu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnisu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWnisu				
SEE ALSO	<code>nis+(1)</code> , <code>nismkdir(1)</code> , <code>nistbladm(1)</code> , <code>nisaddent(1M)</code> , <code>nisinit(1M)</code> , <code>nisserver(1M)</code> , <code>attributes(5)</code>				
NOTES	NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit http://www.sun.com/directory/nisplus/transition.html.				

nisshowcache(1M)

NAME	nisshowcache – NIS+ utility to print out the contents of the shared cache file				
SYNOPSIS	/usr/lib/nis/nisshowcache [-v]				
DESCRIPTION	nisshowcache prints out the contents of the per-machine NIS+ directory cache that is shared by all processes accessing NIS+ on the machine. By default, nisshowcache only prints out the directory names in the cache along with the list of active servers. The shared cache is maintained by nis_cachemgr(1M).				
OPTIONS	-v Verbose mode. Print out the contents of each directory object, including the information on the server name and its universal addresses.				
FILES	/var/nis/NIS_SHARED_DIRCACHE				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	nis_cachemgr(1M), syslogd(1M), nisfiles(4), attributes(5)				
DIAGNOSTICS	Error messages are sent to the syslogd(1M) daemon.				
NOTES	NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit http://www.sun.com/directory/nisplus/transition.html .				

NAME	nisstat – report NIS+ server statistics																
SYNOPSIS	<code>/usr/lib/nis/nisstat [-H <i>host</i>] [<i>directory</i>]</code>																
DESCRIPTION	The <code>nisstat</code> command queries a NIS+ server for various statistics about its operations. These statistics may vary between implementations and from release to release. Not all statistics are available from all servers. If you request a statistic from a server that does not support that statistic, it is never a fatal error. The message “unknown statistic” is returned. By default, statistics are fetched from the server(s) of the NIS+ directory for the default domain. If <i>directory</i> is specified, servers for that directory are queried. Supported statistics for this release are as follows: <table> <tr> <td><i>root server</i></td><td>This reports whether the server is a root server.</td></tr> <tr> <td><i>NIS compat mode</i></td><td>This reports whether the server is running in NIS compat mode.</td></tr> <tr> <td><i>DNS forwarding in NIS mode</i></td><td>This reports whether the server in NIS compat mode will forward host lookup calls to DNS.</td></tr> <tr> <td><i>security level</i></td><td>This reports the security level of this server.</td></tr> <tr> <td><i>serves directories</i></td><td>This lists the directories served by this server.</td></tr> <tr> <td><i>Operations</i></td><td> This statistic returns results in the form: <code>OP=<i>opname</i> : C=<i>calls</i> : E=<i>errors</i> : T=<i>micros</i></code> Where <i>opname</i> is replaced by the RPC procedure name or operation, <i>calls</i> is the number of calls to this procedure that have been made since the server started running. <i>errors</i> is the number of errors that have occurred while processing a call, and <i>micros</i> is the average time in microseconds to complete the last 16 calls. </td></tr> <tr> <td><i>Directory Cache</i></td><td>This statistic reports the number of calls to the internal directory object cache, the number of hits on that cache, the number of misses, and the hit rate percentage.</td></tr> <tr> <td><i>Group Cache</i></td><td>This statistic reports the number of calls to the internal NIS+ group object cache, the number of hits on that cache, the number of misses, and the hit rate percentage.</td></tr> </table>	<i>root server</i>	This reports whether the server is a root server.	<i>NIS compat mode</i>	This reports whether the server is running in NIS compat mode.	<i>DNS forwarding in NIS mode</i>	This reports whether the server in NIS compat mode will forward host lookup calls to DNS.	<i>security level</i>	This reports the security level of this server.	<i>serves directories</i>	This lists the directories served by this server.	<i>Operations</i>	This statistic returns results in the form: <code>OP=<i>opname</i> : C=<i>calls</i> : E=<i>errors</i> : T=<i>micros</i></code> Where <i>opname</i> is replaced by the RPC procedure name or operation, <i>calls</i> is the number of calls to this procedure that have been made since the server started running. <i>errors</i> is the number of errors that have occurred while processing a call, and <i>micros</i> is the average time in microseconds to complete the last 16 calls.	<i>Directory Cache</i>	This statistic reports the number of calls to the internal directory object cache, the number of hits on that cache, the number of misses, and the hit rate percentage.	<i>Group Cache</i>	This statistic reports the number of calls to the internal NIS+ group object cache, the number of hits on that cache, the number of misses, and the hit rate percentage.
<i>root server</i>	This reports whether the server is a root server.																
<i>NIS compat mode</i>	This reports whether the server is running in NIS compat mode.																
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<i>Directory Cache</i>	This statistic reports the number of calls to the internal directory object cache, the number of hits on that cache, the number of misses, and the hit rate percentage.																
<i>Group Cache</i>	This statistic reports the number of calls to the internal NIS+ group object cache, the number of hits on that cache, the number of misses, and the hit rate percentage.																

nisstat(1M)

	<i>Static Storage</i>	This statistic reports the number of bytes the server has allocated for its static storage buffers.				
	<i>Dynamic Storage</i>	This statistic reports the amount of heap the server process is currently using.				
	<i>Uptime</i>	This statistic reports the time since the service has been running.				
	Per-server and per-directory access restrictions may apply. See <code>nisopaccess(1)</code> . <code>nisstat</code> uses <code>NIS_STATUS</code> .					
	OPTIONS	<code>-H host</code>	Normally all servers for the directory are queried. With this option, only the machine named <i>host</i> is queried. If the named machine does not serve the directory, no statistics are returned.			
ENVIRONMENT VARIABLES	<code>NIS_PATH</code>	If this variable is set, and the NIS+ directory name is not fully qualified, each directory specified will be searched until the directory is found. See <code>nisdefaults(1)</code> .				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:					
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWnisu</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnisu
ATTRIBUTE TYPE	ATTRIBUTE VALUE					
Availability	SUNWnisu					
SEE ALSO	<code>nisdefaults(1)</code> , <code>nisopaccess(1)</code> , <code>attributes(5)</code>					
NOTES	NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit http://www.sun.com/directory/nisplus/transition.html .					

NAME	nisupdkeys – update the public keys in a NIS+ directory object	
SYNOPSIS	<pre>/usr/lib/nis/nisupdkeys [-a -C] [-H <i>host</i>] [<i>directory</i>]</pre> <pre>/usr/lib/nis/nisupdkeys -s [-a -C] -H <i>host</i></pre>	
DESCRIPTION	This command updates the public keys in an NIS+ directory object. When the public key(s) for a NIS+ server are changed, <i>nisupdkeys</i> reads a directory object and attempts to get the public key data for each server of that directory. These keys are placed in the directory object and the object is then modified to reflect the new keys. If <i>directory</i> is present, the directory object for that directory is updated. Otherwise the directory object for the default domain is updated. The new key must be propagated to all directory objects that reference that server. On the other hand, <i>nisupdkeys -s</i> gets a list of all the directories served by <i>host</i> and updates those directory objects. This assumes that the caller has adequate permission to change all the associated directory objects. The list of directories being served by a given server can also be obtained by <i>nisstat</i>(1M). Before you do this operation, make sure that the new address/public key has been propagated to all replicas. If multiple authentication mechanisms are configured using <i>nisauthconf</i>(1M), then the keys for those mechanisms will also be updated or cleared. The user executing this command must have modify access to the directory object for it to succeed. The existing directory object can be displayed with the <i>niscat</i>(1) command using the <i>-o</i> option. This command does not update the directory objects stored in the <i>NIS_COLD_START</i> file on the NIS+ clients. If a server is also the root master server, then <i>nisupdkeys -s</i> cannot be used to update the root directory.	
OPTIONS	-a	Update the universal addresses of the NIS+ servers in the directory object. Currently, this only works for the TCP/IP family of transports. This option should be used when the IP address of the server is changed. The server's new address is resolved using <i>getipnodebyname</i> (3SOCKET) on this machine. The <i>/etc/nsswitch.conf</i> file must point to the correct source for <i>ipnodes</i> and <i>hosts</i> for this resolution to work.
	-C	Specify to clear rather than set the public key(s). Communication with a server that has no public key(s) does not require the use of secure RPC.
	-H <i>host</i>	Limit key changes only to the server named <i>host</i> . If the hostname is not a fully qualified NIS+ name, then it is assumed to be a host in the default domain. If the named host does not serve the directory, no action is taken.
	-s	Update all the NIS+ directory objects served by the specified server. This assumes that the caller has adequate access rights to

nisupdkeys(1M)

change all the associated directory objects. If the NIS+ principal making this call does not have adequate permissions to update the directory objects, those particular updates will fail and the caller will be notified. If the `rpc.nisd` on *host* cannot return the list of servers it serves, the command will print an error message. The caller would then have to invoke `nisupdkeys` multiple times (as in the first synopsis), once per NIS+ directory that it serves.

EXAMPLES

EXAMPLE 1 Using `nisupdkeys`

The following example updates the keys for servers of the *foo.bar.* domain.

```
example% nisupdkeys foo.bar.
```

This example updates the key(s) for host *fred* that serves the *foo.bar.* domain.

```
example% nisupdkeys -H fred foo.bar.
```

This example clears the public key(s) for host *wilma* in the *foo.bar.* directory.

```
example% nisupdkeys -CH wilma foo.bar.
```

This example updates the public key(s) in all directory objects that are served by the host *wilma*.

```
example% nisupdkeys -s -H wilma
```

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO

`chkey(1)`, `niscat(1)`, `nisaddcred(1M)`, `nisauthconf(1M)`, `nisstat(1M)`, `getipnodebyname(3SOCKET)`, `nis_objects(3NSL)`, `attributes(5)`

NOTES

NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

NAME	nlsadmin – network listener service administration						
SYNOPSIS	<pre> /usr/sbin/nlsadmin -x /usr/sbin/nlsadmin [options] net_spec /usr/sbin/nlsadmin [options] -N port_monitor_tag /usr/sbin/nlsadmin -V /usr/sbin/nlsadmin -c cmd -o streamname [-p modules] [-A address -D] [-R prognum : versnum] </pre>						
DESCRIPTION	nlsadmin is the administrative command for the network listener process(es) on a machine. Each network has at least one instance of the network listener process associated with it; each instance (and thus, each network) is configured separately. The listener process “listens” to the network for service requests, accepts requests when they arrive, and invokes servers in response to those service requests. The network listener process may be used with any network (more precisely, with any connection-oriented transport provider) that conforms to the transport provider specification. nlsadmin can establish a listener process for a given network, configure the specific attributes of that listener, and start and kill the listener process for that network. nlsadmin can also report on the listener processes on a machine, either individually (per network) or collectively. <i>net_spec</i> represents a particular listener process. Specifically, <i>net_spec</i> is the relative path name of the entry under /dev for a given network (that is, a transport provider). <i>address</i> is a transport address on which to listen and is interpreted using a syntax that allows for a variety of address formats. By default, <i>address</i> is interpreted as the symbolic ASCII representation of the transport address. An <i>address</i> preceded by \x will let you enter an address in hexadecimal notation. Note that <i>address</i> must appear as a single word to the shell, thus it must be quoted if it contains any blanks. Changes to the list of services provided by the listener or the addresses of those services are put into effect immediately.						
OPTIONS	nlsadmin may be used with the following combinations of options and arguments: <table> <tr> <td>-x</td><td>Report the status of all of the listener processes installed on this machine.</td></tr> <tr> <td><i>net_spec</i></td><td>Print the status of the listener process for <i>net_spec</i>.</td></tr> <tr> <td>-q <i>net_spec</i></td><td>Query the status of the listener process for the specified network, and reflects the result of that query in its exit code. If a listener process is active, nlsadmin will exit with a status of 0; if no process is active, the exit</td></tr> </table>	-x	Report the status of all of the listener processes installed on this machine.	<i>net_spec</i>	Print the status of the listener process for <i>net_spec</i> .	-q <i>net_spec</i>	Query the status of the listener process for the specified network, and reflects the result of that query in its exit code. If a listener process is active, nlsadmin will exit with a status of 0; if no process is active, the exit
-x	Report the status of all of the listener processes installed on this machine.						
<i>net_spec</i>	Print the status of the listener process for <i>net_spec</i> .						
-q <i>net_spec</i>	Query the status of the listener process for the specified network, and reflects the result of that query in its exit code. If a listener process is active, nlsadmin will exit with a status of 0; if no process is active, the exit						

nlsadmin(1M)

	code will be 1; the exit code will be greater than 1 in case of error.
<code>-v net_spec</code>	Print a verbose report on the servers associated with <i>net_spec</i> , giving the service code, status, command, and comment for each. It also specifies the <code>uid</code> the server will run as and the list of modules to be pushed, if any, before the server is started.
<code>-z service_code net_spec</code>	Print a report on the server associated with <i>net_spec</i> that has service code <i>service_code</i> , giving the same information as in the <code>-v</code> option.
<code>-q -z service_code net_spec</code>	Query the status of the service with service code <i>service_code</i> on network <i>net_spec</i> , and exits with a status of 0 if that service is enabled, 1 if that service is disabled, and greater than 1 in case of error.
<code>-l address net_spec</code>	Change or set the transport address on which the listener listens (the general listener service). This address can be used by remote processes to access the servers available through this listener (see the <code>-a</code> option, below). If <i>address</i> is just a dash ("<code>-</code>"), <code>nlsadmin</code> reports the address currently configured, instead of changing it. A change of address takes effect immediately.
<code>-t address net_spec</code>	Change or set the address on which the listener listens for requests for terminal service but is otherwise similar to the <code>-l</code> option above. A terminal service address should not be defined unless the appropriate remote login software is available; if such software is available, it must be configured as service code 1 (see the <code>-a</code> option, below).
<code>-i net_spec</code>	Initialize an instance of the listener for the network specified by <i>net_spec</i> ; that is, create and initialize the files required by the listener as well as starting that instance of the listener. Note that a particular instance

`-a service_code`

of the listener should be initialized only once. The listener must be initialized before assigning addresses or services.

`[-p modules] [-w name] -c cmd -y
comment net_spec`

Add a new service to the list of services available through the indicated listener. *service_code* is the code for the service, *cmd* is the command to be invoked in response to that service code, comprised of the full path name of the server and its arguments, and *comment* is a brief (free-form) description of the service for use in various reports. Note that *cmd* must appear as a single word to the shell; if arguments are required, the *cmd* and its arguments must be enclosed in quotation marks. The *comment* must also appear as a single word to the shell. When a service is added, it is initially enabled (see the `-e` and `-d` options, below).

Service codes are alphanumeric strings, and are administered by AT&T. The numeric service codes 0 through 100 are reserved for internal use by the listener. Service code 0 is assigned to the nlps server, which is the service invoked on the general listening address. In particular, code 1 is assigned to the remote login service, which is the service automatically invoked for connections to the terminal login address.

If the `-p` option is specified, then *modules* will be interpreted as a list of STREAMS modules for the listener to push before starting the service being added. The modules are pushed in the order they are specified. *modules* should be a comma-separated list of modules, with no white space included.

If the `-w` option is specified, then *name* is interpreted as the user name from `/etc/passwd` that the listener should look up. From the user name, the listener obtains

	the user ID, the group ID(s), and the home directory for use by the server. If <code>-w</code> is not specified, the default is to use the user name <code>listen</code> .
	A service must explicitly be added to the listener for each network on which that service is to be available. This operation will normally be performed only when the service is installed on a machine, or when populating the list of services for a new network.
<code>-r service_code net_spec</code>	Remove the entry for the <i>service_code</i> from that listener's list of services. This is normally done only in conjunction with the de-installation of a service from a machine.
<code>-e service_code net_spec</code> <code>-d service_code net_spec</code>	Enable or disable (respectively) the service indicated by <i>service_code</i> for the specified network. The service must previously have been added to the listener for that network (see the <code>-a</code> option, above). Disabling a service will cause subsequent service requests for that service to be denied, but the processes from any prior service requests that are still running will continue unaffected.
<code>-s net_spec</code> <code>-k net_spec</code>	Start and kill (respectively) the listener process for the indicated network. These operations are normally performed as part of the system startup and shutdown procedures. Before a listener can be started for a particular network, it must first have been initialized (see the <code>-i</code> option, above). When a listener is killed, processes that are still running as a result of prior service requests will continue unaffected.
Under the Service Access Facility, it is possible to have multiple instances of the listener on a single <i>net_spec</i> . In any of the above commands, the option <code>-N port_monitor_tag</code> may be used in place of the <i>net_spec</i> argument. This argument specifies the tag by which an instance of the listener is identified by the Service Access Facility. If the <code>-N</code> option is not specified (that is, the <i>net_spec</i> is specified in the invocation), then it will be assumed that the last component of the <i>net_spec</i> represents	

the tag of the listener for which the operation is destined. In other words, it is assumed that there is at least one listener on a designated *net_spec*, and that its tag is identical to the last component of the *net_spec*. This listener may be thought of as the primary, or default, listener for a particular *net_spec*.

nlsadmin is also used in conjunction with the Service Access Facility commands. In that capacity, the following combinations of options can be used:

-V

Write the current version number of the listener's administrative file to the standard output. It is used as part of the *sacadm* command line when *sacadm* adds a port monitor to the system.

-c *cmd* | -o *streamname* [-p *modules*] [-A *address* | -D] [-R *prognum* : *versnum*]

Format the port monitor-specific information to be used as an argument to *pmadm*(1M)

The -c option specifies the full path name of the server and its arguments. *cmd* must appear as a single word to the shell, and its arguments must therefore be surrounded by quotes.

The -o option specifies the full path name of a FIFO or named STREAM through which a standing server is actually receiving the connection.

If the -p option is specified, then *modules* will be interpreted as a list of STREAMS modules for the listener to push before starting the service being added. The modules are pushed in the order in which they are specified. *modules* must be a comma-separated list, with no white space included.

If the -A option is specified, then *address* will be interpreted as the server's private address. The listener will monitor this address on behalf of the service and will dispatch all calls arriving on this address directly to the designated service. This option may not be used in conjunction with the -D option.

If the -D option is specified, then the service is assigned a private address dynamically, that is, the listener will have the transport provider select the address each time the listener begins listening on behalf of this service. For RPC services, this option will be often be used in conjunction with the -R option to register the dynamically assigned address with the *rpcbinder*. This option may not be used in conjunction with the -A option.

When the -R option is specified, the service is an RPC service whose address, program number, and version number should be registered with the *rpcbinder* for this transport provider. This registration is performed each time the listener begins listening on behalf of the service. *prognum* and *versnum* are the program number and version number, respectively, of the RPC service.

nlsadmin may be invoked by any user to generate reports; all operations that affect a listener's status or configuration may only be run by a super-user.

nlsadmin(1M)

The options specific to the Service Access Facility may not be used together with any other options.

ERRORS If successful, nlsadmin exits with a status of 0. If nlsadmin fails for any reason, it exits with a status greater than or equal to 2. See -q option for a return status of 1.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO listen(1M), pmadm(1M), rpcbind(1M), sacadm(1M), attributes(5)

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NOTES Dynamically assigned addresses are not displayed in reports as statically assigned addresses are.

NAME	nscd – name service cache daemon								
SYNOPSIS	/usr/sbin/nscd [-f <i>configuration-file</i>] [-g] [-e <i>cachename</i> , yes no] [-i <i>cachename</i>]								
DESCRIPTION	nscd is a process that provides a cache for the most common name service requests. It starts up during multi-user boot. The default <i>configuration-file</i> <code>/etc/nscd.conf</code> determines the behavior of the cache daemon. See <code>nscd.conf(4)</code>. nscd provides caching for the <code>passwd(4)</code>, <code>group(4)</code>, <code>hosts(4)</code>, <code>ipnodes(4)</code>, <code>exec_attr(4)</code>, <code>prof_attr(4)</code>, and <code>user_attr(4)</code> databases through standard libc interfaces, such as <code>gethostbyname(3NSL)</code>, <code>getipnodebyname(3SOCKET)</code>, <code>gethostbyaddr(3NSL)</code>, and others. Each cache has a separate time-to-live for its data; modifying the local database (<code>/etc/hosts</code>, <code>/etc/resolv.conf</code>, and so forth) causes that cache to become invalidated upon the next call to nscd. The shadow file is specifically not cached. <code>getspnam(3C)</code> calls remain uncached as a result. nscd also acts as its own administration tool. If an instance of nscd is already running, commands are passed to the running version transparently. In order to preserve NIS+ security, the startup script for nscd (<code>/etc/init.d/nscd</code>) checks the permissions on the <code>passwd</code> table if NIS+ is being used. If this table cannot be read by unauthenticated users, then nscd will make sure that any encrypted password information returned from the NIS+ server is supplied only to the owner of that password.								
OPTIONS	Several of the options described below require a <i>cachename</i> specification. Supported values are <code>passwd</code>, <code>group</code>, <code>hosts</code>, <code>ipnodes</code>, <code>exec_attr</code>, <code>prof_attr</code>, and <code>user_attr</code>. <table> <tr> <td>-f <i>configuration-file</i></td><td>Causes nscd to read its configuration data from the specified file.</td></tr> <tr> <td>-g</td><td>Prints current configuration and statistics to standard output. This is the only option executable by non-root users.</td></tr> <tr> <td>-e <i>cachename</i>, yes no</td><td>Enables or disables the specified cache.</td></tr> <tr> <td>-i <i>cachename</i></td><td>Invalidate the specified cache.</td></tr> </table>	-f <i>configuration-file</i>	Causes nscd to read its configuration data from the specified file.	-g	Prints current configuration and statistics to standard output. This is the only option executable by non-root users.	-e <i>cachename</i> , yes no	Enables or disables the specified cache.	-i <i>cachename</i>	Invalidate the specified cache.
-f <i>configuration-file</i>	Causes nscd to read its configuration data from the specified file.								
-g	Prints current configuration and statistics to standard output. This is the only option executable by non-root users.								
-e <i>cachename</i> , yes no	Enables or disables the specified cache.								
-i <i>cachename</i>	Invalidate the specified cache.								
EXAMPLES	EXAMPLE 1 Stopping and restarting the nscd daemon. <pre>example# /etc/init.d/nscd stop</pre> <pre>example# /etc/init.d/nscd start</pre>								
FILES	<code>/etc/nscd.conf</code> determines the behavior of the cache daemon								

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ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `getspnam(3C)`, `gethostbyname(3NSL)`, `getipnodebyname(3SOCKET)`, `exec_attr(4)`, `group(4)`, `hosts(4)`, `ipnodes(4)`, `nscd.conf(4)`, `nsswitch.conf(4)`, `passwd(4)`, `prof_attr(4)`, `user_attr(4)`, `attributes(5)`

NOTES The output from the `-g` option to `nscd` is subject to change. Do not rely upon it as a programming interface.

NAME	nslookup – query name servers interactively	
SYNOPSIS	nslookup [- option]... <i>host</i> [<i>server</i>] nslookup [- option]... - [<i>server</i>] nslookup	
DESCRIPTION	nslookup sends queries to Internet domain name servers. It has two modes: interactive and non-interactive. Interactive mode allows the user to contact servers for information about various hosts and domains or to display a list of hosts in a domain. Non-interactive mode is used to display just the name and requested information for a host or domain.	
OPTIONS	<i>-option</i> Set the permissible options, as shown in the following list. These are the same options that the set command supports in interactive mode (see set in the Commands section for more complete descriptions). all List the current settings class= <i>classname</i> Restrict search according to the specified class d2 Set exhaustive debug mode on nod2 Set exhaustive debug mode off debug Set debug mode on nodebug Set debug mode off defname Set domain-appending mode on nodefname Set domain-appending mode off domain= <i>string</i> Establish the appendable domain ignoretc Set it to ignore packet truncation errors noignoretc Set it to acknowledge packet truncation errors	
OPERANDS	<i>host</i>	Inquires about the specified <i>host</i> . In this non-interactive command format, nslookup Does not prompt for additional commands.
	–	Causes nslookup to prompt for more information, such as host names, before sending one or more queries.
	<i>server</i>	Directs inquiries to the name server specified here in the command line rather than the one read from the /etc/resolv.conf file (see resolv.conf(4)). <i>server</i> can be either a name or an Internet address. If the specified host cannot be reached, nslookup resorts to using the name server specified in /etc/resolv.conf.
USAGE		

nslookup(1M)

Non-interactive Mode	Non-interactive mode is selected when the name or Internet address of the host to be looked up is given as the first argument. Within non-interactive mode, space-separated options can be specified. They must be entered before the host name, to be queried. Each option must be prefixed with a hyphen. For example, to request extensive host information and to set the timeout to 10 seconds when inquiring about <i>gypsy</i>, enter: <pre>example% nslookup -query=hinfo -timeout=10 gypsy</pre> To avoid repeated entry of an option that you almost always use, place a corresponding <code>set</code> command in a <code>.nslookuprc</code> file located inside your home directory. (See Commands for more information about <code>set</code>.) The <code>.nslookuprc</code> file can contain several <code>set</code> commands if each is followed by a RETURN.
Entering and Leaving Interactive Mode	Interactive mode is selected when ■ No arguments are supplied. ■ A '-' (hyphen) character is supplied as the <i>host</i> argument. To exit from an interactive nslookup session, type <code>Control-d</code> or type the command <code>exit</code> followed by RETURN.
Supported Command Interactions	The commands associated with interactive mode are subject to various limitations and run-time conventions. The maximum length of a command line is 255 characters. When the RETURN key is pressed, command-line execution begins. While a command is running, its execution can be interrupted by typing <code>Control-c</code>. The first word entered on the command line must be the name of a nslookup command unless you wish to enter the name of a host to inquire about. Any unrecognized command is handled as a host name to inquire about. To force a command to be treated as a host name to be inquired about, precede it with a backslash character.
Commands	<pre>exit</pre> Exit the nslookup program. <pre>help</pre> <pre>?</pre> Display a brief summary of commands. <pre>host [server]</pre> Look up information for <i>host</i> using the current default server, or using <i>server</i> if it is specified.

If the *host* supplied is an Internet address and the query type is A or PTR, the name of the host is returned. If the *host* supplied is a name and it does not have a trailing period, the default domain name is appended to the name. (This behavior depends on the state of the set options domain, srchlist, defname, and search).

To look up a host that is not in the current domain, append a period to the name.

finger [*name*] [>> *filename*]

Connect with the finger server on the current host, which is defined by the most recent successful host lookup.

If no *name* value is specified, a list of login account names on the current host is generated.

Similar to a shell command interpreter, output can be redirected to a file using the usual redirection symbols: > and >>.

ls [-*options*] *domain* [>> *filename*]

List the information available for *domain*, optionally creating or appending to *filename*. The default output contains host names and their Internet addresses.

Output can be redirected to *filename* using the > and >> redirection symbols. When output is directed to a file, hash marks are shown for every 50 records received from the server. The permissible values for *options* are:

a	Lists aliases of hosts in the domain. This is a synonym for the command ls -t CNAME .
d	Lists all records for the domain. This is a synonym for the command ls -t ANY .
h	Lists CPU and operating system information for the domain. This is a synonym for the command ls -t HINFO .
s	Lists well-known services of hosts in the domain. This is a synonym for the command ls -t WKS .
t <i>querytype-value</i>	lists all records of the specified type (see <i>querytype</i> within the discussion of the set command).

set *token=value*

set *keyword*

Establish a preferred mode of search operation. Permissible *token* and *keyword* values are:

all	Display the current values of frequently-used options. Information about the current default server and host is also displayed.

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<code>cl[ass]=<i>classname</i></code>	Limit the search according to the protocol group (<i>classname</i>) for which lookup information is desired. Permissible <i>classname</i> values are: ANY A wildcard selecting all classes IN The Internet class (the default) CHAOS The Chaos class. HESIOD The MIT Athena Hesiod class.
<code>d2</code> <code>nod2</code>	Enable or disable exhaustive debugging mode. Essentially all fields of every packet are displayed. By default, this option is disabled.
<code>deb[ug]</code> <code>nodeb[ug]</code>	Enable or disable debugging mode. When debugging mode is enabled, much more information is produced about the packet sent to the server and the resulting answer. By default, this option is disabled.
<code>def[name]</code> <code>nodef[name]</code>	Enable or disable appending the default domain name to a single-component lookup request (one that lacks a dot). By default, this option is enabled for <code>nslookup</code> . The default value for the domain name is the value given in <code>/etc/resolv.conf</code> , unless: there is an environmental value for <code>LOCALDOMAIN</code> when <code>nslookup</code> is run; a recent value has been specified through the <code>srchlist</code> command or the <code>set domain</code> command.
<code>do[main]=<i>string</i></code>	Change the default domain name to be appended to all lookup requests to <i>string</i> . For this option to have any effect, the <code>defname</code> option must also be enabled and the <code>search</code> option must be set in a compatible way. The domain search list contains the parents of the default domain if it has at least two components in its name. For example, if the default domain is <code>CC.Berkeley.EDU</code> , the search list is <code>CC.Berkeley.EDU</code> and <code>Berkeley.EDU</code> . Use the <code>set srchlist</code> command to specify a different list. Use the <code>set all</code> command to display the list.
<code>ignoretc</code> <code>noignoretc</code>	Ignore packet truncation errors. By default, this option is disabled.

```
srch[list]=name1/name2/...
```

Change the default domain name to *name1* and the domain search list to *name1*, *name2*, etc. A maximum of 6 names can be specified, along with slash characters to separate them. For example,

```
example% set srchlist=lcs.MIT.EDU/ai.MIT.EDU/MIT.EDU
```

sets the domain to *lcs.MIT.EDU* and the search list to all three names. This command overrides the default domain name and search list of the `set domain` command. Use the `set all` command to display the list.

```
search
```

```
nosearch
```

Enable or disable having the domain names in the domain search list appended to the request, generating a series of lookup queries if necessary until an answer is received. To take effect, the lookup request must contain at least one dot (period); yet it must not contain a trailing period. By default, this option is enabled.

```
po[rt]=value
```

Specify the default TCP/UDP name server port. By default, this value is 53.

```
q[ue]rytype=value
```

```
ty[pe]=value
```

Change the type of information returned from a query to one of:

A	The Internet address of the host
CNAME	The canonical name for an alias
HINFO	The host CPU and operating system type
MD	The mail destination
MX	The mail exchanger
MB	The mailbox domain name
MG	The mail group member
MINFO	The mailbox or mail list information
NS	The name server
PTR	The host name if the query is in the form of an Internet address; otherwise the pointer to other information
SOA	The domain's start-of-authority information
TXT	The text information
UINFO	The user information
WKS	The supported well-known services

(Other types specified in the *RFC 1035* document are valid, but they are not as useful.)

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`recurse`
`norecurse`
Enable or disable having to query other name servers before abandoning a search. By default, this feature is enabled.

`ret[ry]=count`
Set the maximum number of times to retry a request before abandoning a search. When a reply to a request is not received within a certain amount of time (changed with `set timeout`), the timeout period is doubled and the request is resent. The retry value controls how many times a request is resent before the request is aborted. The default for *count* is 4.

`ro[ot]=host`
Change the name of the root server to *host*. This affects the `root` command. The default root server is `ns.internic.net`.

`t[timeout]=interval`
Change the amount of time to wait for a reply to *interval* seconds. Each retry doubles the timeout period. The default *interval* is 5 seconds.

`vc`
`novc`
Enable or disable the use of a virtual circuit when sending requests to the server. By default, this feature is disabled.

`root`
Change the default server to the server for the root of the domain name space. Currently, the host `ns.internic.net` is used; this command is a synonym for `server ns.internic.net`. The name of the root server can be changed with the `set root` command.

`server domain`
`lserver domain`
Change the default server to *domain*. `lserver` uses the initial server to look up information about *domain* while `server` uses the current default server. If an authoritative answer can not be found, the names of servers that might have the answer are returned.

EXAMPLES

EXAMPLE 1 Searching the Internet Domain Namespace

To effectively search the Internet domain namespace, it helps to know its structure. At present, the Internet domain name-space is tree-structured, with one top level domain for each country except the United States.. There are also some traditional top level domains, not explicitly tied to any particular country. These include:

COM	Commercial establishments
EDU	Educational institutions
ORG	Not-for-profit organizations
GOV	Government agencies
MIL	MILNET hosts

EXAMPLE 1 Searching the Internet Domain Namespace (Continued)

If you are looking for a specific host, you need to know something about the host's organization in order to determine the top-level domain that it belongs to. For instance, if you want to find the Internet address of a machine at UCLA, do the following:

- Connect with the root server using the `root` command. The root server of the name space has knowledge of the top-level domains.
- Since UCLA is a university, its domain name is `ucla.edu`. Connect with a server for the `ucla.edu` domain with the command `server ucla.edu`. The response produces the names of hosts that act as servers for that domain. Note: the root server does not have information about `ucla.edu`, but knows the names and addresses of hosts that do. Once located by the root server, all future queries will be sent to the UCLA name server.
- To request information about a particular host in the domain (for instance, `locus`), just type the host name. To request a listing of hosts in the UCLA domain, use the `ls` command. The `ls` command requires a domain name, (in this case, `ucla.edu`, as an argument.

If you are connected with a name server that handles more than one domain, all lookups for host names must be fully specified with its domain. For instance, the domain `harvard.edu` is served by `seismo.css.gov`, which also services the `css.gov` and `cornell.edu` domains. A lookup request for the host `aiken` in the `harvard.edu` domain must be specified as `aiken.harvard.edu`. However, the `set domain=name` and `set defname` commands can be used to automatically append a domain name to each request.

After a successful lookup of a host, use the `finger(1)` command to see who is on the system, or to finger a specific person. (`finger` requires the type to be A.)

To get other information about the host, use the `set querytype=value` command to change the type of information desired and request another lookup.

ENVIRONMENT VARIABLES

`HOSTALIASES` References the file containing host aliases

`LOCALDOMAIN` Overrides default domain

EXIT STATUS

The process returns the following values:

0 On success.

1 On failure.

FILES

`/etc/resolv.conf`
Initial domain name and name server addresses

`$HOME/.nslookuprc`
Initial option commands

nslookup(1M)

/usr/lib/nslookup.help
Summary of commands

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	Standard BIND 8.2.4

SEE ALSO finger(1), more(1), in.named(1M), nstest(1M), resolver(3RESOLV), resolv.conf(4), attributes(5)

Mockapetris, Paul. *RFC 1034, Domain Names - Concepts and Facilities*. Network Working Group. November 1987.

Mockapetris, Paul. *RFC 1035, Domain Names - Implementation and Specification*. Network Working Group. November 1987.

DIAGNOSTICS If the lookup request is successful, an error message is produced. Possible errors are:

Timed out	The server did not respond to a request after a certain amount of time (changed with <code>set timeout=value</code>) and a certain number of retries (changed with <code>set retry=value</code>).
No response from server	No name server is running on the server machine.
No records	The server does not have resource records of the current query type for the host, although the host name is valid. The query type is specified with the <code>set querytype</code> command.
Non-existent domain	The host or domain name does not exist.
Connection refused Network is unreachable	The connection to the name or finger server can not be made at the current time. This error commonly occurs with <code>ls</code> and <code>finger</code> requests.
Server failure	The name server found an internal inconsistency in its database and could not return a valid answer.
Refused	The name server refused to service the request.

nslookup(1M)

Format error

The name server found that the request packet was not in the proper format. This may indicate an error in `nslookup`.

nctest(1M)

NAME	nstest – DNS test shell																								
SYNOPSIS	nstest [-d] [-i] [-r] [-v] [-p <i>port</i>] [<i>inet_addr</i> [<i>logfile</i>]]																								
DESCRIPTION	nstest is an interactive DNS test program. Queries are formed and sent by user command; any reply received is printed on the standard output. <i>inet_addr</i> is the Internet address of the DNS resolver to which nstest should send its queries. If <i>inet_addr</i> is not included, nstest first tries to contact a DNS server on the local host; if that fails, it tries the servers listed in the <code>/etc/resolv.conf</code> file. If a <i>logfile</i> is supplied, nstest uses it to log the queries sent and replies received.																								
OPTIONS	-d Causes nstest to create a file named <code>ns_packet.dump</code> (if it does not exist) and write into it a raw (binary) copy of each packet sent. If <code>ns_packet.dump</code> does exist, nstest will truncate it. -i Sets the <code>RES_IGNTC</code> flag on the queries it makes. See <code>resolver(3RESOLV)</code> for a description of the <code>RES_IGNTC</code> flag. -r Turns off the <code>RES_RECURSE</code> flag on the queries it makes. See <code>resolver(3RESOLV)</code> for a description of the <code>RES_RECURSE</code> flag. -v Turns on the <code>RES_USEVC</code> and <code>RES_STAYOPEN</code> flags on the <code>res_send()</code> calls made. See <code>resolver(3RESOLV)</code> for a description of the <code>RES_USEVC</code> and <code>RES_STAYOPEN</code> flags. -p Causes nstest to use the supplied <i>port</i> instead of the default name server port.																								
USAGE	When nstest starts, it prints a prompt ("<code>></code>") and waits for user input. DNS queries are formed by typing a <i>key letter</i> followed by the appropriate <i>argument</i>. Each <i>key letter</i> results in a call to <code>res_mkquery()</code> with <i>op</i> set to either <code>IQUERY</code> or <code>QUERY</code> and <i>type</i> set to one of the type values (defined in <code><arpa/nameser.h></code>). (Any other key letter than those listed below causes nstest to print a summary of the following table.) <table><tr><th colspan="3">Key Letter &</th></tr><tr><th>Argument</th><th>Op</th><th>Type</th></tr><tr><td><i>ahost</i></td><td>QUERY</td><td>T_A</td></tr><tr><td><i>Aaddr</i></td><td>IQUERY</td><td>T_A</td></tr><tr><td><i>Buser</i></td><td>QUERY</td><td>T_MG</td></tr><tr><td><i>buser</i></td><td>QUERY</td><td>T_MB</td></tr><tr><td><i>chost</i></td><td>QUERY</td><td>T_CNAME</td></tr><tr><td><i>fhost</i></td><td>QUERY</td><td>T_UINFO</td></tr></table>	Key Letter &			Argument	Op	Type	<i>ahost</i>	QUERY	T_A	<i>Aaddr</i>	IQUERY	T_A	<i>Buser</i>	QUERY	T_MG	<i>buser</i>	QUERY	T_MB	<i>chost</i>	QUERY	T_CNAME	<i>fhost</i>	QUERY	T_UINFO
Key Letter &																									
Argument	Op	Type																							
<i>ahost</i>	QUERY	T_A																							
<i>Aaddr</i>	IQUERY	T_A																							
<i>Buser</i>	QUERY	T_MG																							
<i>buser</i>	QUERY	T_MB																							
<i>chost</i>	QUERY	T_CNAME																							
<i>fhost</i>	QUERY	T_UINFO																							

<i>Ggid</i>	IQUERY	T_GID
<i>ghost</i>	QUERY	T_GID
<i>hhost</i>	QUERY	T_HINFO
<i>ihost</i>	QUERY	T_MINFO
<i>Mhost</i>	QUERY	T_MAILB
<i>mhost</i>	QUERY	T_MX
<i>nhost</i>	QUERY	T_NS
<i>phost</i>	QUERY	T_PTR
<i>rhost</i>	QUERY	T_MR
<i>shost</i>	QUERY	T_SOA
<i>Thost</i>	QUERY	T_TXT
<i>Uuid</i>	IQUERY	T_UID
<i>uhost</i>	QUERY	T_UID
<i>whost</i>	QUERY	T_WKS
<i>xhost</i>	QUERY	T_AXFR

After the query is successfully formed, `res_send()` is called to send it and wait for a reply. `nctest` then prints the following on the standard output:

- a summary of the request and reply packets, including the `HEADER` structure (defined in `<arpa/nameser.h>`) used in the request
- the question being asked of the name server
- an enumeration of the name server(s) being polled
- a summary of the `HEADER` structure received in the reply
- the question the name server answered
- the answer itself

EXAMPLES

EXAMPLE 1 Fetching the Address of a Host From the Sun Name Server

The following command fetches the address of host `playground.sun.com` from the Sun name server:

```
$ nctest 192.9.5.1
> aplayground.sun.com
```

The utility `nctest` returns the following:

```
res_mkquery(0, playground.sun.com, 1, 1)
res_send()
HEADER:
```

EXAMPLE 1 Fetching the Address of a Host From the Sun Name Server *(Continued)*

```
opcode = QUERY, id = 1, rcode = NOERROR
header flags:  rd
qdcount = 1, ancount = 0, nscount = 0, arcount = 0
```

QUESTIONS:

```
playground.sun.com, type = A, class = IN
```

Querying server (# 1) address = 192.9.5.1

got answer:

HEADER:

```
opcode = QUERY, id = 1, rcode = NOERROR
header flags:  qr aa rd ra
qdcount = 1, ancount = 1, nscount = 0, arcount = 0
```

QUESTIONS:

```
playground.sun.com, type = A, class = IN
```

ANSWERS:

```
playground.sun.com
type = A, class = IN, ttl = 1 day, dlen = 4
internet address = 192.9.5.5
```

EXAMPLE 2 Looking Up a PTR record

The following command looks up a PTR record:

```
$ nctest 192.9.5.1
> p5.5.9.192.in-addr.arpa
```

The utility nctest would return the following:

```
res_mkquery(0, 5.5.9.192.in-addr.arpa, 1, 12)
```

```
res_send()
```

HEADER:

```
opcode = QUERY, id = 2, rcode = NOERROR
header flags:  rd
qdcount = 1, ancount = 0, nscount = 0, arcount = 0
```

QUESTIONS:

```
5.5.9.192.in-addr.arpa, type = PTR, class = IN
```

Querying server (# 1) address = 192.9.5.1

got answer:

HEADER:

```
opcode = QUERY, id = 2, rcode = NOERROR
header flags:  qr aa rd ra
qdcount = 1, ancount = 1, nscount = 0, arcount = 0
```

QUESTIONS:

```
5.5.9.192.in-addr.arpa, type = PTR, class = IN
```

ANSWERS:

```
5.5.9.192.in-addr.arpa
type = PTR, class = IN, ttl = 7 hours 47 mins 2 secs, dlen = 23
domain name = playground.sun.com
```

nstest(1M)

FILES /usr/include/arpa/nameser.h Include file for implementation of DNS protocol

 /usr/include/resolv.h Include file for the resolver daemon (in.named)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO nslookup(1M), resolver(3RESOLV), attributes(5)

nsupdate(1M)

NAME	nsupdate – update Internet name servers interactively
SYNOPSIS	nsupdate [-k <i>keydir:keyname</i>] [-d] [-v] [<i>filename</i>]
DESCRIPTION	The nsupdate program can be used to update Internet domain name servers that support dynamic update. nsupdate uses the DNS resolver library to pass messages to the DNS server requesting the addition or deletion of DNS resource records (RR's). nsupdate reads input from <i>filename</i> or from standard input.
OPTIONS	nsupdate supports the following options: -d Debug mode. -k Sign updates with Secret Key Transaction Authentication for DNS (TSIG). -v Virtual circuit. Make use of TCP to communicate with the server. The default is UDP.
USAGE	nsupdate reads input records, one per line. Each line contributes a resource record to an update request. All domain names used in a single update request must belong to the same DNS zone. Updates are sent to the master server as defined in the SOA MNAME field. A blank line causes the accumulated records to be formatted into a single update request and transmitted to the zone's authoritative name servers. Additional records may follow, which are formed into additional, but completely independent, update requests. End the input with a blank line in order to transmit the last request. Records take one of two general forms. Prerequisite records specify conditions that must be satisfied before the request will be processed. Update records specify changes to be made to the DNS database. An update request consists of zero or more prerequisites and one or more updates. Each update request is processed atomically. All prerequisites must be satisfied, then all updates will be performed. nsupdate understands the following input record formats: prereq nxdomain domain-name This format requires that no RR of any type exist with name <i>domain-name</i>. prereq yxdomain domain-name This format requires that at least one RR names <i>domain-name</i> must exist. prereq nxrrset domain-name [class] type This format requires that no RR exist of the specified type and <i>domain-name</i>. prereq yxrrset domain-name [class] type [data ...] This format requires that an RR exist of the specified type and <i>domain-name</i>. If data is specified, it must match exactly. update delete domain-name [class] [type [data ...]]

This format deletes RR's names *domain-name*. If *type* (and possibly *data*) are specified, only matching records will be deleted.

```
update add domain-name ttl [class] type data ...
```

This format adds a new RR of specified *ttl*, *type* and *data*.

EXAMPLES

EXAMPLE 1 Using nsupdate Interactively To Change an IP Address

The following example shows the interactive use of `nsupdate` to change an IP address. It deletes any existing A records for a domain name and then inserts a new address. Since no prerequisites are specified, the new record will be added even if there are no existing records to delete. A trailing blank line is required to process the request.

```
example$ nsupdate
>update delete test.example.com A
>update add test.example.com 3600 A 10.1.1.1
>
```

EXAMPLE 2 Using nsupdate Interactively to Add a CNAME (Alias)

In the following example, a CNAME (alias) is added to the database only if there are no existing A or CNAME records for the domain name.

```
example$ nsupdate
>prereq nxrrset www.example.com A
>prereq nxrrset www.example.com CNAME
>update add www.example.com 3600 CNAME test.test.com
>
```

EXAMPLE 3 Using nsupdate Interactively With a Key

In the following example, `nsupdate` is signed with the key `mykey`, which is located in the directory `/var/named/keys`.

```
example$ nsupdate -k /var/named/keys:mykey
>update add ftp.example.com 60 A 192.168.5.1
>
```

FILES `/etc/resolv.conf` Initial domain name and name server addresses.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	Standard BIND 8.2.4

nsupdate(1M)

SEE ALSO

`in.named(1M)`, `resolver(3RESOLV)`, `resolv.conf(4)`, `attributes(5)`

Mockapetris, P. *RFC 1034, Domain Names - Concepts and Facilities*. Network Working Group. November 1987.

Mockapetris, P. *RFC 1035, Domain Names - Implementation and Specification*. Network Working Group. November 1987.

Vixie, P., editor, Thomson, S., Rekhter, Y. Bound, J. *RFC 2136, Dynamic Updates in the Domain Name System (DNS)*. Network Working Group. April 1997.

DIAGNOSTICS

`Qq send error`

This message typically indicates that authoritative name servers could not be reached.

`Qq failed update packet`

This message typically indicates that the name server has rejected the update. Either the name server does not support dynamic update, or there was an authentication failure.

`Qq res_mkupdate: packet size = size`

If this is the only message sent, it indicates that the update was received and authenticated by the name server. However, the prerequisites may have prevented the update from being performed. Use debug mode (the `-d` option) to examine the status field in the name server's reply and determine if the update was performed.

NAME	ntpd – set the date and time by way of NTP
SYNOPSIS	/usr/sbin/ntpd [-bBdoqsuv] [-a <i>key#</i>] [-e <i>authdelay</i>] [-k <i>keyfile</i>] [-m] [-o <i>version</i>] [-p <i>samples</i>] [-t <i>timeout</i>] [-w] <i>server...</i>
DESCRIPTION	The <code>ntpd</code> utility sets the local date and time. To determine the correct time, it polls the Network Time Protocol (NTP) servers on the hosts given as arguments. This utility must be run as root on the local host. It obtains a number of samples from each of the servers and applies the standard NTP clock filter and selection algorithms to select the best of these. The reliability and precision of <code>ntpd</code> improve dramatically with a greater number of servers. While a single server may be used, better performance and greater resistance to inaccuracy on the part of any one server can be obtained by providing at least three or four servers, if not more. The <code>ntpd</code> utility makes time adjustments in one of two ways. If it determines that your clock is off by more than 0.5 seconds it simply steps the time by calling <code>gettimeofday(3C)</code>. If the error is less than 0.5 seconds, by default, it slews the clock's time with the offset, by way of a call to <code>adjtime(2)</code>. The latter technique is less disruptive and more accurate when the offset is small; it works quite well when <code>ntpd</code> is run by <code>cron</code> every hour or two. The adjustment made in the latter case is actually 50% larger than the measured offset. This adjustment tends to keep a badly drifting clock more accurate, at some expense to stability. This tradeoff is usually advantageous. At boot time, however, it is usually better to step the time. This can be forced in all cases by specifying the <code>-b</code> option on the command line. The <code>ntpd</code> utility declines to set the date if an NTP server daemon like <code>xntpd(1M)</code> is running on the same host. It can be run on a regular basis from <code>cron(1M)</code> as an alternative to running a daemon. Doing so once every one to two hours results in precise enough timekeeping to avoid stepping the clock.
OPTIONS	The following options are supported: -a <i>key#</i> Authenticate transactions, using the key number, <i>key#</i>. -b Step the time by calling <code>gettimeofday(3C)</code>. -B Force the time to always be slewed using the <code>adjtime(2)</code> system call, even if the measured offset is greater than +128 ms. The default is to step the time using <code>settimeofday(3C)</code> if the offset is greater than +128 ms. If the offset is much greater than +128 ms in this case, that it can take a long time (hours) to slew the clock to the correct value. During this time the host should not be used to synchronize clients. -d Display what will be done without actually doing it. Information useful for general debugging is also printed. -e <i>authdelay</i> Specify an authentication processing delay, <i>authdelay</i> in seconds. See <code>xntpd(1M)</code> for details. This number is usually small enough to

ntpd(1M)

	be negligible for purposes of <code>ntpd</code> . However, specifying a value may improve timekeeping on very slow CPU's.
<code>-k keyfile</code>	Read keys from the file <i>keyfile</i> instead of the default file, <code>/etc/ntp.keys</code> . <i>keyfile</i> should be in the format described in <code>xntpd(1M)</code> .
<code>-m</code>	Join multicast group specified in <i>server</i> and synchronize to multicast NTP packets. The standard NTP group is 224.0.1.1.
<code>-o version</code>	Force the program to poll as a version 1 or version 2 implementation. By default <code>ntpd</code> claims to be an NTP version 3 implementation in its outgoing packets. However, some older software declines to respond to version 3 queries. This option can be used in these cases.
<code>-p samples</code>	Set the number of samples <code>ntpd</code> acquires from each server. <i>samples</i> can be between 1 and 8 inclusive. The default is 4.
<code>-q</code>	Query only. Do not set the clock.
<code>-s</code>	Log actions by way of the <code>syslog(3C)</code> facility rather than to the standard output — a useful option when running the program from <code>cron(1M)</code> .
<code>-t timeout</code>	Set the time <code>ntpd</code> spends, waiting for a response. <i>timeout</i> is rounded to a multiple of 0.2 seconds. The default is 1 second, a value suitable for polling across a LAN.
<code>-u</code>	Use an unprivileged port to send the packets from. This option is useful when you are behind a firewall that blocks incoming traffic to privileged ports, and you want to synchronize with hosts beyond the firewall. The <code>-d</code> option always uses unprivileged ports.
<code>-v</code>	Be verbose. This option causes <code>ntpd</code> 's version identification string to be logged.
<code>-w</code>	Wait until able to synchronize with a server. When the <code>-w</code> option is used together with <code>-m</code> , <code>ntpd</code> waits until able to join the group and synchronize.

FILES `/etc/inet/ntp.keys` Contains the encryption keys used by `ntpd`.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWntpu

ntpdate(1M)

SEE ALSO cron(1M), xntpd(1M), adjtime(2), gettimeofday(3C),
settimeofday(3C), syslog(3C), attributes(5)

NOTES The technique of compensating for clock oscillator errors to improve accuracy is inadequate. However, to further improve accuracy would require the program to save *state* from previous runs.

ntpq(1M)

NAME	ntpq – standard Network Time Protocol query program
SYNOPSIS	/usr/sbin/ntpq [-inp] [-c <i>command</i>] [<i>host</i>] [...]
DESCRIPTION	ntpq queries NTP servers which implement the recommended NTP mode 6 control message format, about current state. It can also request changes in that state. The program can be run in interactive mode; or it can be controlled using command line arguments. Requests to read and write arbitrary variables can be assembled, with raw and pretty-printed output options available. By sending multiple queries to the server, ntpq can also obtain and print a list of peers in a common format. If one or more request options are included on the command line, ntpq sends each of the requests to NTP servers running on each of the hosts given as command line arguments. By default, ntpq sends its requests to localhost, if hosts are not included on the command line. If no request options are given, ntpq attempts to read commands from the standard input and execute them on the NTP server running on the first host given on the command line. Again, ntpq defaults to localhost if no other host is specified. ntpq uses NTP mode 6 packets to communicate with an NTP server. Thus, it can be used to query any compatible server on the network that permits queries. Since NTP is a UDP protocol, this communication will be somewhat unreliable, especially over large distances. ntpq makes one attempt to retransmit requests; requests timeout if the remote host is not heard from within a suitable period.
OPTIONS	Command line options are described below. Specifying a command line option other than -i or -n causes the specified query (queries) to be sent, immediately to the indicated host(s). Otherwise, ntpq attempts to read interactive format commands from standard input. -c Interpret the next argument as an interactive format command and add it to the list of commands to be executed on the specified host(s). Multiple -c options may be given. -i Operate in interactive mode; write prompts to standard output and read commands from standard input. -n Output all host addresses in dotted-quad numeric format rather than converting them to canonical host names. -p Print a list of the peers known to the server as well as a summary of their state. This is equivalent to the peers interactive command. See <i>USAGE</i> below.
USAGE	Interactive format commands consist of a keyword followed by up to four arguments. Only enough characters of the full keyword to uniquely identify the command need be typed. Normally, the output of a command is sent to standard output; but this output may be written to a file by appending a '>', followed by a file name, to the command line.

**Interactive
Commands**

A number of interactive format commands are executed entirely within the ntpq program itself. They do not result in NTP mode 6 requests being sent to a server. If no request options are included on the command line, and if the standard input is a terminal device, ntpq prompts for these commands. The interactive commands are described below:

? [*command_keyword*]

A '?' by itself prints a list of all the command keywords known to the current version of ntpq. A '?' followed by a command keyword prints function and usage information about the command.

timeout *milliseconds*

Specifies a time out period for responses to server queries. The default is about 5000 milliseconds. Since ntpq retries each query once after a time out, the total waiting time for a time out is twice the time out value that is set.

delay *milliseconds*

Specifies a time interval to be added to timestamps included in requests which require authentication. This command is used to enable (unreliable) server reconfiguration over long delay network paths or between machines whose clocks are unsynchronized. Currently, the server does not require time stamps in authenticated requests. Thus, this command may be obsolete.

host *hostname*

Set the name of the host to which future queries are to be sent. *Hostname* may be either a host name or a numeric address.

keyid #

Specify of a key number to be used to authenticate configuration requests. This number must correspond to a key number the server has been configured to use for this purpose.

passwd

Prompts the user to type in a password which will be used to authenticate configuration requests. If an authenticating key has been specified (see *keyid* above), this password must correspond to this key. ntpq does not echo the password as it is typed.

hostnames *yes* | *no*

If "yes" is specified, host names are printed in information displays. If "no" is given, numeric addresses are printed instead. The default is "yes" unless modified using the command line -n switch.

raw

Print all output from query commands exactly as it is received from the remote server. The only formatting/filtering done on the data is to transform non- ASCII data into printable form.

ntpq(1M)

`cooked`

Causes output from query commands to be “cooked”. The values of variables recognized by the server are reformatted, so that they can be more easily read. Variables which `ntpq` thinks should have a decodable value, but do not, are marked with a trailing ‘?’.

`ntpversion [ 1 | 2 | 3 ]`

Sets the NTP version number which `ntpq` claims in packets (defaults is 3). Note that mode 6 control messages (and modes, for that matter) did not exist in NTP version 1. There appear to be no servers left which demand version 1.

`authenticate [ yes | no ]`

The command `authenticate yes` instructs `ntpq` to send authentication with all requests it makes. Normally `ntpq` does not authenticate requests unless they are write requests. Authenticated requests cause some servers to handle requests slightly differently, and can occasionally cause a slowed response if you turn authentication on before doing a peer display. `addvars variable_name[=value] [ , ... ] rmvars variable_name [ , ... ] clearvars`

The data carried by NTP mode 6 messages consists of a list of items of the form

`variable_name=value` where the “`=value`” is ignored, and can be omitted, in requests to the server to read variables. `ntpq` maintains an internal list in which data to be included in control messages can be assembled, and sent. This is accomplished with the `readlist` and `writelist` commands described below. The `addvars` command allows variables and their optional values to be added to the list. If more than one variable is to be added, the list should be comma-separated, and it should not contain white space. The `rmvars` command can be used to remove individual variables from the list; the `clearlist` command removes all variables from the list.

`debug [ more | less | off ]`

Turns internal query program debugging on and off.

`quit`

Exit `ntpq`.

Control Message Commands

Each peer known to an NTP server has a 16 bit integer *association identifier* assigned to it. NTP control messages which carry peer variables must identify the peer that the values correspond to, by including its association ID. An association ID of 0 is special. It indicates the variables are system variables, whose names are drawn from a separate name space.

Control message commands send one or more NTP mode 6 messages to the server, and cause the data returned to be printed in some format. Most commands currently implemented send a single message and expect a single response. The current exceptions are the peers `mreadlist` and `mreadvar` commands. The `peers` command sends a preprogrammed series of messages to obtain the data it needs. The `mreadlist` and `mreadvar` commands, iterate over a range of associations.

Control message commands are described below:

`associations`

Obtains and prints a list of association identifiers and peer statuses for in-spec peers of the server being queried. The list is printed in columns. The first of these is an index that numbers the associations from 1, for internal use. The second column contains the actual association identifier returned by the server and the third the status word for the peer. This is followed by a number of columns containing data decoded from the status word. Note that the data returned by the `associations` command is cached internally in `ntp`. The index is then of use when dealing with “dumb” servers which use association identifiers that are hard for humans to type. For any subsequent commands which require an association identifier as an argument, the identifier can be specified by using the form, *&index*. Here *index* is taken from the previous list.

`lassociations`

Obtains and prints a list of association identifiers and peer statuses for all associations for which the server is maintaining *state*. This command differs from the `associations` command only for servers which retain *state* for out-of-spec client associations. Such associations are normally omitted from the display when the `associations` command is used, but are included in the output of `lassociations`.

`passociations`

Prints association data concerning in-spec peers from the internally cached list of associations. This command performs identically to the `associations` command except that it displays the internally stored data rather than making a new query.

`lpassociations`

Print data for all associations, including out-of-spec client associations, from the internally cached list of associations. This command differs from `passociations` only when dealing with servers which retain *state* for out-of-spec client associations.

`pstatus assocID`

Sends a read status request to the server for the given association. The names and values of the peer variables returned will be printed. Note that the status word from the header is displayed preceding the variables, both in hexadecimal and in pigeon English.

`readvar [ assoc ] [ variable_name[=value] [ , . . . ] ]`

Requests that the values of the specified variables be returned by the server by sending a read variables request. If the association ID is omitted or is given as zero the variables are system variables, otherwise they are peer variables and the values returned will be those of the corresponding peer. Omitting the variable list will send a request with no data which should induce the server to return a default display.

`rv [ assocID ] [ variable_name[=value] [ , . . . ] ]`

An easy-to-type short form for the `readvar` command.

`writevar assocID variable_name=value [ ,... ]`
 Like the `readvar` request, except the specified variables are written instead of read.

`readlist [ assocID ]`
 Requests that the values of the variables in the internal variable list be returned by the server. If the association ID is omitted or is 0 the variables are assumed to be system variables. Otherwise they are treated as peer variables. If the internal variable list is empty a request is sent without data, which should induce the remote server to return a default display.

`rl [ assocID ]`
 An easy-to-type short form of the `readlist` command.

`writelist [ assocID ]`
 Like the `readlist` request, except the internal list variables are written instead of read.

`mreadvar assocID assocID [ variable_name[=value] [ ,... ] ]`
 Like the `readvar` command except the query is done for each of a range of (nonzero) association IDs. This range is determined from the association list cached by the most recent `associations` command.

`mrvar assocID assocID [ variable_name[=value] [ ,... ] ]`
 An easy-to-type short form of the `mreadvar` command.

`mreadlist assocID assocID`
 Like the `readlist` command except the query is done for each of a range of (nonzero) association IDs. This range is determined from the association list cached by the most recent `associations` command.

`mrl assocID assocID`
 An easy-to-type short form of the `mreadlist` command.

`clockvar [ assocID ] [ variable_name[=value] [ ,... ] ]`
 Requests that a list of the server's clock variables be sent. Servers which have a radio clock or other external synchronization respond positively to this. If the association identifier is omitted or zero the request is for the variables of the "system clock". This request generally gets a positive response from all servers with a clock. Some servers may treat clocks as pseudo-peers and, hence, can possibly have more than one clock connected at once. For these servers, referencing the appropriate peer association ID shows the variables of a particular clock. Omitting the variable list causes the server to return a default variable display.

`cv [ assocID ] [ variable_name[=value] [ ,... ] ]`
 An easy-to-type short form of the `clockvar` command.

`peers`
 Obtains a list of in-spec peers of the server, along with a summary of each peer's state. Summary information includes:

- The address of the remote peer
- The reference ID (0.0.0.0 if the ref ID is unknown)

- The stratum of the remote peer
- The type of the peer (local, unicast, multicast or broadcast) when the last packet was received
- The polling interval in seconds
- The reachability register, in octal
- The current estimated delay offset and dispersion of the peer, all in milliseconds.

The character in the left margin indicates the fate of this peer in the clock selection process. The codes mean:

SPACE	Discarded due to high stratum and/or failed sanity checks.
x	Designated falsticker by the intersection algorithm.
.	Culled from the end of the candidate list.
–	Discarded by the clustering algorithm.
+	Included in the final selection set.
#	Selected for synchronization; but distance exceeds maximum.
*	Selected for synchronization.
o	Selected for synchronization, pps signal in use.

Since the `peers` command depends on the ability to parse the values in the responses it gets, it may fail to work from time to time with servers which poorly control the data formats.

The contents of the host field may be given in one of four forms. It may be a host name, an IP address, a reference clock implementation name with its parameter or, `REFCLK(implementation number, parameter)`. On “hostnames no” only IP-addresses will be displayed.

lpeers

Like `peers`, except a summary of all associations for which the server is maintaining state is printed. This can produce a much longer list of peers from inadequate servers.

opeers

An old form of the `peers` command with the reference ID replaced by the local interface address.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWntpu

SEE ALSO `attributes(5)`

ntpq(1M)

BUGS	The <code>peers</code> command is non-atomic. It may occasionally result in spurious error messages about invalid associations occurring and terminating the command. The timeout value is a fixed constant. As a result, it often waits a long time to timeout, since the fixed value assumes sort of a worst case. The program should improve the time out estimate as it sends queries to a particular host; but it does not.

NAME	ntptrace – trace a chain of NTP hosts back to their master time source				
SYNOPSIS	/usr/sbin/ntptrace [-vdm] [-r <i>retries</i>] [-t <i>timeout</i>] [<i>server</i>]				
DESCRIPTION	ntptrace determines where a given Network Time Protocol (NTP) server gets its time from, and follows the chain of NTP servers back to their master time source. If given no arguments, it starts with <i>localhost</i> .				
OPTIONS	The following options are supported: -d Turns on some debugging output. -n Turns off the printing of host names; instead, host IP addresses are given. This may be necessary if a nameserver is down. -r <i>retries</i> Sets the number of retransmission attempts for each host. -t <i>timeout</i> Sets the retransmission timeout (in seconds); default = 2. -v Prints verbose information about the NTP servers.				
EXAMPLES	EXAMPLE 1 Sample Output From the ntptrace Command The following example shows the output from the ntptrace command: <pre>% ntptrace localhost: stratum 4, offset 0.0019529, synch distance 0.144135 server2.bozo.com: stratum 2, offset 0.0124263, synch distance 0.115784 usndh.edu: stratum 1, offset 0.0019298, synch distance 0.011993, refid 'WWVB'</pre> On each line, the fields are (left to right): ■ The server's host name ■ The server's stratum ■ The time offset between that server and the local host (as measured by ntptrace; this is why it is not always zero for <i>localhost</i>) ■ The host's synchronization distance ■ The reference clock ID (only for stratum-1 servers) All times are given in seconds. Synchronization distance is a measure of the goodness of the clock's time.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWntpu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWntpu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWntpu				
SEE ALSO	xntpd(1M), attributes(5)				

ntptrace(1M)

BUGS	This program makes no attempt to improve accuracy by doing multiple samples.

NAME	obpsym – Kernel Symbolic Debugging for OpenBoot Firmware
SYNOPSIS	modload -p misc/obpsym
DESCRIPTION	obpsym is a kernel module that installs OpenBoot callback handlers that provide kernel symbol information to OpenBoot. OpenBoot firmware user interface commands use the callbacks to convert numeric <i>addresses</i> to kernel symbol names for display purposes, and to convert kernel symbol names to numeric <i>literals</i> allowing symbolic names to be used as input arguments to user interface commands. Once obpsym is installed, kernel symbolic names may be used anywhere at the OpenBoot firmware's user interface command prompt in place of a literal (numeric) string. For example, if obpsym is installed, the OpenBoot firmware commands <i>ctrace</i> and <i>dis</i> typically display symbolic names and offsets in the form <i>modname:symbolname + offset</i>. User interface Commands such as <i>dis</i> can be given a kernel symbolic name such as <i>ufs:ufs_mount</i> instead of a numeric address. Placing the command <pre>forceload: misc/obpsym</pre> into the <i>system(4)</i> file forces the kernel module <i>misc/obpsym</i> to be loaded and activates the kernel callbacks during the kernel startup sequence. obpsym may be useful as a kernel debugger in situations where other kernel debuggers are not useful. For example, on SPARC machines, if obpsym is loaded, you may be able to use the OpenBoot firmware's <i>ctrace</i> command to display symbolic names in the stack backtrace after a watchdog reset. The syntax for a kernel symbolic name is: <pre>[<i>module-name</i> :] <i>symbol-name</i></pre> Where <i>module-name</i> is the name of the kernel module that the symbol <i>symbol-name</i> appears in. A NULL module name is taken as "all modules, in no particular order" by obpsym. The module name <i>unix</i> is equivalent to a NULL module name, so that conflicts with words defined in the firmware's vocabulary can be avoided. Typically, OpenBoot firmware reads a word from the input stream and looks the word up in its internal <i>vocabulary</i> before checking if the word is a <i>literal</i>. Thus, kernel symbols, such as <i>reset</i> may be given as <i>unix:reset</i> to avoid the unexpected side effect of the firmware finding and executing a matching word in its vocabulary.
Kernel Symbolic Name Syntax	
FILES	<pre>/etc/system</pre> system configuration information file <pre>/platform/<i>platform-name</i>/kernel/misc/obpsym</pre>

obpsym(1M)

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcar

SEE ALSO

`kadb(1M)`, `kernel(1M)`, `modload(1M)`, `modunload(1M)`, `uname(1)`, `system(4)`, `attributes(5)`

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WARNINGS

Some OpenBoot firmware user interface commands may use system resources incompatibly with the way they are used by the Unix kernel. These commands and the use of this feature as a kernel debugger may cause interactions that the Unix kernel is not prepared to deal with. If this occurs, the Unix kernel and/or the OpenBoot firmware user interface commands may react unpredictably and may panic the system, or may hang or may cause other unpredictable results. For these reasons, the use of this feature is only minimally supported and recommended to be used only as a kernel debugger of "last resort".

If a breakpoint or watchpoint is triggered while the console frame buffer is powered off, the system can crash and be left in a state from which it is difficult to recover. If one of these is triggered while the monitor is powered off, you will not be able to see the debugger output.

NOTES

platform-name can be found using the `-i` option of `uname(1)`

`obpsym` is supported only on architectures that support OpenBoot firmware.

On some systems, OpenBoot must be completely RAM resident so the `obpsym` symbol callback support can be added to the firmware, if the firmware doesn't include support for the symbol callbacks. On these systems, `obpsym` may complain that it requires that "you must use `ramforth` to use this module".

See the *OpenBoot 2.x Command Reference Manual* for details on how to use the `ramforth` command, how to place the command into `nvrarc`, and how to set `use-nvrarc?` to `true`. On systems with version 1.x OpenBoot firmware, `nvrarc` doesn't exist, and the `ramforth` command must be typed manually after each reset, in order to use this module.

Once installed, the symbol table callbacks can be disabled by using the following OpenBoot firmware command:

```
0 0 set-symbol-lookup
```

NAME	ocfserv – OCF server				
SYNOPSIS	ocfserv [-D] [-p <i>path</i>]				
DESCRIPTION	The OCF server, <i>ocfserv</i>, is a per-host daemon that acts as the central point of communications with all smartcards connected to the host. Applications that need to use a smartcard can do so by using the APIs in <i>libsmartcard.so</i> or <i>smartcard.jar</i>. The internal implementation of these APIs communicates with <i>ocfserv</i> to perform the requested function. <i>inetd</i>(1M) automatically starts the <i>ocfserv</i> command when it is needed. Once started, <i>ocfserv</i> runs forever. If <i>ocfserv</i> is killed or crashes, it restarts automatically if necessary. Because <i>ocfserv</i> is run automatically, there really is not a reason to run it by manually. You must have root privileges to execute this utility.				
OPTIONS	The following options are supported: -D Run <i>ocfserv</i> in debug mode. -p <i>path</i> Specify property file name.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.				
FILES	/etc/smartcard/opencard.properties File where server stores properties				
ATTRIBUTES	See <i>attributes</i>(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWocf</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWocf
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWocf				
SEE ALSO	<i>inetd</i> (1M), <i>smartcard</i> (1M), <i>attributes</i> (5), <i>smartcard</i> (5)				

parse_dynamic_clustertoc(1M)

NAME	parse_dynamic_clustertoc – parse clustertoc file based on dynamic entries				
SYNOPSIS	<code>cdrom/export/exec/sparc.Solaris_2.x/sbin/install.d/parse_dynamic_clustertoc</code> <code>cdrom/export/exec/i386.Solaris_2.x/sbin/install.d/parse_dynamic_clustertoc</code>				
DESCRIPTION	This script parses the <code>clustertoc</code> file before the <code>suninstall(1M)</code> process is run. <code>parse_dynamic_clustertoc</code> is called by a modified <code>sysconfig</code> script on the install CD. When <code>parse_dynamic_clustertoc</code> runs, it reads the <code>clustertoc</code> and when it encounters <code>SUNW_CSRMBRIFF</code> lines, it either checks the platform using the script's builtin function, or calls an external script. The script exits with a 0 if the cluster entry is included, otherwise it will be ignored. If the cluster entry is to be included, the <code>SUNW_CSRMBRIFF = (test test_arg) cluster</code> line is converted to <code>SUNW_CSRMEMBER =cluster</code>.				
EXAMPLES	EXAMPLE 1 Checking For an SX Framebuffer The following is an example of a simple external test to check for an SX Framebuffer. The entry in the <code>clustertoc</code> file is shown and following that is the script that must be placed in the <code>install.d/dynamic_test</code> directory. <pre>SUNW_CSRMBRIFF=(smcc.dctoc sx)SUNWCsx #!/bin/sh # # Likewise, this file is expected to live under \$(TESTDIR). # case "\$1" in sx) prtconf -p grep 'SUNW,sx' 1> /dev/null;; esac</pre>				
FILES	<code>cdrom/Solaris_2.x/locale/C/.clustertoc.dynamic</code> Dynamic version of the <code>clustertoc</code> file <code>cdrom/export/exec/sparc.Solaris_2.x/sbin/install.d/dynamic_test</code> Directory that contains any additional tests <code>cdrom/export/exec/i386.Solaris_2.x/sbin/install.d/dynamic_test</code> Directory that contains any additional tests				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SHWPCdrom (Solaris CD)</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SHWPCdrom (Solaris CD)
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SHWPCdrom (Solaris CD)				
SEE ALSO	<code>suninstall(1M)</code> , <code>clustertoc(4)</code> , <code>attributes(5)</code>				

NAME	passmgmt – password files management
SYNOPSIS	passmgmt -a <i>options name</i> passmgmt -m <i>options name</i> passmgmt -d <i>name</i>
DESCRIPTION	The passmgmt command updates information in the password files. This command works with both <code>/etc/passwd</code> and <code>/etc/shadow</code>. passmgmt -a adds an entry for user <i>name</i> to the password files. This command does not create any directory for the new user and the new login remains locked (with the string <code>*LK*</code> in the password field) until the <code>passwd(1)</code> command is executed to set the password. passmgmt -m modifies the entry for user <i>name</i> in the password files. The name field in the <code>/etc/shadow</code> entry and all the fields (except the password field) in the <code>/etc/passwd</code> entry can be modified by this command. Only fields entered on the command line will be modified. passmgmt -d deletes the entry for user <i>name</i> from the password files. It will not remove any files that the user owns on the system; they must be removed manually. passmgmt can be used only by the super-user.
OPTIONS	-c <i>comment</i> A short description of the login, enclosed in quotes. It is limited to a maximum of 128 characters and defaults to an empty field. -h <i>homedir</i> Home directory of <i>name</i>. It is limited to a maximum of 256 characters and defaults to <code>/usr/name</code>. -u <i>uid</i> UID of the <i>name</i>. This number must range from 0 to the maximum non-negative value for the system. It defaults to the next available UID greater than 99. Without the -o option, it enforces the uniqueness of a UID. -o This option allows a UID to be non-unique. It is used only with the -u option. -g <i>gid</i> GID of <i>name</i>. This number must range from 0 to the maximum non-negative value for the system. The default is 1. -s <i>shell</i> Login shell for <i>name</i>. It should be the full pathname of the program that will be executed when the user logs in. The maximum size of <i>shell</i> is 256 characters. The default is for this field to be empty and to be interpreted as <code>/usr/bin/sh</code>. -l <i>logname</i> This option changes the <i>name</i> to <i>logname</i>. It is used only with the -m option. The total size of each login entry is limited to a maximum of 511 bytes in each of the password files.
FILES	<code>/etc/passwd</code> <code>/etc/shadow</code>

passmgmt(1M)

/etc/opasswd
/etc/oshadow

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

`passwd(1)`, `useradd(1M)`, `userdel(1M)`, `usermod(1M)`, `passwd(4)`, `shadow(4)`, `attributes(5)`

EXIT STATUS

The `passmgmt` command exits with one of the following values:

0	Success.
1	Permission denied.
2	Invalid command syntax. Usage message of the <code>passmgmt</code> command is displayed.
3	Invalid argument provided to option.
4	UID in use.
5	Inconsistent password files (for example, <i>name</i> is in the <code>/etc/passwd</code> file and not in the <code>/etc/shadow</code> file, or vice versa).
6	Unexpected failure. Password files unchanged.
7	Unexpected failure. Password file(s) missing.
8	Password file(s) busy. Try again later.
9	<i>name</i> does not exist (if <code>-m</code> or <code>-d</code> is specified), already exists (if <code>-a</code> is specified), or <code>logname</code> already exists (if <code>-m -l</code> is specified).

NOTES

Do not use a colon (:) or RETURN as part of an argument. It is interpreted as a field separator in the password file. The `passmgmt` command will be removed in a future release. Its functionality has been replaced and enhanced by `useradd`, `userdel`, and `usermod`. These commands are currently available.

This command only modifies password definitions in the local `/etc/passwd` and `/etc/shadow` files. If a network nameservice such as NIS or NIS+ is being used to supplement the local files with additional entries, `passmgmt` cannot change information supplied by the network nameservice.

NAME	patchadd – apply a patch package to a system running the Solaris operating environment
SYNOPSIS	patchadd [-dun] [-B <i>backout_dir</i>] [-k <i>keystore</i>] [-P <i>passwd</i>] [-x <i>proxy</i>] [<i>target</i>] <i>source</i> [<i>dest</i>] patchadd -p [<i>target</i>]
DESCRIPTION	patchadd applies a patch package to a system running the Solaris 2.x operating environment or later Solaris environments (such as Solaris 9) that are compatible with Solaris 2.x. This patch installation utility cannot be used to apply Solaris 1 patches. patchadd must be run as root. The patchadd command has the following forms: ■ The first form of patchadd installs one or more patches to a system, client, service, or to the mini root of a Net Install Image. ■ The second form of patchadd displays installed patches on the client, service, or to the mini root of a Net Install Image.
OPTIONS	The following options are supported: -B <i>backout_dir</i> Saves backout data to a directory other than the package database. Specify <i>backout_dir</i> as an absolute path name. -d Does not back up the files to be patched. <i>The patch cannot be removed.</i> -k <i>keystore</i> Use <i>keystore</i> as the location to get trusted certificate authority certificates when verifying digital signatures found in each patch. If no keystore is specified, then the default keystore locations are searched for valid trusted certificates. See KEY STORE LOCATIONS in pkgadd(1M) for more information. -n Tells patchadd to ignore the signature and not to validate it. This should be used only when the content of the patch is known and trusted, and is primarily included to allow patchadd to apply a patch on systems without the ability to verify the patch signature, such as Solaris 8. -p In the second form, displays a list of the patches currently applied. -P <i>passwd</i> Password to use to decrypt the keystore specified with -k, if required. See PASS PHRASE ARGUMENTS in pkgadd(1M) for more information about the format of this option's argument. -u Turns off file validation. Applies the patch even if some of the files to be patched have been modified since their original installation.

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	-x proxy Specify a HTTP[S] proxy to use when downloading packages. The format of proxy is <i>host:port</i>, where <i>host</i> is the hostname of the HTTP[S] proxy, and <i>port</i> is the port number associated with the proxy. This switch overrides all other methods of specifying a proxy. See ENVIRONMENT VARIABLES in pkgadd(1M) for more information on alternate methods of specifying a default proxy.
OPERANDS	The following operands are supported:
Sources	patchadd must be supplied a source for retrieving the patch. The following sources and their syntax are acceptable: patch The absolute path name to <i>patch_id</i> or a URI pointing to a signed patch. <i>/var/sadm/spool/patch/104945-02</i> is an example of a patch. <i>https://syrinx.eng:8887/patches/104945-02</i> is an example of a URI pointing to a signed patch. -M patch_dir patch_id [patch_id...] Specifies the patches to be installed by directory location or URL, and patch number. To use the directory location or URL and the patch number, specify <i>patch_dir</i> as the absolute path name of the directory that contains spooled patches. Specify a URL as the server and path name that contains the spooled patches. Specify <i>patch_id</i> as the patch number of a given patch. Specifying multiple <i>patch_id</i>'s is recommended. <i>patch_id</i> is the patch number of a given patch. <i>104945-02</i> is an example of a <i>patch_id</i>. -M patch_dir patch_list Specifies the patches to be installed by directory location or URL and the name of a file containing a patch list. To use the directory location or URL and a file containing a patch list, specify <i>patch_dir</i> as the absolute path name of the directory that contains spooled patches. Specify URL as the server and path name that contains the spooled patches. Specify <i>patch_list</i> as the name of the file containing the patches to be installed.
Destinations	By default, patchadd applies a patch to the specified destination. If no destination is specified, then the current system (the one with its root filesystem mounted at <i>/</i>) is assumed to be the destination for the patch. You can also specify a destination in the following ways: -C net_install_image Patches the files located on the mini root on a Net Install Image created by <i>setup_install_server</i>. Specify <i>net_install_image</i> as the absolute path name to a Solaris 8 or compatible version boot directory. See EXAMPLES. -R client_root_path Locates all patch files generated by patchadd under the directory <i>client_root_path</i>. <i>client_root_path</i> is the directory that contains the bootable root of a client from the

**KEYSTORE
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KEYSTORE AND
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patchadd(1M)

server's perspective. Specify *client_root_path* as the absolute path name to the beginning of the directory tree under which all patch files generated by patchadd are to be located. -R cannot be specified with the -S option. See NOTES.

-S service

Specifies an alternate service (for example, Solaris_8). This service is part of the server and client model, and can only be used from the server's console. Servers can contain shared /usr file systems that are created by Host Manager. These service areas can then be made available to the clients they serve. -S cannot be specified with the -R option. See NOTES.

See KEYSTORE LOCATIONS in pkgadd(1M) for details.

See KEYSTORE AND CERTIFICATE FORMATS in pkgadd(1M) for details.

The examples in this section are all relative to the /usr/sbin directory.

EXAMPLE 1 Installing a Patch to a Standalone Machine

The following example installs a patch to a standalone machine:

```
example# patchadd /var/spool/patch/104945-02
```

EXAMPLE 2 Installing a Patch to a Client From the Server's Console

The following example installs a patch to a client from the server's console:

```
example# patchadd -R /export/root/client1 /var/spool/patch/104945-02
```

EXAMPLE 3 Installing a Patch to a Service From the Server's Console

The following example installs a patch to a service from the server's console:

```
example# patchadd -S Solaris_8 /var/spool/patch/104945-02
```

EXAMPLE 4 Installing Multiple Patches in a Single Invocation

The following example installs multiple patches in a single patchadd invocation:

```
example# patchadd -M /var/spool/patch 104945-02 104946-02 102345-02
```

EXAMPLE 5 Installing Multiple Patches Specifying List of Patches to Install

The following example installs multiple patches specifying a file with the list of patches to install:

```
example# patchadd -M /var/spool/patch patchlist
```

EXAMPLE 6 Installing Multiple Patches to a Client and Saving the Backout Data

The following example installs multiple patches to a client and saves the backout data to a directory other than the default:

patchadd(1M)

EXAMPLE 6 Installing Multiple Patches to a Client and Saving the Backout Data (Continued)

```
example# patchadd -M /var/spool/patch -R /export/root/client1 \  
-B /export/backoutrepository 104945-02 104946-02 102345-02
```

EXAMPLE 7 Installing a Patch to a Solaris 8 or Compatible Version Net Install Image

The following example installs a patch to a Solaris 8 or compatible version Net Install Image:

```
example# patchadd -C /export/Solaris_8/Tools/Boot \  
/var/spool/patch/104945-02
```

EXAMPLE 8 Displaying the Patches Installed on a Client

The following example displays the patches installed on a client:

```
example# patchadd -R /export/root/client1 -p
```

EXAMPLE 9 Installing a Digitally Signed Set of Patches

The following example installs multiple patches, some of which have been signed, using the supplied keystore, password, and HTTP proxy.

```
example# patchadd -k /etc/mycerts -p pass:abcd -x webcache.eng:8080 \  
-M http://www.sun.com/solaris/patches/latest 101223-02 102323-02
```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
>0	An error occurred.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWswmt, SUNWcsu
Interface Stability	Evolving

DIAGNOSTICS

The following messages might help in determining some of the most common problems associated with installing a patch.

Patch Installation errors

Message

```
The prepatch script exited with return code retcode.  
patchadd is terminating.
```

Explanation and Recommended Action

The prepatch script supplied with the patch exited with a return code other than 0. Run a script trace of the prepatch script and find out why the prepatch had a bad return code. Add the -x option to the first line of the prepatch script to fix

the problem and run patchadd again.

Message

```
The signature on patch patch_id was unable to be verified.
patchadd is terminating.
```

Explanation and Recommended Action

The digital signature on a patch was unable to be verified given the keystore in use and the signature on the patch. Check the keystore to make sure it has the requisite trust anchor(s) required to validate the signature on the package and that the package has not been tampered with.

Message

```
The postpatch script exited with return code retcode.
Backing out patch.
```

Explanation and Recommended Action

The postpatch script provided with the patch exited with an error code other than 0. This script is mostly used to cleanup files (that is, when a package is known to have ownership or permission problems) attributes that do not correspond to the patch package's objects. After the user has noted all validation errors and taken the appropriate action for each one, the user should re-run patchadd using the -u (unconditional) option. This time, the patch installation will ignore validation errors and install the patch anyway.

Message

```
Insufficient space in /var/sadm/patch to save old files.
(For 2.4 systems and previous)
```

Explanation and Recommended Action

There is insufficient space in the /var/sadm/patch directory to save old files. The user has three options for handling this problem: Use the -B option while invoking patchadd. This option will direct patchadd to: save the backout data to the user specified file system, generate additional disk space by deleting unneeded files, or override the saving of the old files by using the -d (do not save) option when running patchadd.

If the user elects not to save the old versions of the files to be patched, patchrm *cannot* be used. One way to regain space on a system is to remove the save area for previously applied patches. Once the user has decided that it is unlikely that a patch will be backed out, the user can remove the files that were saved by patchadd. The following commands should be executed to remove the saved files for patch *patch_id*:

```
cd /var/sadm/patch/patch_id
rm -r save/*
rm .oldfilessaved
```

After these commands have been executed, patch *patch_id* can no longer be backed out.

patchadd(1M)

Message

```
Insufficient space in /var/sadm/pkg/PKG/save to save old files.  
(For 2.5 systems and later)
```

Explanation and Recommended Action

There is insufficient space in the `/var/sadm/pkg/PKG/save` directory to save old files. The user has three options for handling this problem: (1) Use the `-B` option while invoking `patchadd`. This option will direct `patchadd` to save the backout data to the user specified file system. (See synopsis above.) (2) Generate additional disk space by deleting unneeded files, or (3) override the saving of the old files by using the `-d` (do not save) option when running `patchadd`.

However, if the user elects not to save the old versions of the files to be patched, `patchrm` *cannot* be used. One way to regain space on a system is to remove the save area for previously applied patches. Once the user has decided that it is unlikely that a patch will be backed out, the user can remove the files that were saved by `patchadd`. The following commands should be executed to remove the saved files for patch *patch_id*:

```
cd /var/sadm/pkg/pkgabbrev/save  
rm -r patch_id
```

After these commands have been executed, patch *patch_id* can no longer be backed out.

Message

```
Save of old files failed.  
(For 2.4 systems and previous)
```

Explanation and Recommended Action

Before applying the patch, the patch installation script uses `cpio` to save the old versions of the files to be patched. This error message means that the `cpio` failed. The output of the `cpio` would have been preceded this message. The user should take the appropriate action to correct the `cpio` failure. A common reason for failure will be insufficient disk space to save the old versions of the files. The user has two options for handling insufficient disk space: (1) generate additional disk space by deleting unneeded files, or (2) override the saving of the old files by using the `-d` option when running `patchadd`. However if the user elects not to save the old versions of the files to be patched, the patch *cannot* be backed out.

Message

```
Pkgadd of pkgname package failed with error code code.  
See /tmp/log.patch_id for reason for failure.
```

Explanation and Recommended Action

The installation of one of the patch packages failed. `patchadd` will backout the patch to leave the system in its pre-patched state. See the log file for the reason for failure. Correct the problem and reapply the patch.

Message

```
Pkgadd of pkgname package failed with error code code.
Will not backout patch...patch re-installation.
Warning: The system may be in an unstable state!
See /tmp/log.patch_id for reason for failure.
```

Explanation and Recommended Action

The installation of one of the patch packages failed. patchadd will *not* backout the patch. You may manually backout the patch using patchrm, then re-apply the entire patch. Look in the log file for the reason pkgadd failed. Correct the problem and re-apply the patch.

Message

```
patchadd is unable to find the INST_RELEASE file. This file
must be present for patchadd to function correctly.
```

Explanation and Recommended Action

The INST_RELEASE file is missing from the system. This file is created during either initial installation or during an update.

Message

```
A previous installation of patch patch_id was invoked
that saved files that were to be patched. Since files
were saved, you must run this instance of patchadd
without the -d option.
```

Explanation and Recommended Action

If a patch was previously installed without using the -d option, then the re-installation attempt must also be invoked without the -d option. Execute patchadd without the -d option.

Message

```
A previous installation of patch patch_id was invoked
with the -d option. (i.e. Do not save files that would
be patched) Therefore, this invocation of patchadd
must also be run with the -d option.
```

Explanation and Recommended Action

If a patch was previously installed using the -d option, then the re-installation attempt must also be invoked with the -d option. Execute patchadd with the -d' option.

**Diagnostic
Reference**

The patch installation messages listed below are not necessarily considered errors, as indicated in the explanations given. These messages are, however, recorded in the patch installation log for diagnostic reference.

Message

```
Package not patched:
PKG=SUNxxxx
Original package not installed
```

patchadd(1M)

Explanation and Recommended Action

One of the components of the patch would have patched a package that is not installed on your system. This is not necessarily an error. A patch may fix a related bug for several packages.

For example, suppose a patch fixes a bug in both the `online-backup` and `fddi` packages. If you had `online-backup` installed but didn't have `fddi` installed, you would get the message :

```
Package not patched:
PKG=SUNWbf
Original package not installed
```

This message only indicates an error if you thought the package was installed on your system. If this is the case, take the necessary action to install the package, backout the patch (if it installed other packages) and re-install the patch.

Message

```
Package not patched:
PKG=SUNxxx
ARCH=xxxxxxx
VERSION=xxxxxxx
Architecture mismatch
```

Explanation and Recommended Action

One of the components of the patch would have patched a package for an architecture different from your system. This is not necessarily an error. Any patch to one of the architecture-specific packages might contain one element for each of the possible architectures. For example, assume you are running on a `sun4u`. If you were to install a patch to package `SUNWcar`, you would see the following (or similar) messages:

```
Package not patched:
PKG=SUNWcar
ARCH=sparc.sun4c
VERSION=11.5.0,REV=2.0.18
Architecture mismatch
```

```
Package not patched:
PKG=SUNWcar
ARCH=sparc.sun4u
VERSION=11.5.0,REV=2.0.18
Architecture mismatch
```

```
Package not patched:
PKG=SUNWcar
ARCH=sparc.sun4e
VERSION=11.5.0,REV=2.0.18
```

```
Package not patched:
PKG=SUNWcar
ARCH=sparc.sun4
VERSION=11.5.0,REV=2.0.18
Architecture mismatch
```

These messages indicate an error condition only if patchadd does not correctly recognize your architecture.

Message

```
Package not patched:
PKG=SUNxxxx
ARCH=xxxx
VERSION=xxxxxxx
Version mismatch
```

Explanation and Recommended Action

The version of software to which the patch is applied is not installed on your system. For example, if you were running Solaris 8, and you tried to install a patch against Solaris 9, you would see the following (or similar) message:

```
Package not patched:
PKG=SUNWcsu
ARCH=sparc
VERSION=10.0.2
Version mismatch
```

This message does not necessarily indicate an error. If the version mismatch was for a package you needed patched, either get the correct patch version or install the correct package version. Then backout the patch (if necessary) and re-apply.

Message

```
Re-installing Patch.
```

Explanation and Recommended Action

The patch has already been applied, but there is at least one package in the patch that could be added. For example, if you applied a patch that had both Openwindows and Answerbook components, but your system did not have Answerbook installed, the Answerbook parts of the patch would not have been applied. If, at a later time, you pkgadd Answerbook, you could re-apply the patch, and the Answerbook components of the patch would be applied to the system.

Message

```
patchadd Interrupted.
patchadd is terminating.
```

Explanation and Recommended Action

patchadd was interrupted during execution (usually through pressing CTRL-c). patchadd will clean up its working files and exit.

Message

```
patchadd Interrupted.
Backing out Patch...
```

Explanation and Recommended Action

patchadd was interrupted during execution (usually through pressing CTRL-c). patchadd will clean up its working files, backout the patch, and exit.

patchadd(1M)

SEE ALSO	<code>cpio(1)</code> , <code>pkginfo(1)</code> , <code>patchrm(1M)</code> , <code>pkgadd(1M)</code> , <code>pkgadm(1M)</code> , <code>pkgchk(1M)</code> , <code>pkgrm(1M)</code> , <code>smpatch(1M)</code> , <code>showrev(1M)</code> , <code>attributes(5)</code>
NOTES	To successfully install a patch to a client or server, <code>patchadd</code> must be issued twice, once with the <code>-R</code> option and once with the <code>-S</code> option. This guarantees that the patch is installed to both the <code>/usr</code> and <code>root</code> partitions. This is necessary if there are both <code>/usr</code> and <code>root</code> packages in the patch. <code>pkgadd</code> is invoked by <code>patchadd</code> and executes the installation scripts in the <code>pkg/install</code> directory. The <code>checkinstall</code> script is executed with its ownership set to user <code>install</code>, if there is no user <code>install</code> then <code>pkgadd</code> executes the <code>checkinstall</code> script as <code>nobody</code>. The SVR4 ABI states that the <code>checkinstall</code> shall only be used as an information gathering script. If the permissions for the <code>checkinstall</code> script are changed to something other than the initial settings, <code>pkgadd</code> may not be able to open the file for reading, thus causing the patch installation to abort with the following error: <pre>pkgadd: ERROR: checkinstall script did not complete successfully.</pre> The permission for the <code>checkinstall</code> script should not be changed. Contents of log file for a successful installation: <code>patchadd</code> redirects <code>pkgadd</code>'s output to the patch installation log file. For a successful installation, <code>pkgadd</code> will produce the following message that gets inserted into the log file: <pre>This appears to be an attempt to install the same architecture and version of a package which is already installed. This installation will attempt to overwrite this package. This message does not indicate a failure, it represents the correct behavior by pkgadd when a patch installs correctly. This message does not indicate a failure, it represents the correct behavior by pkgadd when a patch installs correctly.</pre> On client server machines the patch package is <i>not</i> applied to existing clients or to the client root template space. Therefore, when appropriate, <i>all client machines will need the patch applied directly using this same patchadd method on the client</i>. See instructions above for applying patches to a client. A bug affecting a package utility (for example, <code>pkgadd</code>, <code>pkgrm</code>, <code>pkgchk</code>) could affect the reliability of <code>patchadd</code> or <code>patchrm</code>, which use package utilities to install and backout the patch package. It is recommended that any patch that fixes package utility problems be reviewed and, if necessary, applied before other patches are applied. Existing patches are: Solaris 2.5.1 Sparc Platform Edition: 104578 Solaris 2.5.1 Intel Platform Edition: 104579 Solaris 2.6 Sparc Platform Edition: 106292 Solaris 2.6 Intel Platform Edition: 106293

NAME	patchrm – remove a Solaris patch package and restore previously saved files
SYNOPSIS	patchrm [-f] [-B <i>backout_dir</i>] [-C <i>net_install_image</i> -R <i>client_root_path</i> -S <i>service</i>] <i>patch_id</i>
DESCRIPTION	patchrm removes a patch package and restores previously saved files to a system running the Solaris 2.x operating environment or later Solaris environments (such as Solaris 8) that are compatible with Solaris 2.x. patchrm cannot be used with Solaris 1 patches. patchrm must be run as root.
OPTIONS	The following options are supported: -B <i>backout_dir</i> Removes a patch whose backout data has been saved to a directory other than the package database. This option is only needed if the original backout directory, supplied to the patchadd command at installation time, has been moved. Specify <i>backout_dir</i> as an absolute path name. -C <i>net_install_image</i> Removes the patched files located on the mini root on a Net Install Image created by <i>setup_install_server</i>. Specify <i>net_install_image</i> as the absolute path name to a Solaris 2.6 or compatible version boot directory. See EXAMPLES. -f Forces the patch removal regardless of whether the patch was superseded by another patch. -R <i>client_root_path</i> Locates all patch files generated by patchrm under the directory <i>client_root_path</i>. <i>client_root_path</i> is the directory that contains the bootable root of a client from the server's perspective. Specify <i>client_root_path</i> as the absolute path name to the beginning of the directory tree under which all patch files generated from patchrm will be located. -R cannot be specified with the -S option. -S <i>service</i> Specifies an alternate service (for example, Solaris_2.3). This service is part of the server and client model, and can only be used from the server's console. Servers can contain shared /usr file systems that are created by Host Manager. These service areas can then be made available to the clients they serve. -S cannot be specified with the -R option..
OPERANDS	The following operands are supported: <i>patch_id</i> The patch number of a given patch. 104945-02 is an example of a <i>patch_id</i>.

patchrm(1M)

EXAMPLES

The examples in this section assume that patch 104945-02 has been installed to the system prior to removal. All of the examples are relative to the `/usr/sbin` directory.

EXAMPLE 1 Removing a Patch From a Stand-alone System

The following example removes a patch from a standalone system:

```
example# patchrm 104945-02
```

EXAMPLE 2 Removing a Patch From a Client's System From the Server's Console

The following example removes a patch from a client's system from the server's console:

```
example# patchrm -R /export/root/client1 104945-02
```

EXAMPLE 3 Removing a Patch From a Server's Service Area

The following example removes a patch from a server's service area:

```
example# patchrm -S Solaris_2.3 104945-02
```

EXAMPLE 4 Removing a Patch From a Net Install Image

The following example removes a patch from a Net Install Image:

```
example# patchrm -C /export/Solaris_2.6/Tools/Boot 104945-02
```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
>0	An error occurred.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWswmt, SUNWcsu

DIAGNOSTICS

The following messages may help in determining some of the most common problems associated with backing out a patch.

Message

```
prebackout patch exited with return code code.
patchrm exiting.
```

Explanation and Recommended Action

The prebackout script supplied with the patch exited with a return code other than 0. Generate a script trace of the prebackout script to determine why the

prebackout script failed. Add the `-x` option to the first line of the prepatch script to fix the problem and run `patchadd` again.

Message

```
postbackout patch exited with return code code.
patchrm exiting.
```

Explanation and Recommended Action

The postbackout script supplied with the patch exited with a return code other than 0. Look at the postbackout script to determine why it failed. Add the `-x` option to the first line of the prepatch script to fix the problem, and, if necessary, *re-execute the postbackout script only*.

Message

```
Only one service may be defined.
```

Explanation and Recommended Action

You have attempted to specify more than one service from which to backout a patch. Different services must have their patches backed out with different invocations of `patchrm`.

Message

```
The -S and -R arguments are mutually exclusive.
```

Explanation and Recommended Action

You have specified both a non-native service and a *client_root_path* from which to backout a patch. These two arguments are mutually exclusive. If backing out a patch from a non-native `usr` partition, the `-S` option should be used. If backing out a patch from a client's root partition (either native or non-native), the `-R` option should be used.

Message

```
The service service cannot be found on this system
```

Explanation and Recommended Action

You have specified a non-native service from which to backout a patch, but the specified service is not installed on your system. Correctly specify the service when backing out the patch.

Message

```
Only one client_root_path may be defined.
```

Explanation and Recommended Action

You have specified more than one *client_root_path* using the `-R` option. The `-R` option may be used only once per invocation of `patchrm`.

Message

```
The dir directory cannot be found on this system.
```

patchrm(1M)

Explanation and Recommended Action

You have specified a directory using the `-R` option which is either not mounted, or does not exist on your system. Verify the directory name and re-backout the patch.

Message

```
Patch patch_id has not been successfully installed to this system.
```

Explanation and Recommended Action

You have attempted to backout a patch that is not installed on this system. If you must restore previous versions of patched files, you may have to restore the original files from the initial installation CD.

Message

```
Patch patch_id has not been successfully applied to this system.  
Will remove directory dir.
```

Explanation and Recommended Action

You have attempted to back out a patch that is not applied to this system. While the patch has not been applied, a residual `/var/sadm/patch/patch_id` (perhaps from an unsuccessful `patchadd`) directory still exists. The patch cannot be backed out. If you must restore old versions of the patched files, you may have to restore them from the initial installation CD.

Message

```
This patch was obsoleted by patch patch_id.  
Patches must be backed out in the reverse order in  
which they were installed. Patch backout aborted.
```

Explanation and Recommended Action

You are attempting to backout patches out of order. Patches should never be backed-out out of sequence. This could undermine the integrity of the more current patch.

Message

```
Patch patch_id is required to be installed by an already  
installed patch_id.  
It cannot be backed out until the required patch is backed out first.
```

Explanation and Recommended Action

Backout the patch that is required to be installed then backout the desired patch.

Message

```
The installation of patch patch_id was interrupted.
```

Explanation and Recommended Action

A previous installation was interrupted. The interrupted patch needs to be installed before backing out the desired patch.

Message

Patch *patch_id* was installed without backing up the original files. It cannot be backed out.

Explanation and Recommended Action

Either the `-d` option of `patchadd` was set when the patch was applied, or the save area of the patch was deleted to regain space. As a result, the original files are not saved and `patchrm` cannot be used. The original files can only be recovered from the original installation CD.

Message

`pkgadd` of *pkgname* package failed return code *code*.
See `/var/sadm/patch/patch_id/log` for reason for failure.

Explanation and Recommended Action

The installation of one of patch packages failed. See the log file for the reason for failure. Correct the problem and run the backout script again.

Message

Restore of old files failed.

Explanation and Recommended Action

The backout script uses the `cpio` command to restore the previous versions of the files that were patched. The output of the `cpio` command should have preceded this message. The user should take the appropriate action to correct the `cpio` failure. This is for Solaris 2.4 or previous versions.

SEE ALSO `cpio(1)`, `pkginfo(1)`, `patchadd(1M)`, `pkgadd(1M)`, `pkgchk(1M)`, `pkgrm(1M)`, `showrev(1M)`, `attributes(5)`

NOTES On client server machines the patch package is *not* removed from existing clients or from client root template space. Therefore, when appropriate, *all client machines will need the patch removed directly using this same patchrm method on the client*. A bug affecting a package utility (for example, `pkgadd`, `pkgrm`, `pkgchk`) could affect the reliability of `patchadd` or `patchrm` which use package utilities to install and backout the patch package. It is recommended that any patch that fixes package utility problems be reviewed and, if necessary, applied before other patches are applied. Existing patches are:

Solaris 2.1:
patch 100901

Solaris 2.2:
101122

Solaris 2.3:
10133

Solaris 2.4 Sparc Platform Edition:
102039

patchrm(1M)

Solaris 2.4 Intel Platform Edition:
102041

Solaris 2.5.1 Sparc Platform Edition:
104578

Solaris 2.51 Intel Platform Edition:
104579

Solaris 2.6 Sparc Platform Edition:
106292

Solaris 2.6 Intel Platform Edition:
106293

NAME	pbind – control and query bindings of processes to processors						
SYNOPSIS	pbind -b <i>processor_id</i> <i>pid</i>... pbind -u <i>pid</i>... pbind [-q] [<i>pid</i>...]						
DESCRIPTION	pbind controls and queries bindings of processes to processors. pbind binds all the LWPs (lightweight processes) of a process to a processor, or removes or displays the bindings. When an LWP is bound to a processor, it will be executed only by that processor except when the LWP requires a resource that is provided only by another processor. The binding is not exclusive, that is, the processor is free execute other LWPs as well. Bindings are inherited, so new LWPs and processes created by a bound LWP will have the same binding. Binding an interactive shell to a processor, for example, binds all commands executed by the shell. Superusers may bind or unbind any process, and other users can use pbind to bind or unbind any process for which the user has permission to signal, that is, any process that has the same effective user ID as the user.						
OPTIONS	The following options are supported: <table> <tr> <td>-b <i>processor_id</i></td><td>Binds all the LWPs of the specified processes to the processor <i>processor_id</i>. Specify <i>processor_id</i> as the processor ID of the processor to be controlled or queried. <i>processor_id</i> must be present and on-line. Use the <code>psrinfo</code> command to determine whether or not <i>processor_id</i> is present and on-line. See <code>psrinfo(1M)</code>.</td></tr> <tr> <td>-q</td><td>Displays the bindings of the specified processes, or of all processes. If a process is composed of multiple LWPs, which have different bindings, the bindings of only one of the bound LWPs will be displayed.</td></tr> <tr> <td>-u</td><td>Removes the bindings of all LWPs of the specified processes, allowing them to be executed on any on-line processor.</td></tr> </table>	-b <i>processor_id</i>	Binds all the LWPs of the specified processes to the processor <i>processor_id</i> . Specify <i>processor_id</i> as the processor ID of the processor to be controlled or queried. <i>processor_id</i> must be present and on-line. Use the <code>psrinfo</code> command to determine whether or not <i>processor_id</i> is present and on-line. See <code>psrinfo(1M)</code> .	-q	Displays the bindings of the specified processes, or of all processes. If a process is composed of multiple LWPs, which have different bindings, the bindings of only one of the bound LWPs will be displayed.	-u	Removes the bindings of all LWPs of the specified processes, allowing them to be executed on any on-line processor.
-b <i>processor_id</i>	Binds all the LWPs of the specified processes to the processor <i>processor_id</i> . Specify <i>processor_id</i> as the processor ID of the processor to be controlled or queried. <i>processor_id</i> must be present and on-line. Use the <code>psrinfo</code> command to determine whether or not <i>processor_id</i> is present and on-line. See <code>psrinfo(1M)</code> .						
-q	Displays the bindings of the specified processes, or of all processes. If a process is composed of multiple LWPs, which have different bindings, the bindings of only one of the bound LWPs will be displayed.						
-u	Removes the bindings of all LWPs of the specified processes, allowing them to be executed on any on-line processor.						
OPERANDS	The following operands are supported: <i>pid</i> The process ID of the process to be controlled or queried.						
EXAMPLES	EXAMPLE 1 Binding Processes The following example binds processes 204 and 223 to processor 2: <pre>example% pbind -b 2 204 223 process id 204: was 2, now 2 process id 223: was 3, now 2</pre>						

pbind(1M)

EXAMPLE 2 Unbinding a Process

The following example unbinds process 204:

```
example% pbind -u 204
```

EXAMPLE 3 Querying Bindings

The following example queries bindings. It demonstrates that process 1 is bound to processor 0, process 149 has at least one LWP bound to CPU3, and process 101 has no bound LWPs.

```
example% pbind -q 1 149 101
process id 1: 0
process id 149: 3
process id 101: not bound
```

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

EXIT STATUS

The following exit values are returned:

0	Successful completion.
>0	An error occurred.

SEE ALSO

psradm(1M), psrinfo(1M), psrset(1M), processor_bind(2), processor_info(2), sysconf(3C), attributes(5)

DIAGNOSTICS

```
pbind: cannot query pid 31: No such process
    The process specified did not exist or has exited.

pbind: cannot bind pid 31: Not owner
    The user does not have permission to bind the process.

pbind: cannot bind pid 31: Invalid argument
    The specified processor is not on-line.
```

NAME	pcmcia – PCMCIA user daemon				
SYNOPSIS	<code>/usr/lib/pcmcia</code>				
DESCRIPTION	The PCMCIA user daemon provides user-level services for the PCMCIA nexus driver and PCMCIA card client drivers. There are no user-configurable options for this daemon.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWpcmcu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWpcmcu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWpcmcu				
SEE ALSO	<code>pcmcia(4)</code> , <code>attributes(5)</code>				
DIAGNOSTICS	<code>pcmcia</code>: can't open <code>/dev/pem</code>: No such file or directory The user daemon could not communicate with the PCMCIA event management driver.				

pfinstall(1M)

NAME	pfinstall – tests installation profiles						
SYNOPSIS	<code>/usr/sbin/install.d/pfinstall -D -d disk_config [-c CDpath] profile</code>						
DESCRIPTION	After you create a profile, you can use the <code>pfinstall</code> command to test the profile and see if it does what you want before using it to install or upgrade a system. <code>pfinstall</code> enables you to test a profile against: ■ The system's disk configuration where <code>pfinstall</code> is being run. ■ Other disks by using a disk configuration file that represents a structure of a disk. See NOTES on how to create a disk configuration file. To successfully and accurately test a profile for a particular Solaris release, you must test a profile within the Solaris environment of the same release. For example, if you want to test a profile for Solaris 2.6, you have to run the <code>pfinstall</code> command on a system running Solaris 2.6. So, on a system running Solaris 2.6, you can test Solaris 2.6 initial installation profiles. However, if you want to test a Solaris 2.6 upgrade profile on a system running a previous version of Solaris, or if you don't have a Solaris 2.6 system installed yet to test Solaris 2.6 initial installation profiles, you have to boot a system from a Solaris 2.6 CD image and temporarily create a Solaris 2.6 install environment. Then, you can run <code>pfinstall</code> in the Solaris 2.6 install environment to test your profiles. To create a temporary Solaris 2.6 install environment, boot a system from a Solaris 2.6 CD image (just as you would to install), answer any system identification questions, choose the Solaris Interactive Installation program, and exit out of the first screen that is presented. Then, from the shell, you can execute the <code>pfinstall</code> command.						
OPTIONS	The following options are supported: <table> <tr> <td><code>-c CDpath</code></td><td>The path to the Solaris 2 installation image. This is required if the image is not mounted on <code>/cdrom</code>. (For example, use this option if you copied the installation image to disk or mounted the CD-ROM on a directory other than <code>/cdrom</code>.)</td></tr> <tr> <td><code>-d disk_config</code></td><td><code>pfinstall</code> uses a disk configuration file, <i>disk_config</i>, to test the profile. See NOTES on how to create a disk configuration file. You must specify either this option or the <code>-D</code> option to test the profile (see WARNINGS). This option cannot be used with an upgrade profile (<code>install_type upgrade</code>). You must always test an upgrade profile against a system's disk configuration (<code>-D</code> option).</td></tr> <tr> <td><code>-D</code></td><td><code>pfinstall</code> uses the system's disk configuration to test the profile. You must specify either this option or the <code>-d</code> option to test the profile (see WARNINGS).</td></tr> </table>	<code>-c CDpath</code>	The path to the Solaris 2 installation image. This is required if the image is not mounted on <code>/cdrom</code> . (For example, use this option if you copied the installation image to disk or mounted the CD-ROM on a directory other than <code>/cdrom</code> .)	<code>-d disk_config</code>	<code>pfinstall</code> uses a disk configuration file, <i>disk_config</i> , to test the profile. See NOTES on how to create a disk configuration file. You must specify either this option or the <code>-D</code> option to test the profile (see WARNINGS). This option cannot be used with an upgrade profile (<code>install_type upgrade</code>). You must always test an upgrade profile against a system's disk configuration (<code>-D</code> option).	<code>-D</code>	<code>pfinstall</code> uses the system's disk configuration to test the profile. You must specify either this option or the <code>-d</code> option to test the profile (see WARNINGS).
<code>-c CDpath</code>	The path to the Solaris 2 installation image. This is required if the image is not mounted on <code>/cdrom</code> . (For example, use this option if you copied the installation image to disk or mounted the CD-ROM on a directory other than <code>/cdrom</code> .)						
<code>-d disk_config</code>	<code>pfinstall</code> uses a disk configuration file, <i>disk_config</i> , to test the profile. See NOTES on how to create a disk configuration file. You must specify either this option or the <code>-D</code> option to test the profile (see WARNINGS). This option cannot be used with an upgrade profile (<code>install_type upgrade</code>). You must always test an upgrade profile against a system's disk configuration (<code>-D</code> option).						
<code>-D</code>	<code>pfinstall</code> uses the system's disk configuration to test the profile. You must specify either this option or the <code>-d</code> option to test the profile (see WARNINGS).						
OPERANDS	The following operands are supported: <table> <tr> <td><i>profile</i></td><td>The file name of the profile to test. If <i>profile</i> is not in the directory where <code>pfinstall</code> is being run, you must specify the path.</td></tr> </table>	<i>profile</i>	The file name of the profile to test. If <i>profile</i> is not in the directory where <code>pfinstall</code> is being run, you must specify the path.				
<i>profile</i>	The file name of the profile to test. If <i>profile</i> is not in the directory where <code>pfinstall</code> is being run, you must specify the path.						

EXAMPLES**EXAMPLE 1** Testing an Upgrade Profile

The following example tests an upgrade profile, `upgrade.prof`, on a system with a previous version of the Solaris software installed.

1. Boot the system to be upgraded from the Solaris image chosen for the upgrade, just as you would to install. The image can be located in the system's local CD-ROM or on an install server.
2. Answer the system configuration questions, if prompted.
3. If you are presented with a choice of installation options, choose the Solaris Interactive Installation program.
4. Exit from the first screen of the Solaris Interactive Installation program.
After the Solaris Interactive Installation program exits, a shell prompt is displayed.

5. Create a temporary mount point:

```
example# mkdir /tmp/mnt
```

6. Mount the directory that contains the profile(s) you want to test.

If you want to mount a remote NFS file system (for systems on the network), enter:

```
mount -F nfs server_name:path /tmp/mnt
```

If you want to mount a UFS-formatted diskette, enter:

```
mount -F ufs /dev/diskette /tmp/mnt
```

If you want to mount a PCFS-formatted diskette, enter:

```
mount -F pcfs /dev/diskette /tmp/mnt
```

7. Change directory to `/tmp/mnt` where the profile resides:

```
example# cd /tmp/mnt
```

8. Test the `upgrade.prof` profile:

```
/usr/sbin/install.d/pfinstall -D upgrade.prof
```

EXAMPLE 2 Testing the `basic.prof` Profile

The following example tests the `basic.prof` profile against the disk configuration on a Solaris 2.6 system where `pfinstall` is being run. The path to the Solaris CD image is specified because Volume Management is being used.

```
example# /usr/sbin/install.d/pfinstall -D -c /cdrom/cdrom0/s0 basic.prof
```

EXAMPLE 3 Testing the `basic.prof` Profile

The following example tests the `basic.prof` profile against the `535_test` disk configuration file. This example uses a Solaris CD image located in the `/export/install` directory, and `pfinstall` is being run on a Solaris 2.6 system.

```
example# /usr/sbin/install.d/pfinstall -d 535_test \
-c /export/install basic.prof
```

pfinstall(1M)

EXIT STATUS	0	Successful (system rebooted).
	1	Successful (system not rebooted).
	2	An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWinst

SEE ALSO `fdisk(1M)`, `prtvtoc(1M)`, `attributes(5)`

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WARNINGS If the `-d` or `-D` option is not specified, `pfinstall` may perform an actual installation on the system by using the specified profile, and the data on the system may be overwritten.

NOTES You have to test a profile on a system with the same platform type for which the profile was created.

SPARC To create a disk configuration file (`-d` option) for a SPARC based system:

1. Locate a SPARC based system with a disk that you want to test.
2. Create a disk configuration file by redirecting the output of the `prtvtoc(1M)` command to a file.

```
example# prtvtoc /dev/rdisk/c0t3d0s2 > 535_disk
```

3. (Optional.) Concatenate disk configuration files into a single file to test a profile against multiple disks. The target numbers in the disk device names must be unique.

```
example# cat 535_disk 1G_disk > mult_disks
```

x86 To create a disk configuration file (`-d` option) for an x86 based system:

1. Locate an x86 based system with a disk that you want to test.
2. Create part of the disk configuration file by saving the output of the `fdisk(1M)` command to a file:

```
example# fdisk -R -W 535_disk /dev/rdisk/c0t3d0p0
```

3. Append the output of the `prtvtoc(1M)` command to the disk configuration file.

```
example# prtvtoc /dev/rdisk/c0t3d0s2 >> 535_disk
```


`pfinstall(1M)`

4. (Optional.) Concatenate disk configuration files into a single file to test a profile against multiple disks. The target numbers in the disk device names must be unique.

```
example# cat 535_disk 1G_disk > mult_disks
```

To test a profile with a specific system memory size, set `SYS_MEMSIZE` to the specific memory size (in Mbytes) before running `pfinstall`:

```
example# SYS_MEMSIZE=memory_size
```

```
example# export SYS_MEMSIZE
```

pgxconfig(1M)

NAME	pgxconfig, GFXconfig, TSIGfxp_config – configure the PGX32 (Raptor GFX) Graphics Accelerator
SYNOPSIS	<pre>/usr/sbin/pgxconfig [-dev <i>device-filename</i>] [-res <i>video-mode</i> [try noconfirm nocheck]] [-file <i>machine</i> <i>system</i>] [-depth 8 24] [-24only true false] [-cachedpixmap true false] [-defaults] /usr/sbin/pgxconfig [-propt] [-prconf] /usr/sbin/pgxconfig [-help] [-res ?] /usr/sbin/pgxconfig [-i]</pre>
DESCRIPTION	The <code>pgxconfig</code> utility configures the PGX32 (Raptor GFX) Graphics Accelerator and some of the X11 window system defaults for PGX32 (Raptor GFX). A previous version of this utility was named <code>GFXconfig</code>. The first form of <code>pgxconfig</code> shown in the synopsis above stores the specified options in the <code>OWconfig</code> file. These options are used to initialize the PGX32 (Raptor GFX) device the next time the window system is run on that device. Updating options in the <code>OWconfig</code> file provides persistence of these options across window system sessions and system reboots. The second, third, and fourth forms, which invoke only the <code>-prconf</code>, <code>-propt</code>, <code>-help</code>, and <code>-res ?</code> options, do not update the <code>OWconfig</code> file. For the third form all other options are ignored. The <code>-i</code> option starts <code>pgxconfig</code> in interactive mode. Options may be specified for only one PGX32 (Raptor GFX) device at a time. Only PGX32 (Raptor GFX)-specific options can be specified through <code>pgxconfig</code>. The normal window system options for specifying default depth, default visual class and so forth are still specified as device modifiers on the <code>openwin</code> command line. See the <code>Xsun(1)</code> manual page available with the <code>SUNWxwman</code> package. The user can also specify the <code>OWconfig</code> file that is to be updated. By default, the machine-specific file in the <code>/usr/openwin</code> directory tree is updated. The <code>-file</code> option can be used to specify an alternate file to use. For example, the system-global <code>OWconfig</code> file in the <code>/etc/openwin</code> directory tree can be updated instead. Both of these standard <code>OWconfig</code> files can only be written by root.
OPTIONS	The following options are supported: <code>-cachedpixmap true false</code> When set to <code>false</code>, it forces the PGX32 (Raptor GFX) device to use 24-bit only when running OpenWindows. The default value is <code>true</code>.

Certain applications make use of a cached pixmap when writing to the display device. Such a technique can cause garbled output and can cause the X server to crash. If you experience such behavior, try setting the `-cachedpixmap` option to `false`.

-defaults

Reset all option values to their default values.

-depth 8 | 24

Sets the screen depth to 8 or 24 bits per pixel. 24 bits per pixel enables TrueColor graphics in the window system.

-dev *device-filename*

Specify the PGX32 (Raptor GFX) special file. The default is `/dev/fbs/gfxp0`, or `/dev/fbs/raptor0` if applicable.

-file *machine* | *system*

Specify which OWconfig file to update. If *machine*, the machine-specific OWconfig file in the `/etc/openwin` directory tree is used. If *system*, the global OWconfig file in the `/usr/openwin` directory tree is used. If the file does not exist, it is created.

-help

Print a list of the `pgxconfig` command line options, along with a brief explanation of each.

-i

Start `pgxconfig` in interactive mode.

-prconf

Print the PGX32 (Raptor GFX) hardware configuration. The following is a typical display:

```
--- Hardware Configuration for /dev/fbs/gfxp0 ---
DAC: version 0x0
Type:
Board:
PROM: version 0x0
PROM Information:
RAM:
EDID Data:
Monitor Sense ID:
Card possible resolutions: 640x480x60, 800x600x75, 1024x768x60
                           1024x768x70, 1024x768x75, 1280x1024x75, 1280x1024x76
                           1280x1024x60, 1152x900x66, 1152x900x76, 1280x1024x67
                           1280x1024x67, 1152x900x76, 1280x1024x67
                           960x680x112S, 960x680x108S, 640x480x60i, 768x575x50i,
                           1280x800x76, 1440x900x76, 1600x1000x66, 1600x1000x76,
                           vga, svga, 1152, 1280, stereo, ntsc, pal
Monitor possible resolutions: 720x400x70, 720x400x88, 640x480x60
                             640x480x67, 640x480x72, 640x480x75, 800x600x56,
                             800x600x60, 800x600x72, 800x600x75, 832x624x75,
                             1024x768x87, 1024x768x60, 1024x768x70, 1024x768x75,
                             1280x1024x75, 1280x1024x76, 1152x900x66, 1152x900x76,
                             1280x1024x67, 960x680x112S, vga, svga, 1152, 1280
                             stereo
```

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```
Current resolution setting: 1280x1024x76
Possible depths: 8, 24, 8+24
Current depth: 8
```

-propt

Print the current values of all PGX32 (Raptor GFX) options in the OWconfig file specified by the `-file` option for the device specified by the `-dev` option. Print the values of options as they would be in the OWconfig file after the call to `pgxconfig` would have completed. The following is a typical display:

```
--- OpenWindows Configuration for /dev/fbs/gfxp0 ---
OWconfig: machine
Video Mode: not set
Depth: 8+24
```

-res *video-mode* [*try* | *noconfirm* | *nocheck*]

Specify the built-in video mode used to drive the monitor connected to the specified PGX32 (Raptor GFX) device.

The format for *video-mode* can be one of the following:

widthxheightxrate

The *width* is the screen width in pixels, *height* is the screen height in pixels, and *rate* is the vertical frequency of the screen refresh. As a convenience, `-res` also accepts formats with `@` prepended to the refresh rate rather than `x`. For example: `1280x1024@76`. The list can be obtained by running `pgxconfig` with the `-res ?` option (the third form shown in the command synopsis above). Note that not all resolutions are supported by both the video board and by the monitor. The `pgxconfig` utility will not permit you to set a resolution not supported by the board unless the `noconfirm` or `nocheck` option is specified. It will also request confirmation before setting a resolution not supported by the monitor if the `nocheck` option is not specified.

Symbolic names

For convenience, the video modes listed below have symbolic names defined. Rather than the form *widthxheightxrate*, the symbolic name may be supplied as the argument to `-res`. If the symbolic name is `none`, the screen resolution will be the video mode that is currently programmed in the device when the window system is run.

svga	1024x768x60
1152	1152x900x76
1280	1280x1024x76
vga	640x480x60

none default console resolution

The `-res` option also accepts additional, optional arguments immediately following the video mode specification. Any or all of these may be present.

`noconfirm` Using the `-res` option, the user could put the system into an unusable state, a state where there is no video output. This can happen if there is ambiguity in the monitor sense codes for the particular code read. To reduce the chance of this occurring, the default behavior of `pgxconfig` is to print a warning message to this effect and to prompt the user to find out if it is okay to continue. The `noconfirm` option instructs `pgxconfig` to bypass this confirmation and to program the requested video mode anyway. This option is useful when `pgxconfig` is being run from a shell script.

`nocheck` If present, normal error checking based on the monitor sense code is suspended. The video mode specified by the user will be accepted regardless of whether it is appropriate for the currently attached monitor. (This option is useful if a different monitor is to be connected to the PGX32 (Raptor GFX) device). Use of this option implies `noconfirm` as well.

`try` This option allows the user to test the specified resolution before committing it. It displays a pattern on the screen with the specified resolution. If the test pattern appears correctly, the user may answer "y" to the query. The other permissible answer is "n".

`-res ?`

Print the list of possible resolutions supported by the PGX32 and the monitor.

`-24only`

Force the PGX32 (Raptor GFX) device to use 24 bit only when running Openwindows.

DEFAULTS

For a given invocation of `pgxconfig`, if an option does not appear on the command line, the corresponding `OWconfig` option is not updated; it retains its previous value, except for `-depth` and `-24only`.

A default value is used if a PGX32 (Raptor GFX) option has not been specified with `pgxconfig` when the window system is run. The option defaults are as follows:

`-dev` `/dev/fbs/gfxp0`
`-file` `system`
`-res` `none`

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The default of none for the `-res` option indicates that when the window system is run, the screen resolution will be the video mode that is currently programmed in the device.

EXAMPLES

EXAMPLE 1 Switching the Resolution on the Monitor Type

The following example switches the monitor type to the resolution of 1280 x 1024 at 76 Hz:

```
example# /usr/sbin/pgxconfig -res 1280x1024x76
```

FILES

`/dev/fbs/gfxp0`
device special file

`/usr/openwin/server/etc/OWconfig`
system configuration file

`/etc/openwin/server/etc/OWconfig`
machine configuration file

SEE ALSO

PGX32 Installation Manual

NAME	picld – PICL daemon
SYNOPSIS	<code>/usr/lib/picl/picld</code>
DESCRIPTION	The Platform Information and Control Library (PICL) provides a mechanism to publish platform-specific information for clients to access in a platform-independent way. <code>picld</code> maintains and controls access to the PICL information from clients and plug-in modules. The daemon is started in both single-user and multi-user boot mode. Upon startup, the PICL daemon loads and initializes the plug-in modules. These modules use the <code>libpicltree(3PICLTREE)</code> interface to create nodes and properties in the PICL tree to publish platform configuration information. After the plug-in modules are initialized, the daemon opens the PICL daemon door to service client requests to access information in the PICL tree.
PICL Tree	The PICL tree is the repository of all the nodes and properties created by the plug-in modules to represent the platform configuration. Every node in the PICL tree is an instance of a well-defined PICL class. The name of the base PICL class is <code>picl</code>, which defines a basic set of properties that all nodes in the tree must possess. Two of those properties are <code>name</code> and <code>_class</code>, where <code>name</code> contains the name of the node, and the <code>_class</code> contains the PICL class name of the node. Certain nodes in the PICL tree have well-known names. For example, the name of the root node of the PICL tree is <code>/</code> and the name of the root node of the sub-tree containing platform device nodes is <code>platform</code>.
PICL plug-in Modules	The PICL plug-in modules are shared objects that publish platform-specific data in the PICL tree. They are located in well-known directories so that the daemon can locate and load them. Plug-in modules are located in one of the following plug-in directories depending on the platform-specific nature of the data that they collect and publish: <pre> /usr/platform/'uname -i'/lib/picl/plugins /usr/platform/'uname -m'/lib/picl/plugins </pre> A plug-in module can specify its dependency on another plug-in module using the <code>-l</code> or <code>-R</code> linker option. The plug-ins are loaded by the daemon using <code>dlopen(3DL)</code> according to the specified dependencies. Each plug-in module must define a <code>.init</code> section, which is executed when the plug-in module is loaded, to register themselves with the daemon. See <code>picld_plugin_register(3PICLTREE)</code> for additional information on plug-in registration. The plug-in modules use the <code>libpicltree(3PICLTREE)</code> interface to publish nodes and properties in the PICL tree so that clients can access them. When the PICL daemon invokes the initialization routine of the plug-in module, the plug-in collects the platform information and creates nodes and/or properties to represent the configuration in the PICL tree. A plug-in can create additional threads to monitor the platform configuration and update the PICL tree with any changes. This enables a PICL plug-in to operate as a daemon within the PICL framework.

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An environmental monitor is an example of a plug-in module that uses a thread to monitor the temperatures and fan speeds of the platform, then publishes the environmental information in the PICL tree so clients can access them.

Clients use the `libpicl(3PICL)` interface to send requests to `picld` for accessing the PICL tree.

EXIT STATUS `picld` does not return an exit status.

FILES

<code>/var/run/picld_door</code>	PICL daemon door
<code>/usr/lib/picl/picld</code>	PICL daemon
<code>/etc/init.d/picld</code>	Start/stop script

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpiclu

SEE ALSO `dlopen(3DL)`, `libpicl(3PICL)`, `libpicltree(3PICLTREE)`, `picld_log(3PICLTREE)`, `picld_plugin_register(3PICLTREE)`, `attributes(5)`

NAME	ping – send ICMP (ICMP6) ECHO_REQUEST packets to network hosts		
SYNOPSIS	<pre> /usr/sbin/ping host [timeout] /usr/sbin/ping -s [-l -U] [-adlLnRv] [-A addr_family] [-c traffic_class] [-g gateway [-g gateway...]] [-F flow_label] [-I interval] [-i interface] [-P tos] [-p port] [-t ttl] host [data_size] [npackets] </pre>		
DESCRIPTION	The utility <code>ping</code> utilizes the ICMP (ICMP6 in IPv6) protocol's ECHO_REQUEST datagram to elicit an ICMP (ICMP6) ECHO_RESPONSE from the specified <i>host</i> or network <i>gateway</i>. If <i>host</i> responds, <code>ping</code> will print: <pre> host is alive </pre> on the standard output and exit. Otherwise, after <i>timeout</i> seconds, it will write: <pre> no answer from host </pre> The default value of <i>timeout</i> is 20 seconds. When you specify the <code>s</code> flag, sends one datagram per second (adjust with <code>-I</code>) and prints one line of output for every ECHO_RESPONSE that it receives. <code>ping</code> produces no output if there is no response. In this second form, <code>ping</code> computes round trip times and packet loss statistics; it displays a summary of this information upon termination or timeout. The default <i>data_size</i> is 56 bytes, or you can specify a size with the <i>data_size</i> command-line argument. If you specify the optional <i>npackets</i>, <code>ping</code> sends <code>ping</code> requests until it either sends <i>npackets</i> requests or receives <i>npackets</i> replies. When using <code>ping</code> for fault isolation, first <code>ping</code> the local host to verify that the local network interface is running.		
OPTIONS	The following options are supported: <table> <tr> <td><code>-A addr_family</code></td><td> Specify the address family of the target host. <i>addr_family</i> can be either <code>inet</code> or <code>inet6</code>. Address family determines which protocol to use. For an argument of <code>inet</code>, IPv4 is used. For <code>inet6</code>, IPv6 is used. By default, if the name of a host is provided, not the literal IP address, and a valid IPv6 address exists in the name service database, <code>ping</code> will use this address. Otherwise, if the name service database contains an IPv4 address, it will try the IPv4 address. Specify the address family <code>inet</code> or <code>inet6</code> to override the default behavior. If the argument specified is <code>inet</code>, <code>ping</code> will use the IPv4 address associated with the host </td></tr> </table>	<code>-A addr_family</code>	Specify the address family of the target host. <i>addr_family</i> can be either <code>inet</code> or <code>inet6</code>. Address family determines which protocol to use. For an argument of <code>inet</code>, IPv4 is used. For <code>inet6</code>, IPv6 is used. By default, if the name of a host is provided, not the literal IP address, and a valid IPv6 address exists in the name service database, <code>ping</code> will use this address. Otherwise, if the name service database contains an IPv4 address, it will try the IPv4 address. Specify the address family <code>inet</code> or <code>inet6</code> to override the default behavior. If the argument specified is <code>inet</code>, <code>ping</code> will use the IPv4 address associated with the host
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	name. If none exists, <code>ping</code> will state that the host is unknown and exit. It does not try to determine if an IPv6 address exists in the name service database. If the specified argument is <code>inet6</code>, <code>ping</code> uses the IPv6 address that is associated with the host name. If none exists, <code>ping</code> states that the host is unknown and exits.
-F <i>flow_label</i>	Specify the flow label of probe packets. The value must be an integer in the range from 0 to 1048575. This option is valid only on IPv6.
-I <i>interval</i>	Turn on the statistics mode and specify the interval between successive transmissions. The default is one second. See the discussion of the <code>-s</code> option.
-L	Turn off loopback of multicast packets. Normally, members are in the host group on the outgoing interface, a copy of the multicast packets will be delivered to the local machine.
-P <i>tos</i>	Set the type of service (<i>tos</i>) in probe packets to the specified value. The default is zero. The value must be an integer in the range from 0 to 255. Gateways also in the path can route the probe packet differently, depending upon the value of <i>tos</i> that is set in the probe packet. This option is valid only on IPv4.
-R	Record route. Sets the IPv4 record route option, which stores the route of the packet inside the IPv4 header. The contents of the record route are only printed if the <code>-v</code> and <code>-s</code> options are given. They are only set on return packets if the target host preserves the record route option across echos, or the <code>-l</code> option is given. This option is valid only on IPv4.
-U	Send UDP packets instead of ICMP (ICMP6) packets. <code>ping</code> sends UDP packets to consecutive ports expecting to receive back ICMP (ICMP6) <code>PORT_UNREACHABLE</code> from the target host.
-a	<code>ping</code> all addresses, both IPv4 and IPv6, of the multihomed destination. The output appears as if <code>ping</code> has been run once for each IP address of the destination. If this option is used together with <code>-A</code>, <code>ping</code> probes only the addresses that are of the specified address family. When used with the <code>-s</code> option and <i>npackets</i> is not specified, <code>ping</code> continuously probes the destination addresses in a round robin

	fashion. If <i>npackets</i> is specified, <i>ping</i> sends <i>npackets</i> number of probes to each IP address of the destination and then exits.
<code>-c traffic_class</code>	Specify the traffic class of probe packets. The value must be an integer in the range from 0 to 255. Gateways along the path can route the probe packet differently, depending upon the value of <i>traffic_class</i> set in the probe packet. This option is valid only on IPv6.
<code>-d</code>	Set the <code>SO_DEBUG</code> socket option.
<code>-g gateway</code>	Specify a loose source route gateway so that the probe packet goes through the specified host along the path to the target host. The maximum number of gateways is 8 for IPv4 and 127 for IPv6. Note that some factors such as the link MTU can further limit the number of gateways for IPv6.
<code>-i interface_address</code>	Specify the outgoing interface address to use for multicast packets for IPv4 and both multicast and unicast packets for IPv6. The default interface address for multicast packets is determined from the (unicast) routing tables. <i>interface_address</i> can be a literal IP address, for example, 10.123.100.99, or an interface name, for example, <code>le0</code> , or an interface index, for example 2.
<code>-l</code>	Use to send the probe packet to the given host and back again using loose source routing. Usually specified with the <code>-R</code> option. If any gateways are specified using <code>-g</code> , they are visited twice, both to and from the destination. This option is ignored if the <code>-U</code> option is used.
<code>-n</code>	Show network addresses as numbers. <i>ping</i> normally does a reverse name lookup on the IP addresses it extracts from the packets received. The <code>-n</code> option blocks the reverse lookup, so <i>ping</i> prints IP addresses instead of host names.
<code>-p port</code>	Set the base UDP <i>port</i> number used in probes. This option is used with the <code>-U</code> option. The default base <i>port</i> number is 33434. The <i>ping</i> utility starts setting the destination port number of UDP packets to this base and increments it by one at each probe.
<code>-r</code>	Bypass the normal routing tables and send directly to a host on an attached network. If the host is not on a directly attached network, an error is returned. This

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	option can be used to ping a local host through an interface that has been dropped by the router daemon. See <code>in.routed(1M)</code>. <code>-s</code> Send one datagram per second and collect statistics. <code>-t ttl</code> Specify the IPv4 time to live, or IPv6 hop limit, for unicast and multicast packets. The default time to live (hop limit) for unicast packets can be set with <code>ndd(1M)</code> using the <code>icmp_ipv4_ttl</code> variable for IPv4 and the <code>icmp_ipv6_ttl</code> variable for IPv6. The default time to live (hop limit) for multicast is one hop. <code>-v</code> Verbose output. List any ICMP (ICMP6) packets, other than replies from the target host.				
OPERANDS	<i>host</i> The network host				
EXAMPLES	EXAMPLE 1 Using ping With IPv6 This example shows ping sending probe packets to all the IPv6 addresses of the host london, one at a time. It sends an ICMP6 ECHO_REQUEST every second until the user interrupts it. <pre>istanbul% ping -s -A inet6 -a london PING london: 56 data bytes 64 bytes from london (4::114:a00:20ff:ab3d:83ed): icmp_seq=0. time=2. ms 64 bytes from london (fec0::114:a00:20ff:ab3d:83ed): icmp_seq=1. time=1. ms 64 bytes from london (4::114:a00:20ff:ab3d:83ed): icmp_seq=2. time=1. ms 64 bytes from london (fec0::114:a00:20ff:ab3d:83ed): icmp_seq=3. time=1. ms 64 bytes from london (4::114:a00:20ff:ab3d:83ed): icmp_seq=4. time=1. ms 64 bytes from london (fec0::114:a00:20ff:ab3d:83ed): icmp_seq=5. time=1. ms ^C ----london PING Statistics---- 6 packets transmitted, 6 packets received, 0% packet loss round-trip (ms) min/avg/max = 1/1/2</pre>				
EXIT STATUS	The following exit values are returned: 0 Successful operation; the machine is alive. non-zero An error has occurred. Either a malformed argument has been specified, or the machine was not alive.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWbip</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWbip
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWbip				

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SEE ALSO ifconfig(1M), in.routed(1M), ndd(1M), netstat(1M), rpcinfo(1M),
traceroute(1M), attributes(5), icmp(7P), icmp6(7P)

pkgadd(1M)

NAME	pkgadd – transfer software packages to the system
SYNOPSIS	<pre>pkgadd [-nvi] [-a <i>admin</i>] [-d <i>device</i>] [-x <i>proxy</i>] [[-M] -R <i>root_path</i>] [-r <i>response</i>] [-k <i>keystore</i>] [-P <i>passwd</i>] [-V <i>fs_file</i>] [<i>source</i>] [<i>instances</i>] pkgadd -s [<i>source</i>] [<i>instances</i>]</pre>
DESCRIPTION	pkgadd transfers the contents of a software package from the distribution medium or directory to install it onto the system. Used without the -d option, pkgadd looks in the default spool directory for the package (<i>var/spool/pkg</i>). Used with the -s option, it writes the package to a spool directory instead of installing it. The pkgadd utility requires an amount of temporary space the size of the package that is being installed. pkgadd determines which temporary directory to use by checking for the existence of the \$TMPDIR environment variable. If \$TMPDIR is not defined, pkgadd uses P_tmpdir from <i>stdio.h</i>. P_tmpdir has a default of <i>/var/tmp/</i>. Certain unbundled and third-party packages are no longer entirely compatible with the latest version of pkgadd. These packages require user interaction throughout the installation and not just at the very beginning. To install these older packages (released prior to Solaris 2.4), set the following environment variable: NONABI_SCRIPTS=TRUE pkgadd permits keyboard interaction throughout the installation as long as this environment variable is set.
OPTIONS	The following options are supported: -a <i>admin</i> Define an installation administration file, <i>admin</i>, to be used in place of the default administration file. The token none overrides the use of any <i>admin</i> file, and thus forces interaction with the user. Unless a full path name is given, pkgadd first looks in the current working directory for the administration file. If the specified administration file is not in the current working directory, pkgadd looks in the <i>/var/sadm/install/admin</i> directory for the administration file. -d <i>device</i> Install or copy a package from <i>device</i>. <i>device</i> can be a full path name to a directory or the identifiers for tape, floppy disk, or removable disk (for example, <i>/var/tmp</i> or <i>/floppy/floppy_name</i>). It can also be a device alias (for example, <i>/floppy/floppy0</i>) or a datastream created by <i>pkgtrans</i> (see <i>pkgtrans(1)</i>). -k <i>keystore</i> Use <i>keystore</i> as the location from which to get trusted certificate authority certificates when verifying digital signatures found in packages. If no keystore is specified, then the default keystore locations are searched for valid trusted certificates. See KEYSTORE LOCATIONS for more information. -M Instruct pkgadd not to use the <i>\$root_path/etc/vfstab</i> file for determining the client's mount points. This option assumes the

	mount points are correct on the server and it behaves consistently with Solaris 2.5 and earlier releases.
-n	Installation occurs in non-interactive mode. Suppress output of the list of installed files. The default mode is interactive.
-P passwd	Password to use to decrypt keystore specified with -k , if required. See PASS PHRASE ARGUMENTS for more information about the format of this option's argument.
-r response	Identify a file or directory which contains output from a previous pkgask(1M) session. This file supplies the interaction responses that would be requested by the package in interactive mode. <i>response</i> must be a full pathname.
-R root_path	Define the full path name of a directory to use as the <i>root_path</i> . All files, including package system information files, are relocated to a directory tree starting in the specified <i>root_path</i> . The <i>root_path</i> may be specified when installing to a client from a server (for example, /export/root/client1).
-s spool	Write the package into the directory <i>spool</i> instead of installing it.
-v	Trace all of the scripts that get executed by pkgadd, located in the <i>pkginst/install</i> directory. This option is used for debugging the procedural and non-procedural scripts.
-V fs_file	Specify an alternative <i>fs_file</i> to map the client's file systems. For example, used in situations where the <i>\$root_path/etc/vfstab</i> file is non-existent or unreliable.
-x proxy	Specify a HTTP[S] proxy to use when downloading packages. The format of proxy is <i>host:port</i> , where <i>host</i> is the hostname of the HTTP[S] proxy, and <i>port</i> is the port number associated with the proxy. This switch overrides all other methods of specifying a proxy. See ENVIRONMENT VARIABLES for more information on alternate methods of specifying a default proxy.

When executed without options or operands, pkgadd uses /var/spool/pkg (the default spool directory).

OPERANDS

The following operands are supported:

Sources	By default, pkgadd looks in the /var/spool/pkg directory when searching for instances of a package to install or spool. Optionally, the source for the package instances to be installed or spooled can be specified using:
-d device	Install or copy a package from <i>device</i> . <i>device</i> can be a full path name to a directory or the identifiers for tape, floppy disk, or removable disk (for example, /var/tmp or /floppy/floppy_name). It can also be a device alias (for example, /floppy/floppy0) or a datastream created by pkgtrans (see pkgtrans(1)).

pkgadd(1M)

	<i>device</i> can also be a URL pointing to a datastream created by <code>pkgtrans</code>.
Instances	By default, <code>pkgadd</code> searches the specified source, and presents an interactive menu allowing the user to select which package instances found on the source are to be installed. As an alternative, the package instances to be installed can be specified using: <i>pkginst</i> The package instance or list of instances to be installed. The token <code>all</code> may be used to refer to all packages available on the source medium. The format <i>pkginst</i>.<code>*</code> can be used to indicate all instances of a package. The asterisk character (<code>*</code>) is a special character to some shells and may need to be escaped. In the C-Shell, the asterisk must be surrounded by single quotes (<code>'</code>) or preceded by a backslash (<code>\</code>). <code>-Y category[,category...]</code> Install packages based on the value of the <code>CATEGORY</code> parameter stored in the package's <code>pkginfo(4)</code> file. All packages on the source medium whose <code>CATEGORY</code> matches one of the specified categories will be selected for installation or spooling.
KEYSTORE LOCATIONS	Package and patch tools such as <code>pkgadd</code> or <code>patchadd</code> use a set of trusted certificates to perform signature validation on any signatures found within the packages or patches. If there are no signatures included in the packages or patches then signature validation is skipped. The certificates can come from a variety of locations. If <code>-k keystore</code> is specified, and <i>keystore</i> is a directory, then <i>keystore</i> is assumed to be the base directory of the certificates to be used. If <i>keystore</i> is a file, then the file itself is assumed to have all required keys and certificates. When <code>-k</code> is not specified, then <code>/var/sadm/security</code> is used as the base directory. Within the specified base directory, the store locations to be searched are different based on the application doing the searching and the type of store being searched for. The following directories are searched in the specified order: 1. <code><store_dir>/<app_name>/<store_type></code> 2. <code><store_dir>/<store_type></code> Where <code><store_dir></code> is the directory specified by <code>-k</code>, <code><app_name></code> is the name of the application doing the searching, and <code><store_type></code> is one of <code>keystore</code> (for private keys), <code>certstore</code> (for untrusted public key certificates), or <code>truststore</code> (for trusted certificate authority certificates). For example, when <code>pkgadd</code> is run with <code>-k /export/certs</code>, then the following locations are successively searched to find the trust store: 1. <code>/export/certs/pkgadd/truststore</code> 2. <code>/export/certs/truststore</code> This searching order enables administrators to have a single location for most applications, and special certificate locations for certain applications.

**KEYSTORE AND
CERTIFICATE
FORMATS**

The packaging and patching utilities, such as `pkgtrans` and `patchadd`, require access to a set of keys and certificates in order to sign, and optionally verify, packages and patches.

The keystore files found by following the search pattern specified in `KEYSTORE LOCATIONS` must each be a self-contained PKCS#12-format file.

When signing a package with `pkgtrans`, if a `certstore` has more than one public key certificate, then each public key must have a `friendlyName` attribute in order to be identifiable and selectable with the `-a` option when signing packages or patches. In addition, the public key certificate selected with `-a` and found in the `certstore` must have an associated private key in the keystore.

Several browsers and utilities can be used to export and import certificates and keys into a PKCS#12 keystore. For example, a trusted certificate can be exported from Netscape, and then imported into a PKCS#12 keystore for use with `pkgadd` with the OpenSSL Toolkit.

**PASS PHRASE
ARGUMENTS**

`pkgtrans` and `pkgadd` accept password arguments, typically using `-p` to specify the password. These allow the password to be obtained from a variety of sources. Both of these options take a single argument whose format is described below. If no password argument is given and a password is required then the user is prompted to enter one: this will typically be read from the current terminal with echoing turned off.

`pass:password`

The actual password is *password*. Because the password is visible to utilities such as `ps` this form should only be used where security is not important.

`env:var`

Obtain the password from the environment variable *var*. Because the environment of other processes is visible on certain platforms this option should be used with caution.

`file:pathname`

The first line contained within *pathname* is the password. *pathname* need not refer to a regular file: it could, for example, refer to a device or named pipe. For example, to read the password from standard input, use `file:/dev/stdin`.

`console`

Read the password from `/dev/tty`.

EXAMPLES

EXAMPLE 1 Installing a Package from a Solaris CD-ROM

The following example installs a package from a Solaris CD-ROM. You are prompted for the name of the package you want to install.

```
example% pkgadd -d /cdrom/cdrom0/s0/Solaris_2.6
```

EXIT STATUS

0	Successful completion
1	Fatal error.

pkgadd(1M)

**ENVIRONMENT
VARIABLES**

- 2 Warning.
- 3 Interruption.
- 4 Administration.
- 5 Administration. Interaction is required. Do not use pkgadd -n.
- 10 Reboot after installation of all packages.
- 20 Reboot after installation of this package.
- HTTPPROXY
 Specifies an HTTP proxy host. Overrides administration file setting, and
 http_proxy environment variable.
- HTTPPROXYPORT
 Specifies the port to use when contacting the host specified by HTTPPROXY. Ignored
 if HTTPPROXY is not set.
- http_proxy
 URL format for specifying proxy host and port. Overrides administration file
 setting.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpkgcmdsu
Interface Stability	Evolving

SEE ALSO

pkginfo(1), pkgmk(1), pkgparam(1), pkgproto(1), pkgtrans(1), installf(1M),
pkgadm(1M), pkgask(1M), pkgrm(1M), removef(1M), admin(4), pkginfo(4),
attributes(5)

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<http://www.openssl.org>

NOTES

When transferring a package to a spool directory, the -r, -n, and -a options cannot be
used.

The -r option can be used to indicate a directory name as well as a filename. The
directory can contain numerous response files, each sharing the name of the package
with which it should be associated. This would be used, for example, when adding
multiple interactive packages with one invocation of pkgadd. In this situation, each
package would need a response file. If you create response files with the same name as
the package (for example, pkinst1 and pkinst2), then name the directory in which
these files reside after the -r.

The -n option causes the installation to halt if any interaction is needed to complete it.

If the default *admin* file is too restrictive, the administration file may need to be modified to allow for total non-interaction during a package installation. See *admin(4)* for details.

If a package stream is specified with *-d*, and a digital signature is found in that stream, the default behavior is to attempt to validate the certificate and signature found. This behavior can be overridden with *admin* file settings. See *admin(4)* for more information.

pkgadm(1M)

NAME	pkgadm – manage packaging and patching system				
SYNOPSIS	pkgadm addcert [-ty] [-a <i>app</i>] [-k <i>keystore</i>] [-e <i>keyfile</i>] [-f <i>format</i>] [-n <i>name</i>] [-P <i>passarg</i>] [-p <i>import_passarg</i>] [-R <i>rootpath</i>] <i>certfile</i> pkgadm removecert [-a <i>app</i>] [-k <i>keystore</i>] -n <i>name</i> [-P <i>passarg</i>] [-R <i>rootpath</i>] pkgadm listcert [-a <i>app</i>] [-f <i>format</i>] [-k <i>keystore</i>] -n <i>name</i> [-P <i>passarg</i>] [-o <i>outfile</i>] [-R <i>rootpath</i>] pkgadm -V pkgadm -?				
DESCRIPTION	The pkgadm utility is used for managing the packaging and patching system. It has several subcommands that perform various operations relating to packaging. The pkgadm command includes subcommands for managing certificates and keys used.				
Managing Keys and Certificates	pkgadm maintains the packaging-system-wide keystore in <i>/var/sadm/security</i>, and individual user's certificates in <i>~/ .pkg/security</i>. The following subcommands operate on the package keystore database: addcert Add (import) a certificate into the database, with optional trust. Once added, trusted certificates can be used to verify signed packages and patches. Non-trusted user certificates and their associated keys can be used to sign packages and patches. Added user certificates are <i>not</i> used to build certificate chains during certificate verification. removecert Removes a user certificate/private key pair, or a trusted certificate authority certificate from the keystore. Once removed, the certificate and keys cannot be used. listcert Print details of one or more certificates in the keystore.				
OPTIONS	The following options are supported: -a <i>app</i> If this option is used, then the command only affects the keystore associated with a particular application. Otherwise, the global keystore is affected. -e <i>keyfile</i> When adding a non-trusted certificate/key combination, this option can be used to specify the file that contains the private key. If this option is not used, the private key must be in the same file as the certificate being added. -f <i>format</i> When adding certificates, this specifies the format to expect certificates and private keys in. Possible values when adding are: <table> <tr> <td>pem</td><td>Certificate and any private key uses PEM encoding.</td></tr> <tr> <td>der</td><td>Certificate and any private key uses DER encoding.</td></tr> </table>	pem	Certificate and any private key uses PEM encoding.	der	Certificate and any private key uses DER encoding.
pem	Certificate and any private key uses PEM encoding.				
der	Certificate and any private key uses DER encoding.				

When printing certificates, this specifies the output format used when printing. Acceptable values for format are:

<code>pem</code>	Output each certificate using PEM encoding.
<code>der</code>	Output each certificate using DER encoding.
<code>text</code>	Output each certificate in human-readable format.

`-k keystore`

Overrides the default location used when accessing the keystore.

`-n name`

Identifies the entity in the store on which you want to operate. When adding a user certificate, or removing certificates, this name is required. The name is associated with the certificate/key combination, and when adding, can be used later to reference the entity. When printing certificates, if no alias is supplied, then all keystore entities are printed.

`-o outfile`

Output the result of the command to *outfile*. Only used when examining (printing) certificates from the key store. Standard out is the default.

`-P passarg`

Password retrieval method to use to decrypt keystore specified with `-k`, if required. See PASS PHRASE ARGUMENTS in `pkgadd(1M)` for more information about the format of this option's argument. `console` is the default.

`-p import_passarg`

This option's argument is identical to `-P`, but is used for supplying the password used to decrypt the certificate and/or private key being added. `console` is the default.

`-R rootpath`

Defines the full name of a directory to use as the root (/) path. The default user location of the certificate operations is `${HOME}/.pkg`. If the `-R` option is supplied, the certificates and keys will be stored under `<altroot>/var/sadm/security`. Note that this operation fails if the user does not have sufficient permissions to access this directory. The `listcert` command requires read permission, while `addcert` and `removecert` require both read and write permission.

`-t`

Indicates the certificate being added is a trusted CA certificate. The details of the certificate (including the Subject Name, Validity Dates, and Fingerprints) are printed and the user is asked to verify the data. This verification step can be skipped with `-y`. When importing a trusted certificate, a private key should not be supplied, and will be rejected if supplied. Once a certificate is trusted, it can be used as a trust anchor when verifying future untrusted certificates.

`-V`

Print version associated with packaging tools.

pkgadm(1M)

	-y When adding a trusted certificate, the details of the certificate (Subject name, Issuer name, Validity dates, Fingerprints) are shown to the user and the user is asked to verify the correctness before proceeding. With -y, this additional verification step is skipped. -? Print help message.
OPERANDS	The following operand is supported: certfile File containing the certificate and optional private key, used when adding a trust anchor or certificate/key combination. Certificates must be encoded using PEM or binary DER.
KEYSTORE ALIASES	All keystore entries (user cert/key and trusted certificate entries) are accessed via unique aliases. Aliases are case-sensitive. An alias is specified when you add an entity to a keystore using the <code>addcert</code> or <code>trustcert</code> subcommand. If an alias is not supplied for a trust anchor, the trust anchor's Common Name is used as the alias. An alias is required when adding a signing certificate or chain certificate. Subsequent <code>pkgetcrt</code> or other package tool commands must use this same alias to refer to the entity.
KEYSTORE PASSWORDS	See <code>pkgadd(1M)</code> for a description of the passwords supplied to this utility.
EXAMPLES	EXAMPLE 1 Adding a Trust Anchor The following example adds a well-known and trusted certificate to be used when verifying signatures on packages. <pre>example% pkgadm addcert -t /tmp/certfile.pem</pre> EXAMPLE 2 Adding a Signing Certificate The following example adds a signing certificate and associated private key, each of which is in a separate file, which can then be used to sign packages. <pre>example% pkgadm addcert -a pkgtrans -e /tmp/keyfile.pem \ /tmp/certfile.pem</pre> EXAMPLE 3 Printing Certificates The following example prints all certificates in the root keystore. <pre>example% pkgadm listcert</pre>
EXIT STATUS	0 successful completion non-zero fatal error

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpkgcmdsu
Interface Stability	Evolving

SEE ALSO pkginfo(1), pkgmk(1), pkgparam(1), pkgproto(1), pkgtrans(1), installf(1M), pkgadd(1M), pkgask(1M), pkgrm(1M), removef(1M), admin(4), pkginfo(4), attributes(5)

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pkgask(1M)

NAME	pkgask – stores answers to a request script				
SYNOPSIS	pkgask [-d <i>device</i>] [-R <i>root_path</i>] -r <i>response</i> <i>pkginst</i> ...				
DESCRIPTION	pkgask allows the administrator to store answers to an interactive package (one with a request script, that is, a user-created file that must be named <i>request</i>). Invoking this command generates a response file that is then used as input at installation time. The use of this response file prevents any interaction from occurring during installation since the file already contains all of the information the package needs.				
OPTIONS	The following options are supported -d <i>device</i> Run the request script for a package on <i>device</i>. <i>device</i> can be a directory pathname or the identifiers for tape, floppy disk or removable disk (for example, /var/tmp, /dev/diskette, and /dev/dsk/c1d0s0). The default device is the installation spool directory. -R <i>root_path</i> Define the full path name of a directory to use as the <i>root_path</i>. All files, including package system information files, are relocated to a directory tree starting in the specified <i>root_path</i>. -r <i>response</i> Identify a file or directory which should be created to contain the responses to interaction with the package. The name must be a full pathname. The file, or directory of files, can later be used as input to the pkgadd(1M) command.				
OPERANDS	The following operands are supported: <i>pkginst</i> Specify the package instance, or list of instances for which request scripts will be created. The token <i>all</i> may be used to refer to all packages available on the source medium.				
EXIT STATUS	0 Successful completion. >0 An error occurred.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	pkginfo(1), pkgmk(1), pkgparam(1), pkgproto(1), pkgtrans(1), installf(1M), pkgadd(1M), pkgchk(1M), pkgrm(1M), removef(1M), admin(4), attributes(5) <i>Application Packaging Developer's Guide</i>				
NOTES	The -r option can be used to indicate a directory name as well as a filename. The directory name is used to create numerous response files, each sharing the name of the package with which it should be associated. This would be used, for example, when				

pkgask(1M)

you will be adding multiple interactive packages with one invocation of `pkgadd(1M)`. Each package would need a response file. To create multiple response files with the same name as the package instance, name the directory in which the files should be created and supply multiple instance names with the `pkgask` command. When installing the packages, you will be able to identify this directory to the `pkgadd(1M)` command.

If the default `admin` file is too restrictive, the administration file may need to be modified to allow for total non-interaction during a package installation. See `admin(4)` for details.

pkgchk(1M)

NAME	pkgchk – check package installation accuracy
SYNOPSIS	pkgchk [-l -acfngvx] [-i <i>file</i>] [-p <i>path...</i>] [-R <i>root_path</i>] [[-m <i>pkgmap</i> [-e <i>envfile</i>]] pkginst... -Y <i>category,category...</i>] pkgchk -d <i>device</i> [-l -fv] [-i <i>file</i>] [-M] [-p <i>path...</i>] [-v <i>fs_file</i>] [pkginst... -Y <i>category[,category...]</i>]
DESCRIPTION	pkgchk checks the accuracy of installed files or, by using the -l option, displays information about package files. pkgchk checks the integrity of directory structures and files. Discrepancies are written to standard error along with a detailed explanation of the problem. The first synopsis defined above is used to list or check the contents and/or attributes of objects that are currently installed on the system, or in the indicated pkgmap. Package names may be listed on the command line, or by default, the entire contents of a machine will be checked. The second synopsis is used to list or check the contents of a package which has been spooled on the specified device, but not installed. Note that attributes cannot be checked for spooled packages.
OPTIONS	The following options are supported: -a Audit the file attributes only and do not check file contents. Default is to check both. -c Audit the file contents only and do not check file attributes. Default is to check both. -d <i>device</i> Specify the device on which a spooled package resides. <i>device</i> can be a directory path name or the identifiers for tape, floppy disk, or removable disk (for example, /var/tmp or /dev/diskette). -e <i>envfile</i> Request that the package information file named as <i>envfile</i> be used to resolve parameters noted in the specified pkgmap file. -f Correct file attributes if possible. If used with the -x option, this option removes hidden files. When pkgchk is invoked with this option, it creates directories, named pipes, links, and special devices if they do not already exist. If the -d option calls out an uninstalled package, the -f option will only take effect if the package is in directory (not stream) format. All file attributes will be set to agree with the entries in the pkgmap file except that setuid, setgid, and sticky bits will not be set in the mode. -i <i>file</i> Read a list of path names from <i>file</i> and compare this list against the installation software database or the indicated pkgmap file. Path names which are not contained in <i>file</i> are not checked. -l List information on the selected files that make up a package. This option is not compatible with the -a, -c, -f, -g, and -v options.

	-m pkgmap	Check the package against the package map file, pkgmap.
	-M	Instruct pkgchk not to use the <i>\$root_path/etc/vfstab</i> file for determining the client's mount points. This option assumes the mount points are correct on the server and it behaves consistently with Solaris 2.5 and earlier releases.
	-n	Do not check volatile or editable files' contents. This should be used for most post-installation checking.
	-p <i>path</i>	Only check the accuracy of the path name or path names listed. <i>path</i> can be one or more path names separated by commas (or by white space, if the list is quoted).
	-q	Quiet mode. Do not give messages about missing files.
	-R <i>root_path</i>	Define the full name of a directory to use as the <i>root_path</i> . All files, including package system information files, are relocated to a directory tree starting in the specified <i>root_path</i> . The <i>root_path</i> may be specified when installing to a client from a server (for example, <i>/export/root/client1</i>).
	-v	Verbose mode. Files are listed as processed.
	-V <i>fs_file</i>	Specify an alternative <i>fs_file</i> to map the client's file systems. For example, used in situations where the <i>\$root_path/etc/vfstab</i> file is non-existent or unreliable.
	-x	Search exclusive directories, looking for files which exist that are not in the installation software database or the indicated pkgmap file.
	-Y <i>category</i>	Check packages based on the value of the CATEGORY parameter stored in the installed or spooled package's pkginfo(4) file.
OPERANDS	<i>pkginst</i>	The package instance or instances to be checked. The format <i>pkginst</i> . * can be used to check all instances of a package. The default is to display all information about all installed packages. The asterisk character (*) is a special character to some shells and may need to be escaped. In the C-Shell, "*" must be surrounded by single quotes (') or preceded by a backslash (\);
EXAMPLES	EXAMPLE 1 Using pkgchk for Displaying Package Installation Information The following example displays package installation information for <i>/usr/bin/ls</i>: <pre>example% pkgchk -l -p /usr/bin/ls</pre>	
EXIT STATUS	0	Successful completion.
	>0	An error occurred.

pkgchk(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO pkginfo(1), pkgtrans(1), pkgadd(1M), pkgask(1M), pkgrm(1M), pkginfo(4), attributes(5)

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NAME	pkgrm – remove a package from the system
SYNOPSIS	<pre>pkgrm [-nv] [-a <i>admin</i>] [[-A -M] -R <i>root_path</i>] [-V <i>fs_file</i>] [pkginst... -Y <i>category</i> [, <i>category</i>...]] pkgrm -s <i>spool</i> [pkginst... -Y <i>category</i> [, <i>category</i>...]]</pre>
DESCRIPTION	pkgrm will remove a previously installed or partially installed package from the system. A check is made to determine if any other packages depend on the one being removed. If a dependency exists, the action taken is defined in the <i>admin</i> file. The default state for the command is in interactive mode, meaning that prompt messages are given during processing to allow the administrator to confirm the actions being taken. Non-interactive mode can be requested with the <i>-n</i> option. The <i>-s</i> option can be used to specify the directory from which spooled packages should be removed. Certain unbundled and third-party packages are no longer entirely compatible with the latest version of pkgrm. These packages require user interaction throughout the removal and not just at the very beginning. To remove these older packages (released prior to Solaris 2.4), set the following environment variable: <code>NONABI_SCRIPTS=TRUE</code> pkgrm permits keyboard interaction throughout the removal as long as this environment variable is set.
OPTIONS	The following options are supported: -a <i>admin</i> Use the installation administration file, <i>admin</i>, in place of the default <i>admin</i> file. pkgrm first looks in the current working directory for the administration file. If the specified administration file is not in the current working directory, pkgrm looks in the <code>/var/sadm/install/admin</code> directory for the administration file. -A Remove the package files from the client's file system, absolutely. If a file is shared with other packages, the default behavior is to not remove the file from the client's file system. -M Instruct pkgrm not to use the <code>\$root_path/etc/vfstab</code> file for determining the client's mount points. This option assumes the mount points are correct on the server and it behaves consistently with Solaris 2.5 and earlier releases. -n Non-interactive mode. If there is a need for interaction, the command will exit. Use of this option requires that at least one package instance be named upon invocation of the command. Certain conditions must exist for a package to be removed non-interactively or a non-restrictive <i>admin</i> file needs to be used.

pkgrm(1M)

	-R <i>root_path</i> Defines the full path name of a directory to use as the <i>root_path</i>. All files, including package system information files, are relocated to a directory tree starting in the specified <i>root_path</i>. -s <i>spool</i> Remove the specified package(s) from the directory <i>spool</i>. The default directory for spooled packages is <code>/var/sadm/pkg</code>. -v Trace all of the scripts that get executed by <code>pkgrm</code>, located in the <i>pkginst/install</i> directory. This option is used for debugging the procedural and non-procedural scripts. -V <i>fs_file</i> Specify an alternative <i>fs_file</i> to map the client's file systems. Used in situations where the <code>\$root_path/etc/vfstab</code> file is non-existent or unreliable. -Y <i>category</i> Remove packages based on the value of the <code>CATEGORY</code> parameter stored in the installed or spooled package's <code>pkginfo(4)</code> file. No package with the <code>CATEGORY</code> value of <code>system</code> can be removed from the file system with this option.														
OPERANDS	The following operand is supported: <i>pkginst</i> Specifies the package to be removed. The format <i>pkginst</i>. * can be used to remove all instances of a package. The asterisk character (*) is a special character to some shells and may need to be escaped. In the C-Shell, "*" must be surrounded by single quotes (') or preceded by a backslash (\).														
EXAMPLES	EXAMPLE 1 Removing All instances of SUNWjunk From <code>client1</code> The following example removes all instances of SUNWjunk from <code>client1</code>: <pre>example% pkgrm -R /export/root/client1 SUNWjunk*</pre>														
EXIT STATUS	The following exit values are returned: <table> <tr> <td>0</td><td>Successful completion.</td></tr> <tr> <td>1</td><td>Fatal error.</td></tr> <tr> <td>2</td><td>Warning.</td></tr> <tr> <td>3</td><td>Interruption.</td></tr> <tr> <td>4</td><td>Administration.</td></tr> <tr> <td>10</td><td>Reboot after removal of all packages.</td></tr> <tr> <td>20</td><td>Reboot after removal of this package.</td></tr> </table>	0	Successful completion.	1	Fatal error.	2	Warning.	3	Interruption.	4	Administration.	10	Reboot after removal of all packages.	20	Reboot after removal of this package.
0	Successful completion.														
1	Fatal error.														
2	Warning.														
3	Interruption.														
4	Administration.														
10	Reboot after removal of all packages.														
20	Reboot after removal of this package.														

pkgrm(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO pkginfo(1), pkgmk(1), pkgparam(1), pkgproto(1), pkgtrans(1), installf(1M), pkgadd(1M), pkgask(1M), pkgchk(1M), removef(1M), admin(4), pkginfo(4), attributes(5)

Application Packaging Developer's Guide

pmadm(1M)

NAME	pmadm – port monitor administration
SYNOPSIS	<pre>pmadm -a [-p <i>pmtag</i> -t <i>type</i>] -s <i>svctag</i> -i <i>id</i> -m <i>pmspecific</i> -v <i>ver</i> [-f <i>xu</i>] [-y <i>comment</i>] [-z <i>script</i>] pmadm -r -p <i>pmtag</i> -s <i>svctag</i> pmadm -e -p <i>pmtag</i> -s <i>svctag</i> pmadm -d -p <i>pmtag</i> -s <i>svctag</i> pmadm -l [-t <i>type</i> -p <i>pmtag</i>] [-s <i>svctag</i>] pmadm -L [-t <i>type</i> -p <i>pmtag</i>] [-s <i>svctag</i>] pmadm -g -p <i>pmtag</i> -s <i>svctag</i> [-z <i>script</i>] pmadm -g -s <i>svctag</i> -t <i>type</i> -z <i>script</i></pre>
DESCRIPTION	pmadm is the administrative command for the lower level of the Service Access Facility hierarchy, that is, for service administration. A port may have only one service associated with it although the same service may be available through more than one port. In order to uniquely identify an instance of a service, the pmadm command must identify both the port monitor or port monitors through which the service is available (-p or -t) and the service (-s). See OPTIONS. pmadm performs the following functions: ■ adds or removes a service ■ enables or disables a service ■ installs or replaces a per-service configuration script ■ prints requested service information Any user on the system may invoke pmadm to request service status (-l or -L) or to print per-service configuration scripts (-g without the -z option). pmadm with other options may be executed only by a privileged user.
OPTIONS	The following options are supported: -a Add a service. pmadm adds an entry for the new service to the port monitor's administrative file. Because of the complexity of the options and arguments that follow the -a option, it may be convenient to use a command script or the menu system to add services. -d Disable a service. Add x to the flag field in the entry for the service <i>svctag</i> in the port monitor's administrative file. This is the entry used by port monitor <i>pmtag</i>. See the -f option, below, for a description of the flags available. -e Enable a service. Remove x from the flag field in the entry for the service <i>svctag</i> in the port monitor administrative file. This is the entry used by port monitor <i>pmtag</i>. See the -f option, below, for a description of the flags available.

-f <i>xu</i>	The -f option specifies one or both of the following two flags which are then included in the flag field of the entry for the new service in the port monitor's administrative file. If the -f option is not included, no flags are set and the default conditions prevail. By default, a new service is enabled and no utmpx entry is created for it. An -f option without a following argument is illegal. <table> <tr> <td>x</td><td>Do not enable the service <i>svctag</i> available through port monitor <i>pmtag</i>.</td></tr> <tr> <td>u</td><td>Create a utmpx entry for service <i>svctag</i> available through port monitor <i>pmtag</i>.</td></tr> </table>	x	Do not enable the service <i>svctag</i> available through port monitor <i>pmtag</i> .	u	Create a utmpx entry for service <i>svctag</i> available through port monitor <i>pmtag</i> .								
x	Do not enable the service <i>svctag</i> available through port monitor <i>pmtag</i> .												
u	Create a utmpx entry for service <i>svctag</i> available through port monitor <i>pmtag</i> .												
-g	Print, install, or replace a per-service configuration script. The -g option with a -p option and a -s option prints the per-service configuration script for service <i>svctag</i> available through port monitor <i>pmtag</i> . The -g option with a -p option, a -s option, and a -z option installs the per-service configuration script contained in the file <i>script</i> as the per-service configuration script for service <i>svctag</i> available through port monitor <i>pmtag</i> . The -g option with a -s option, a -t option, and a -z option installs the file <i>script</i> as the per-service configuration script for service <i>svctag</i> available through any port monitor of type <i>type</i> . Other combinations of options with -g are invalid.												
-i <i>id</i>	<i>id</i> is the identity that is to be assigned to service <i>svctag</i> when it is started. <i>id</i> must be an entry in <i>/etc/passwd</i> .												
-l	The -l option requests service information. Used by itself and with the options described below, it provides a filter for extracting information in several different groupings. <table> <tr> <td>-l</td><td>By itself, the -l option lists all services on the system.</td></tr> <tr> <td>-l -p <i>pmtag</i></td><td>Lists all services available through port monitor <i>pmtag</i>.</td></tr> <tr> <td>-l -s <i>svctag</i></td><td>Lists all services with tag <i>svctag</i>.</td></tr> <tr> <td>-l -p <i>pmtag</i>-s<i>svctag</i></td><td>Lists service <i>svctag</i>.</td></tr> <tr> <td>-l -t <i>type</i></td><td>Lists all services available through port monitors of type <i>type</i>.</td></tr> <tr> <td>-l -t <i>type</i>-s<i>svctag</i></td><td>Lists all services with tag <i>svctag</i> available through a port monitor of type <i>type</i>.</td></tr> </table> Other combinations of options with -l are invalid.	-l	By itself, the -l option lists all services on the system.	-l -p <i>pmtag</i>	Lists all services available through port monitor <i>pmtag</i> .	-l -s <i>svctag</i>	Lists all services with tag <i>svctag</i> .	-l -p <i>pmtag</i> -s <i>svctag</i>	Lists service <i>svctag</i> .	-l -t <i>type</i>	Lists all services available through port monitors of type <i>type</i> .	-l -t <i>type</i> -s <i>svctag</i>	Lists all services with tag <i>svctag</i> available through a port monitor of type <i>type</i> .
-l	By itself, the -l option lists all services on the system.												
-l -p <i>pmtag</i>	Lists all services available through port monitor <i>pmtag</i> .												
-l -s <i>svctag</i>	Lists all services with tag <i>svctag</i> .												
-l -p <i>pmtag</i> -s <i>svctag</i>	Lists service <i>svctag</i> .												
-l -t <i>type</i>	Lists all services available through port monitors of type <i>type</i> .												
-l -t <i>type</i> -s <i>svctag</i>	Lists all services with tag <i>svctag</i> available through a port monitor of type <i>type</i> .												
-L	The -L option is identical to the -l option except that output is printed in a condensed format.												

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-m <i>pmspecific</i>	<i>pmspecific</i> is the port monitor-specific portion of the port monitor administrative file entry for the service.
-p <i>pmtag</i>	Specifies the tag associated with the port monitor through which a service (specified as -s <i>svctag</i>) is available.
-r	Remove a service. When <i>pmadm</i> removes a service, the entry for the service is removed from the port monitor's administrative file.
-s <i>svctag</i>	Specifies the service tag associated with a given service. The service tag is assigned by the system administrator and is part of the entry for the service in the port monitor's administrative file.
-t <i>type</i>	Specifies the the port monitor type.
-v <i>ver</i>	Specifies the version number of the port monitor administrative file. The version number may be given as -v ' <i>pmspec</i> -V' where <i>pmspec</i> is the special administrative command for port monitor <i>pmtag</i> . This special command is <i>ttadm</i> for <i>ttymon</i> and <i>nlsadmin</i> for <i>listen</i> . The version stamp of the port monitor is known by the command and is returned when <i>pmspec</i> is invoked with a -V option.
-y <i>comment</i>	Associate <i>comment</i> with the service entry in the port monitor administrative file.
-z <i>script</i>	Used with the -g option to specify the name of the file that contains the per-service configuration script. Modifying a configuration script is a three-step procedure. First a copy of the existing script is made (-g alone). Then the copy is edited. Finally, the copy is put in place over the existing script (-g with -z).

Options that request information write the requested information to the standard output. A request for information using the -l option prints column headers and aligns the information under the appropriate headings. In this format, a missing field is indicated by a hyphen. A request for information in the condensed format using the -L option prints the information in colon-separated fields; missing fields are indicated by two successive colons. # is the comment character.

EXAMPLES

EXAMPLE 1 Adding a Service to a Port Monitor with the Tag *pmtag*

The following command adds a service to a port monitor with tag *pmtag* and gives the service the tag *svctag*. The port monitor-specific information is generated by *specpm*. The service defined by *svctag* will be invoked with identity *root*.

```
pmadm -a -p pmtag -s svctag -i root -m 'specpm -a arg1 -b arg2' -v 'specpm -V'
```

EXAMPLE 2 Adding a Service with Service Tab `svctag`

The following command adds a service with service tag `svctag`, identity `guest`, and port monitor-specific information generated by `specpm` to all port monitors of type `type`:

```
pmadm -a -s svctag -i guest -t type -m 'specpm -a arg1 -b arg2' -v 'specpm -V'
```

EXAMPLE 3 Removing a Service

The following command removes the service `svctag` from port monitor `pmtag`:

```
pmadm -r -p pmtag -s svctag
```

EXAMPLE 4 Enabling a Service

The following command enables the service `svctag` available through port monitor `pmtag`:

```
pmadm -e -p pmtag -s svctag
```

EXAMPLE 5 Disabling a Service

The following command disables the service `svctag` available through port monitor `pmtag`:

```
pmadm -d -p pmtag -s svctag
```

EXAMPLE 6 Listing Status Information

The following command lists status information for all services:

```
pmadm -l
```

EXAMPLE 7 Listing Status Information

The following command lists status information for all services available through the port monitor with tag `ports`:

```
pmadm -l -p ports
```

EXAMPLE 8 Listing Status Information in Condensed Format

The following command lists the status information for all services available through the port monitor with tag `ports` in condensed format:

```
pmadm -L -p ports
```

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EXAMPLE 9 Listing Status Information for All Services

List status information for all services available through port monitors of type `listen`:

```
pmadm -l -t listen
```

EXAMPLE 10 Printing the per-service Configuration

The following command prints the per-service configuration script associated with the service `svctag` available through port monitor `pmtag`:

```
pmadm -g -p pmtag -s svctag
```

EXIT STATUS The following exit values are returned:

0 Successful operation.

>0 Operation failed.

FILES `/etc/saf/pmtag/_config`

`/etc/saf/pmtag/svctag`

`/var/saf/pmtag/*`

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `sac(1M)`, `sacadm(1M)`, `doconfig(3NSL)`, `attributes(5)`

NAME	pmconfig – Configure the Power Management system									
SYNOPSIS	/usr/sbin/pmconfig [-r]									
DESCRIPTION	The pmconfig utility sets the Power Management and suspend-resume configuration. User has permission to change Power Management configuration using pmconfig only if he is allowed to do so according to PMCHANGEPERM keyword of /etc/default/power. User has permission to change the suspend-resume configuration using pmconfig only if he is allowed to do so according to the CPRCHANGEPERM keyword of /etc/default/power. See FILES section below for a description of the PMCHANGEPERM and CPRCHANGEPERM keywords of /etc/default/power. Based on user permissions, pmconfig first resets the Power Management and/or suspend-resume state back to its default and then reads the new Power Management and/or suspend-resume configuration from /etc/power.conf and issues the commands to activate the new configuration. The pmconfig utility is run at system boot. This utility can also be run from the command line after manual changes have been made to the /etc/power.conf file. For editing changes made to the /etc/power.conf file to take effect, users must run pmconfig. The preferred interface for changing Power Management and suspend-resume configuration is dtpower(1M).									
OPTIONS	The following options are supported: -r Reset Power Management and suspend-resume state to default and exit. User must have both Power Management and suspend-resume configuration permission for this option.									
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Upon successful completion</td></tr><tr><td>>0</td><td>An error occurred</td></tr></table>		0	Upon successful completion	>0	An error occurred				
0	Upon successful completion									
>0	An error occurred									
FILES	<table><tr><td>/etc/power.conf</td><td>System Power Management configuration file</td></tr><tr><td>/etc/default/power</td><td>File that controls permissions for system’s Power Management and suspend-resume features. The PMCHANGEPERM keyword controls the Power Management configuration permissions, while the CPRCHANGEPERM keyword controls the suspend-resume configuration permissions.</td></tr></table> Allowed values are: <table><tr><td>all</td><td>Any user can change the configuration.</td></tr><tr><td>-</td><td>No one except super-user can change the configuration.</td></tr></table>		/etc/power.conf	System Power Management configuration file	/etc/default/power	File that controls permissions for system’s Power Management and suspend-resume features. The PMCHANGEPERM keyword controls the Power Management configuration permissions, while the CPRCHANGEPERM keyword controls the suspend-resume configuration permissions.	all	Any user can change the configuration.	-	No one except super-user can change the configuration.
/etc/power.conf	System Power Management configuration file									
/etc/default/power	File that controls permissions for system’s Power Management and suspend-resume features. The PMCHANGEPERM keyword controls the Power Management configuration permissions, while the CPRCHANGEPERM keyword controls the suspend-resume configuration permissions.									
all	Any user can change the configuration.									
-	No one except super-user can change the configuration.									

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<user1, user2, ...> A user in this user list or a super-user can change the configuration. The user list is a space and/or comma (,) separated list. You must enclose the list in < and > characters.

console-owner A user who owns the system console device node or a super-user can change the configuration.

The default values are PMCHANGEPERM=console-owner and CPRCHANGEPERM=console-owner.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpmu
Interface stability	Unstable

SEE ALSO powerd(1M), power.conf(4), attributes(5), cpr(7), pm(7D)

Using Power Management

DIAGNOSTICS If the program cannot open the configuration file, it prints an error message to standard error. If the program encounters a syntax error in the configuration file, it prints an error message and the line number of the error in the configuration file. It then skips the rest of the information on that line and processes the next line. Any configuration information already processed on the line containing the error is used. If user does not have permission to change Power Management and/or suspend-resume configuration, and configuration file has entries for which user doesn't have permission, it process the entries for which user has permissions and prints error on rest.

NAME	pntadm – DHCP network table management utility
SYNOPSIS	<pre> pntadm -C [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] <i>network</i> pntadm -A <i>name_IP_address</i> [-c <i>comment</i>] [-e <i>mm/dd/yyyy</i>] [-f <i>num</i> <i>keywords</i>] [-h <i>client_hostname</i>] [-i [-a] <i>client_ID</i>] [-m [-y] <i>macro</i>] [-s <i>server</i>] [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] <i>network</i> pntadm -M <i>name_IP_address</i> [-c <i>comment</i>] [-e <i>mm/dd/yyyy</i>] [-f <i>num</i> <i>keywords</i>] [-h <i>client_hostname</i>] [-i [-a] <i>client_ID</i>] [-m [-y] <i>macro</i>] [-n <i>new_client_IP_address</i>] [-s <i>server</i>] [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] <i>network</i> pntadm -D <i>name_IP_address</i> [-y] [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] <i>network</i> pntadm -P [-v] [-x] [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] <i>network</i> pntadm -R [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] <i>network</i> pntadm -L [-r <i>resource</i>] [-p <i>path</i>] [-u <i>uninterpreted</i>] pntadm -B [-v] [<i>batchfile</i>] </pre>
DESCRIPTION	The pntadm command is used to manage the Dynamic Host Configuration Protocol (DHCP) network tables. It is used to add and remove networks under DHCP management, and add, delete, or modify IP address records within network tables, or to view tables. For a description of the format of DHCP network tables, see dhcp_network(4). pntadm can be run as root or by other users assigned to the DHCP Management profile. See rbac(5) and user_attr(4). If the networks you want to add are subnetted, you need to update the netmasks(4) table. One of the following options (function flags) must be specified with the pntadm command: -A, -B, -C, -D, -L, -M, -P, or -R.
OPTIONS	The following options are supported: -A <i>name_IP_address</i> Add a client entry with hostname or client IP address, <i>name_IP_address</i>, to the named DHCP network table. The following sub-options are optional: -c <i>comment</i> Comment text. The default is NULL. -e <i>mm/dd/yyyy</i> Absolute lease. The default is 0. -f <i>num</i> <i>keywords</i> Flag value. The default is 00.

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The flag (-f) option can be specified either as a single number denoting the intended flag value, or as a series of the following keywords, combined using the plus (+) symbol:

DYNAMIC or 00

Server manager's assignment.

PERMANENT or 01

Lease on entry is permanent.

MANUAL or 02

Administrator managed assignment.

UNUSABLE or 04

Entry is not valid.

BOOTP or 08

Entry reserved for BOOTP clients.

For a more detailed description of the flag values, see `dhcp_network(4)`.

-h *client_hostname*

Client hostname. The default is NULL.

When the -h option is used in this mode, the *client_hostname* is added to the hosts table within the resource used for storing host names (files, NIS+ or DNS). The command will fail if this *client_hostname* is already present in the hosts table.

-i *client_ID* [-a]

Client identifier [-a]. The default is 00.

The -i option modified with -a specifies that the client identifier is in ASCII format, and thus needs to be converted to hexadecimal format before insertion into the table.

-m *macro* [-y]

Macro name. Default is UNKNOWN.

The -m option modified with -y verifies the existence of the named macro in the `dhcptab` table before adding the entry.

-s *server*

Server IP or name. Default is system name (uname -n).

-B

Activate batch mode. `pntadm` will read from the specified file or from standard input a series of `pntadm` commands and execute them within the same process. Processing many `pntadm` commands using this method is much faster than running an executable batchfile itself. Batch mode is recommended for using `pntadm` in scripts.

The following sub-option is optional:

- v
Display commands to standard output as they are processed.
- C
Create the DHCP network table for the network specified by *network*. See OPERANDS. For details, see *dhcp_network(4)* and *networks(4)*.
- D *name_IP_address*
Delete the specified client entry with hostname or client IP address, *name_IP_address*, in the named DHCP network table. (See *dhcp_network(4)*.)

The following sub-option is optional:
 - Y
Remove associated host table entry. The -y option requests that all hostnames associated with the IP address in the hosts table in the resource be removed.
- L
List the DHCP network tables presently configured, one per line, on standard output. If none are found, no output is printed and an exit status of 0 is returned.
- M *name_IP_address*
Modify the specified client entry with hostname or client IP address, *name_IP_address*, in the named DHCP network table. See *dhcp_network(4)*. The default for the sub-options is what they currently are set to.

The following sub-options are optional.
 - c *comment*
New comment text.
 - e *mm/dd/yy*
New absolute lease expiration date. Time defaults to 12:00 AM of the day specified.
 - f *num* | *keyboard*
New flag value, see explanation following the description of the -A option.
 - h *host_name*
New client hostname.

The -h option allows you to change the current *hostname* associated with the IP address or to add a new *hostname* to the hosts table if an entry associated with this IP address does not exist.
 - i *client_ID*
New client identifier [-a].
 - m *macro* [-y]
Macro name defined in *dhcptab*.
 - n *new_client_IP_address*
New IP address.

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-s *server*

New server IP or name.

For more detailed description of the sub-options and flag values, see `dhcp_network(4)`.

-P

Display the named DHCP network table.

The following sub-options are optional:

-v

Display lease time in full verbose format and resolve IP addresses for the clients and server to hostnames.

-x

Display lease time in raw format.

These flag codes are used with the **-P** sub-options:

-v	-x	Description
D	00	DYNAMIC
P	01	PERMANENT
M	02	MANUAL
U	04	UNUSABLE
B	08	BOOTP

See `dhcp_network(4)` for information on these sub-options and associated flag codes.

-p *path*

Override the `dhcpsvc.conf(4)` configuration value for data store resource path, *path* See `dhcpsvc.conf(4)`

-R

Remove the named DHCP network table. See `dhcp_network(4)`.

-r *data_store_resource*

Override the `/etc/inet/dhcpsvc.conf` configuration value for `RESOURCE=` with the *data_store_resource* specified. See the `dhcpsvc.conf(4)` man page for more details on resource type, and the *Solaris DHCP Service Developer's Guide* for more information about adding support for other data stores.

-u *uninterpreted*

Data which will be ignored by `pntadm`, but passed to the currently configured public module to be interpreted by the data store. This might be used for a database account name or other authentication or authorization parameters required by a

	particular data store.
OPERANDS	The following operand is supported: <i>network</i> The network address or network name which corresponds to the dhcp network table. See dhcp_network(4).
EXAMPLES	EXAMPLE 1 Creating a Table for the 10.0.0.0 DHCP Network The following command creates a table for the 10.0.0.0 (subnetted to class C) DHCP network table. Note that if you have an alias for this network in your networks(4) table, you can use that value rather than the dotted Internet Address notation. <pre>example# pntadm -C 10.0.0.0</pre> EXAMPLE 2 Adding an Entry to the 10.0.0.0 Table The following command adds an entry to the 10.0.0.0 table in the files resource in the /var/mydhcp directory: <pre>example# pntadm -r SUNWfiles -p /var/mydhcp -A 10.0.0.1 10.0.0.0</pre> EXAMPLE 3 Modifying the 10.0.0.1 Entry of the 10.0.0.0 Table The following command modifies the 10.0.0.1 entry of the 10.0.0.0 table, changing the macro name to Green, setting the flags field to MANUAL and PERMANENT: <pre>example# pntadm -M 10.0.0.1 -m Green -f 'PERMANENT + MANUAL' 10.0.0.0</pre> EXAMPLE 4 Changing the 10.0.0.1 Entry to 10.0.0.2 The following command changes the 10.0.0.1 entry to 10.0.0.2, making an entry in the hosts(4) table called myclient: <pre>example# pntadm -M 10.0.0.1 -n 10.0.0.2 -h myclient 10.0.0.0</pre> EXAMPLE 5 Setting the Client ID as ASCII The following command sets the client ID as ASCII aruba.foo.com for the myclient entry: <pre>example# pntadm -M myclient -i 'aruba.foo.com' -a 10.0.0.0</pre> EXAMPLE 6 Deleting the myclientEntry from the 10.0.0.0 Table The following command deletes the myclient (10.0.0.2) entry from the 10.0.0.0 table: <pre>example# pntadm -D myclient 10.0.0.0</pre>

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EXAMPLE 7 Removing the Named DHCP Network Table

The following command removes the named DHCP network table in the NIS+ directory specified:

```
example# pntadm -r SUNWnisplus -p Test.Nis.Plus. -R 10.0.0.0
```

EXAMPLE 8 Listing the Configured DHCP Network Tables

The following command lists the configured DHCP network tables:

```
example# pntadm -L
192.168.0.0
10.0.0.0
```

EXAMPLE 9 Executing pntadm Commands in Batch Mode

The following command runs a series of pntadm commands contained in a batch file:

```
example# pntadm -B addclients
```

EXIT STATUS

0	Successful completion.
1	Object already exists.
2	Object does not exist.
3	Non-critical error.
4	Critical error.

FILES

/etc/inet/dhcpsvc.conf
/etc/inet/hosts

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWdhcsu
Interface Stability	Evolving

SEE ALSO

dhcpconfig(1M), dhcpgmgr(1M), dhcp_network(4), , dhcpsvc.conf(4), dhcptab(4), hosts(4), netmasks(4), networks(4), user_attr(4), attributes(5), dhcp(5), dhcp_modules(5), rbac(5)

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System Administration Guide: IP Services

Alexander, S., and R. Droms, *DHCP Options and BOOTP Vendor Extensions*, RFC 1533, Lachman Technology, Inc., Bucknell University, October 1993.

Droms, R., *Interoperation Between DHCP and BOOTP*, RFC 1534, Bucknell University, October 1993.

Droms, R., *Dynamic Host Configuration Protocol*, RFC 1541, Bucknell University, October 1993.

Wimer, W., *Clarifications and Extensions for the Bootstrap Protocol*, RFC 1542, Carnegie Mellon University, October 1993.

pooladm(1M)

NAME	pooladm – activate and deactivate the resource pools facility
SYNOPSIS	<code>/usr/sbin/pooladm [-n] [-c <i>filename</i>] -x]</code>
DESCRIPTION	The <code>pooladm</code> command provides administrative operations on pools and sets. <code>pooladm</code> reads the specified filename and attempts to activate the pool configuration contained in it. Before updating the current pool run-time configuration, <code>pooladm</code> validates the configuration for correctness. Without options, <code>pooladm</code> prints out the current running pools configuration.
OPTIONS	The following options are supported: -c Instantiate the configuration at the given location. If a filename is not specified, it defaults to <code>/etc/pooladm.conf</code>. -n Validate the configuration without actually updating the current active files. -x Remove the currently active pool configuration. Destroy all defined resources, and return all formerly partitioned components to their default resources.
OPERANDS	The following operands are supported: <i>filename</i> Use the configuration contained within this file.
EXAMPLES	EXAMPLE 1 Instantiating a Configuration The following command instantiates the configuration contained at <code>/home/admin/newconfig</code>: <pre>example# /usr/sbin/pooladm -c /home/admin/newconfig</pre> EXAMPLE 2 Validating the Configuration Without Instantiating It The following command attempts to instantiate the configuration contained at <code>/home/admin/newconfig</code>. It displays any error conditions that it encounters, but does not actually modify the active configuration. <pre>example# /usr/sbin/pooladm -n -c /home/admin/newconfig</pre> EXAMPLE 3 Removing the Current Configuration The following command removes the current pool configuration: <pre>example# /usr/sbin/pooladm -x</pre>
FILES	<code>/etc/pooladm.conf</code>

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpool
Interface Stability	Evolving
Invocation	Unstable
Output	

SEE ALSO poolcfg(1M), poolbind(1M), libpool(3LIB), attributes(5),

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NOTES Resource bindings that are not presented in the form of a binding to a partitionable resource, such as the scheduling class, are not necessarily be modified in a pooladm -x operation.

poolbind(1M)

NAME	poolbind – bind processes, tasks, or projects or query binding of processes to resource pools
SYNOPSIS	<pre>/usr/sbin/poolbind -p poolname [-i idtype] id... /usr/sbin/poolbind -q pid... /usr/sbin/poolbind -Q pid...</pre>
DESCRIPTION	The <code>poolbind</code> command allows an authorized user to bind projects, tasks, and processes to pools. It can also allow a user to query a process to determine which pool the process is bound to.
OPTIONS	The following options are supported: <i>-i idtype</i> This option, together with the <i>idlist</i> arguments, specifies one or more processes to which the <code>poolbind</code> command is to apply. The interpretation of <i>idlist</i> depends on the value of <i>idtype</i>. The valid <i>idtype</i> arguments and corresponding interpretations of <i>idlist</i> are as follows: <i>pid</i> <i>idlist</i> is a list of process IDs. Binds the specified processes to the specified pool. This is the default behavior if no <i>idtype</i> is specified. <i>taskid</i> <i>idlist</i> is a list of task IDs. Bind all processes within the list of task IDs to the specified pool. <i>projid</i> <i>idlist</i> is a list of project IDs. Bind all processes within the list of projects to the specified pool. Each project ID can be specified as either a project name or a numerical project ID. See <code>project(4)</code>. <i>-q pid ...</i> Queries the pool bindings for a given list of process IDs. If the collection of resources associated with the process does not correspond to any currently existing pool, or if there are multiple pools with the set of resources that the process is bound to, the query fails for that particular process ID. <i>-Q pid ...</i> Queries the resource bindings for a given list of process IDs. The resource bindings are each reported on a separate line.
OPERANDS	The following operands are supported: <i>poolname</i> The name of a pool to which the specified project, tasks or processes are to be bound.

EXAMPLES**EXAMPLE 1** Binding All Processes

The following command binds all processes in projects 5 and 7 to pool web_app:

```
example# /usr/sbin/poolbind -p web_app -i projid 5 7
```

EXAMPLE 2 Binding the Running Shell

The following command binds the running shell to pool web_app:

```
example# /usr/sbin/poolbind -p web_app $$
```

EXAMPLE 3 Querying the Pool Bindings

The following command queries the bindings to verify that the shell is bound to the given pool:

```
example# /usr/sbin/poolbind -q $$
```

EXAMPLE 4 Querying the Resource Bindings

The following command queries the bindings to verify that the shell is bound to the given resources:

```
example# /usr/sbin/poolbind -Q $$
```

EXIT STATUS

The following exit values are returned:

- 0 Successful completion.
- 1 Requested operation could not be completed.
- 2 Invalid command line options were specified.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpool
Interface Stability	Evolving
Invocation	Unstable
Output	

SEE ALSO

pooladm(1M), poolcfg(1M), libpool(3LIB), project(4), attributes(5)

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poolcfg(1M)

NAME	poolcfg – create and modify resource pool configuration files
SYNOPSIS	<pre>/usr/sbin/poolcfg -c <i>command filename</i> /usr/sbin/poolcfg -f <i>command_file filename</i> /usr/sbin/poolcfg -h</pre>
DESCRIPTION	The <code>poolcfg</code> command provides configuration operations on pools and sets. These operations are performed upon an existing configuration and take the form of modifications to the specified configuration file. The special <code>discover</code> command does not require an existing configuration. Actual activation of the resulting configuration is achieved by way of the <code>pooladm(1M)</code> command. Pools configuration files are structured files that must have been constructed using <code>poolcfg</code> itself or <code>libpool(3LIB)</code> directly. The configurations which are created by this tool may be used by <code>pooladm</code> to instantiate the configuration upon a target host.
OPTIONS	The following options are supported: <code>-c <i>command</i></code> Specify <i>command</i> as an editing command. See USAGE. <code>-f <i>command_file</i></code> Take the commands from <i>command_file</i>. <i>command_file</i> consists of editing commands, one per line. <code>-h</code> Display extended information about the syntax of editing commands.
USAGE	
Scripts	A script consists of editing commands, one per line, of the following: <code>info [<i>entity-name</i>]</code> Display configuration (or specified portion) in human readable form to standard output. If no entity is specified, system information is displayed. Therefore, <code>poolcfg -c 'info' afile</code> is an equivalent invocation to <code>poolcfg -c 'info system name' afile</code>. <code>create <i>entity-name</i> [<i>property-list</i>]</code> Make an entity of the specified type and name. <code>destroy <i>entity-name</i></code> Remove the specified entity. <code>modify <i>entity-name</i> [<i>property-list</i>]</code> Change the listed properties on the named entity. <code>associate <i>pool-name</i> [<i>resource-list</i>]</code> Connect one or more resources to a pool, or replace one or more existing connections.

	discover	Create a system entity, with one pool entity and resources to match current system configuration. All discovered resources of each resource type are recorded in the file, with the single pool referring to the default resource for each resource type.
	rename <i>entity-name</i> to <i>new-name</i>	Change the name of an entity on the system to its new name.
Property Lists	The property list is specified by:	
		(proptype name = value [; proptype name = value]*)
		where the last definition in the sequence for a given proptype, name pair is the one that holds. For property deletion, use ~ proptype name.
Resource Lists	A resource list is specified by	
		(resourcetype name [; resourcetype name]*)
		where the last specification in the sequence for a resource is the one that holds. There is no deletion syntax for resource lists.
Recognized Entities	system	Machine level entity
	pool	Named collection of resource associations
Resource Types	pset	Processor set resource
Property Types	boolean	Takes one of two values true or false.
	int	A 64-bit signed integer value.
	uint	A 64-bit unsigned integer value.
	string	Strings are delimited by quotes ("), and support the character escape sequences defined in <code>formats(5)</code> .
	float	Scientific notation is not supported.
EXAMPLES	EXAMPLE 1 Creating an Initial Configuration File	
		The following command creates an initial configuration file for this host. By not supplying a file name, <code>/etc/pooladm.conf</code> is assumed.
		<pre>\$ poolcfg -c discover</pre>
	EXAMPLE 2 Creating an Initial Configuration File	
		The following command creates an initial configuration file for this host and writes it to <code>/home/admin/new_config</code> :
		<pre>\$ poolcfg -c discover /home/admin/new_config</pre>

EXAMPLE 3 Writing a poolcfg Script

The following poolcfg script creates a pool named Accounting, and a processor set, small-1. The processor set is created first, then the pool is created and associated with the set.

```
create pset small-1 ( uint pset.min = 1 ; uint pset.max = 4 )
create pool Accounting
associate pool Accounting ( pset small-1 )
```

EXAMPLE 4 Reporting on pool_0

The following command reports on pool_0 to standard output in human readable form:

```
# poolcfg -c 'info pool pool_0' /etc/pooladm.conf
```

EXAMPLE 5 Destroying pool_0 and Its Associations

The following command destroys pool_0 and associations, but not the formerly associated resources:

```
# poolcfg -c 'destroy pool pool_0' /etc/pooladm.conf
```

EXAMPLE 6 Displaying the Current Configuration

The following command displays the current configuration:

```
$ poolcfg -c 'info' /etc/pooladm.conf
system muskoka
    int system.version 1
    boolean system.bind-default true
    string system.comment Discovered by libpool

    pool pool_default
        boolean pool.default true
        boolean pool.active true
        int pool.importance 5
        string pool.comment
        string pool.scheduler FSS
        pset pset_default

    pset pset_default
        int pset.sys_id -1
        string pset.units population
        boolean pset.default true
        uint pset.max 4294967295
        uint pset.min 1
        string pset.comment
        boolean pset.escapable false
        uint pset.load 0
        uint pset.size 2

    cpu
```

EXAMPLE 6 Displaying the Current Configuration (Continued)

```

        int cpu.sys_id 0
        string cpu.comment

    cpu
        int cpu.sys_id 2
        string cpu.comment

```

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpool
Interface Stability	Evolving
Invocation	Unstable
Output	

SEE ALSO pooladm(1M), poolbind(1M), libpool(3LIB), attributes(5), formats(5)

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ports(1M)

NAME	ports – creates /dev entries and inittab entries for serial lines
SYNOPSIS	/usr/sbin/ports [-r <i>rootdir</i>]
DESCRIPTION	devfsadm(1M) is now the preferred command for /dev and /devices and should be used instead of ports. The ports command creates symbolic links in the /dev/term and /dev/cua directories to the serial-port character device files in /devices and adds new entries in /etc/inittab for non-system ports found. System-board ports are given single lower-case letters for names (such as a and b) while other ports are named numerically. ports searches the kernel device tree to find the serial devices attached to the system. It also checks /dev/term and /dev/cua to see what symbolic links to serial devices already exist. ports then performs the following: 1. Assigns new numbers (or letters for system-board ports) to ports that are attached to the system but do not have /dev/term and /dev/cua entries. The numbers or letters assigned are the lowest-unused numbers or letters. 2. Removes dangling links: links from /dev/term and /dev/cua pointing to no-longer-existing ports. 3. Creates new /dev/term and /dev/cua links for new serial devices. 4. Invokes sacadm(1M) to make new port monitor entries for the new devices. This is not done automatically for on-board ports; on workstations these ports are often not used for dial-in sessions, so a port-monitor for one of these ports must be created explicitly. If the configuration has not changed, ports exits without doing anything. ports is run each time a reconfiguration-boot is performed, or when add_drv(1M) is executed. When invoking ports manually, first run drvconfig(1M) to ensure /devices is consistent with the current device configuration.
Notice to Driver Writers	ports considers devices with a node type of DDI_NT_SERIAL, DDI_NT_SERIAL_MB, DDI_NT_SERIAL_DO, or DDI_NT_SERIAL_MB_DO to be serial port devices. Devices with one of these node types must create minor device names that obey the following conventions when calling ddi_create_minor_node(9F). ■ The minor name for non-system port devices (DDI_NT_SERIAL) consists of an ASCII numeric string, where the first port on the device is named 0, the second named 1, the third named 2, up to the number of ports provided by the device. ■ The minor name for non-system dialout devices (DDI_NT_SERIAL_DO) is the ASCII numeric port name, concatenated with ,cu. For example, the minor name for the first dialout port on the serial board is 0,cu. ■ The minor name for system-board port devices (DDI_NT_SERIAL_MB) consists of a string containing a single ASCII lowercase character, where the first port on the device is named a, the second is named b, the third is named c, for all ports on the

device (or up through port z).

- The minor name for system-board dialout devices (DDI_NT_SERIAL_MB_DO) consists of the lowercase character port name, concatenated with , cu. For example, the minor name for the first dialout port on the on-board serial device is a, cu.

To prevent disks from attempting to automatically generate links for a device, drivers must specify a private node type and refrain from using one of the above node types when calling `ddi_create_minor_node(9F)`.

OPTIONS The following options are supported:

`-r rootdir` Causes ports to presume that the `/dev/term`, `/dev/cua`, and `/devices` directories are found under *rootdir*, not directly under `/`. If this argument is specified, `sacadm(1M)` is not invoked, since it would update terminal administration files under `/etc` without regard to the *rootdir*.

EXAMPLES **EXAMPLE 1** Creating the Serial and Dialout Minor Device Nodes

The following example creates the serial and dialout minor device nodes from the `xkserial` driver's `attach(9E)` function:

```
/*
 * Create the minor number by combining the instance number
 * with the port number.
 */
#define XKNUMPORTS      8
#define XKMINORNUM(i, p) ((i) << 4 | (p))
#define XKMINORNUM_DO(i, p) ((i) << 4 | (p) | 0x80)
int
xkserialattach(dev_info_t *dip, ddi_attach_cmd_t cmd)
{
    int instance, portnum;
    char name[8];
    /* other stuff in attach... */
    instance = ddi_get_instance(dip);
    for (portnum = 0; portnum < XKNUMPORTS; portnum++) {
        /*
         * create the serial port device
         */
        sprintf(name, "%d", portnum);
        ddi_create_minor_node(dip, name, S_IFCHR,
            XKMINORNUM(instance, portnum), DDI_NT_SERIAL, 0);

        /*
         * create the dialout device
         */
        sprintf(name, "%d,cu", portnum);
        ddi_create_minor_node(dip, name, S_IFCHR,
            XKMINORNUM_DO(instance, portnum), DDI_NT_SERIAL_DO, 0);
    }
}
```

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EXAMPLE 2 Installing the xkserial Port Driver on a SPARCstation 20

The following example installs the xkserial port driver on a SPARCstation 20 (with the driver controlling the fictional XKSerial 8 port serial board) and performs a reconfiguration-boot. It creates the following special files in /devices.

```
# ls -l /devices/iommu@f,e0000000/sbus@f,e0001000/xkserial@f,800000/
crw-r----- 1 root sys  32,  16 Aug 29 00:02 xkserial@2000:0
crw-r----- 1 root sys  32, 144 Aug 29 00:02 xkserial@2000:0,cu
crw-r----- 1 root sys  32,  17 Aug 29 00:02 xkserial@2000:1
crw-r----- 1 root sys  32, 145 Aug 29 00:02 xkserial@2000:1,cu
crw-r----- 1 root sys  32,  18 Aug 29 00:02 xkserial@2000:2
crw-r----- 1 root sys  32, 146 Aug 29 00:02 xkserial@2000:2,cu
crw-r----- 1 root sys  32,  19 Aug 29 00:02 xkserial@2000:3
crw-r----- 1 root sys  32, 147 Aug 29 00:02 xkserial@2000:3,cu
crw-r----- 1 root sys  32,  20 Aug 29 00:02 xkserial@2000:4
crw-r----- 1 root sys  32, 148 Aug 29 00:02 xkserial@2000:4,cu
crw-r----- 1 root sys  32,  21 Aug 29 00:02 xkserial@2000:5
crw-r----- 1 root sys  32, 149 Aug 29 00:02 xkserial@2000:5,cu
crw-r----- 1 root sys  32,  22 Aug 29 00:02 xkserial@2000:6
crw-r----- 1 root sys  32, 150 Aug 29 00:02 xkserial@2000:6,cu
crw-r----- 1 root sys  32,  23 Aug 29 00:02 xkserial@2000:7
crw-r----- 1 root sys  32, 151 Aug 29 00:02 xkserial@2000:7,cu
```

/dev/term contain symbolic links to the serial port device nodes in /devices

```
# ls -l /dev/term
/dev/term/0 -> ../../devices/[...]/xkserial@2000:0
/dev/term/1 -> ../../devices/[...]/xkserial@2000:1
/dev/term/2 -> ../../devices/[...]/xkserial@2000:2
/dev/term/3 -> ../../devices/[...]/xkserial@2000:3
/dev/term/4 -> ../../devices/[...]/xkserial@2000:4
/dev/term/5 -> ../../devices/[...]/xkserial@2000:5
/dev/term/6 -> ../../devices/[...]/xkserial@2000:6
/dev/term/7 -> ../../devices/[...]/xkserial@2000:7
```

and /dev/cua contain symbolic links to the dialout port device nodes in /devices

```
# ls -l /dev/cua
/dev/cua/0 -> ../../devices/[...]/xkserial@2000:0,cu
/dev/cua/1 -> ../../devices/[...]/xkserial@2000:1,cu
/dev/cua/2 -> ../../devices/[...]/xkserial@2000:2,cu
/dev/cua/3 -> ../../devices/[...]/xkserial@2000:3,cu
/dev/cua/4 -> ../../devices/[...]/xkserial@2000:4,cu
/dev/cua/5 -> ../../devices/[...]/xkserial@2000:5,cu
/dev/cua/6 -> ../../devices/[...]/xkserial@2000:6,cu
/dev/cua/7 -> ../../devices/[...]/xkserial@2000:7,cu
```

FILES	/dev/term/ <i>n</i>	Logical serial port devices
	/dev/cua/ <i>n</i>	Logical dialout port devices
	/etc/inittab	
	/etc/saf/*	

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ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO add_drv(1M), devfsadm(1M), devlinks(1M), disks(1M), drvconfig(1M),
pmadm(1M), sacadm(1M), tapes(1M), attributes(5), attach(9E),
ddi_create_minor_node(9F)

Writing Device Drivers

powerd(1M)

NAME	powerd – Power manager daemon
SYNOPSIS	/usr/lib/power/powerd [-n]
DESCRIPTION	The powerd daemon is started by pmconfig(1M) to monitor system activity and perform an automatic shutdown using the suspend-resume feature. When the system is suspended, complete current state is saved on the disk before power is removed. On reboot, the system automatically starts a resume operation and the system is restored to the same state it was in immediately prior to suspend. Immediately prior to system shutdown, the daemon notifies syslogd(1M) of the shutdown, which broadcasts a notification.
OPTIONS	The following option is supported: -n No broadcast mode. The daemon silently shuts down the system without notifying syslogd(1M).
FILES	/etc/power.conf Power Management configuration information file
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpmu
Interface stability	Unstable

SEE ALSO	pmconfig(1M), dtpower(1M), syslogd(1M), power.conf(4), attributes(5), cpr(7), pm(7D)
	<i>Using Power Management</i>

NAME	pppd – point to point protocol daemon	
SYNOPSIS	pppd [<i>tty_name</i>] [<i>speed</i>] [<i>options</i>]	
DESCRIPTION	The point-to-point protocol (PPP) provides a method for transmitting datagrams over serial point-to-point links. PPP is composed of three components: a facility for encapsulating datagrams over serial links, an extensible link control protocol (LCP), and a family of network control protocols (NCP) for establishing and configuring different network-layer protocols. The encapsulation scheme is provided by driver code in the kernel. pppd provides the basic LCP authentication support and several NCPs for establishing and configuring the Internet Protocol (referred to as the IP Control Protocol or “IPCP”) and IPv6 (IPV6CP).	
OPTIONS	The following sections discuss the pppd options:	
Options Files	Options are taken from files and the command line. pppd reads options from the files /etc/ppp/options, \$HOME/.ppprc and /etc/ppp/options.<i>ttyname</i> (in that order) before processing the options on the command line. (Command-line options are scanned for the terminal name before the options.<i>ttyname</i> file is read.) To form the name of the options.<i>ttyname</i> file, the initial /dev/ is removed from the terminal name, and any remaining forward slash characters (/) are replaced with dots. For example, with serial device /dev/cua/a, option file /etc/ppp/options.cua.a is read. An options file is parsed into a series of words that are delimited by whitespace. Whitespace can be included in a word by enclosing the word in double-quotes ("). A backslash (\) quotes the succeeding character. A hash (#) starts a comment, which continues until the end of the line. There is no restriction on using the file or call options within an options file.	
Frequently Used Options	<tty_name>	Communicate over the named device. The string /dev/ is prepended if necessary. If no device name is given, or if the name of the terminal connected to the standard input is given, pppd uses that terminal and does not fork to put itself in the background. A value for this option from a privileged source cannot be overridden by a non-privileged user.
	<speed>	Set the baud rate to <speed> (a decimal number). The default is to leave the baud rate unchanged. This option is normally needed for dial-out only.
	asyncmap <map>	Set the async character map to <map>. The map describes which control characters cannot be successfully received over the serial line. pppd asks the peer to send these characters as a 2-byte escape sequence. The argument is a 32 bit hex number, with each bit representing a character to escape. Bit 0

pppd(1M)

	(00000001) represents the character 0x00; bit 31 (80000000) represents the character 0x1f or ^_. If multiple <code>asynmap</code> options are given, the values are ORed together. If no <code>asynmap</code> option is given, <code>pppd</code> attempts to negotiate a value of 0. If the peer agrees, this disables escaping of the standard control characters. Use the <code>default-asynmap</code> option to disable negotiation and escape all control characters.
<code>auth</code>	Require the peer to authenticate itself before allowing network packets to be sent or received. This option is the default if the system has a default route. If the <code>auth</code> or the <code>noauth</code> option is not specified, <code>pppd</code> allows the peer to use only those IP addresses to which the system does not already have a route.
<code>call name</code>	Read options from the file <code>/etc/ppp/peers/name</code> . This file may contain privileged options, including <code>noauth</code> , even if <code>pppd</code> is not being run by root. The <i>name</i> string may not begin with a slash ("/") or include consecutive periods (". . ") as a pathname component.
<code>callback number</code>	Request a callback to the given telephone number using Microsoft CBCP.
<code>connect script</code>	Use the executable or shell command specified by <i>script</i> to set up the serial line. This script would typically use the <code>chat(1M)</code> program to dial the modem and start the remote PPP session. A value for this option originating from a privileged source cannot be overridden by a non-privileged user.
<code>crtcts</code>	Use hardware flow control, that is, RTS/CTS, to control the flow of data on the serial port. If the <code>crtcts</code> , <code>nocrtcts</code> , <code>cdtrcts</code> or <code>nocdtrcts</code> option is not provided, the hardware flow control setting for the serial port is left unchanged. Some serial ports lack a true RTS output and use this mode to implement unidirectional flow control. The serial port suspends transmission when requested by the modem by means of CTS but cannot request the modem to stop sending to the computer. This mode allows the use of DTR as a modem control line.
<code>defaultroute</code>	Add a default route to the system routing tables when IPCP negotiation successfully completes, using the peer as the gateway. This entry is removed when the PPP connection is broken. This option is privileged if the <code>nodefaultroute</code> option is specified.

<i>disconnect script</i>	Run the executable or shell command specified by <i>script</i> after pppd terminates the link. Typically, this script is used to command the modem to hang up if hardware modem control signals are not available. <i>disconnect</i> is not run if the modem has already hung up. A value for this option originating from a privileged source cannot be overridden by a non-privileged user.
<i>escape xx,yy,...</i>	Specifies that certain characters be escaped on transmission regardless of whether the peer requests them to be escaped with its <i>async</i> control character map. The characters to be escaped are specified as a list of hex numbers separated by commas. Note that almost any character can be specified for the <i>escape</i> option, unlike the <i>asynctest</i> option which allows only control characters to be specified. Characters that cannot be escaped are those containing hex values 0x20 through 0x3f and 0x5e.
<i>file name</i>	Read options from file <i>name</i> . If this option is used on the command line or in <i>\$HOME/.ppprc</i> , the file must be readable by the user invoking pppd. See Options Files for a list of files that pppd always reads, regardless of the use of this option.
<i>init script</i>	Run the executable or shell command specified by <i>script</i> to initialize the serial line. This script would typically use the <i>chat(1M)</i> program to configure the modem to enable auto-answer. A value for this option from a privileged source cannot be overridden by a non-privileged user.
<i>lock</i>	Directs pppd to create a UUCP-style lock file for the serial device to ensure exclusive access to the device.
<i>mrul n</i>	Set the Maximum Receive Unit (MRU) value to <i>n</i> . pppd asks the peer to send packets of no more than <i>n</i> bytes. Minimum MRU value is 128. Default MRU value is 1500. A value of 296 is recommended for slow links (40 bytes for TCP/IP header + 256 bytes of data). For IPv6, MRU must be at least 1280.
<i>mtu n</i>	Set the Maximum Transmit Unit (MTU) value to <i>n</i> . Unless the peer requests a smaller value via MRU negotiation, pppd requests the kernel networking code to send data packets of no more than <i>n</i> bytes through the PPP network interface. For IPv6, MTU must be at least 1280.

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	<code>passive</code> Enables the "passive" option in the LCP. With this option, <code>pppd</code> attempts to initiate a connection; if no reply is received from the peer, <code>pppd</code> waits passively for a valid LCP packet instead of exiting, as it would without this option.
Options	<code><local_IP_address>:<remote_IP_address></code> Set the local and/or remote interface IP addresses. Either one may be omitted, but the colon is required. The IP addresses are specified with a host name or in decimal dot notation, for example: <code>:10.1.2.3</code>. The default local address is the first IP address of the system unless the <code>noipdefault</code> option is provided. The remote address is obtained from the peer if not specified in any option. Thus, in simple cases, this option is not required. If a local and/or remote IP address is specified with this option, <code>pppd</code> will not accept a different value from the peer in the IPCP negotiation unless the <code>ipcp-accept-local</code> and/or <code>ipcp-accept-remote</code> options are given, respectively. <code>allow-fcs fcs-type</code> Set allowable FCS type(s) for data sent to the peer. The <i>fcs-type</i> is a comma-separated list of "crc16", "crc32", "null", or integers. By default, all known types are allowed. If this option is specified and the peer requests a type not listed, a LCP Configure-Nak is sent to request only the listed types. <code>allow-ip address(es)</code> Allow peers to use the given IP address or subnet without authenticating themselves. The parameter is parsed in the same manner as each element of the list of allowed IP addresses is parsed in the secrets files. See the Authentication section more more details. <code>bsdcomp nr,nt</code> Request that the peer compress packets that it sends using the BSD-Compress scheme, with a maximum code size of <i>nr</i> bits, and agree to compress packets sent to the peer with a maximum code size of <i>nt</i> bits. If <i>nt</i> is not specified, it defaults to the value given for <i>nr</i>. Values in the range 9 to 15 may be used for <i>nr</i> and <i>nt</i>; larger values provide better compression but consume more kernel memory for compression dictionaries. Alternatively, a value of 0 for <i>nr</i> or <i>nt</i> disables compression in the corresponding direction. Use <code>nobsdcomp</code> or <code>bsdcomp 0</code> to disable BSD-Compress compression entirely. If this option is read from a privileged source, a nonprivileged user may not specify a code size larger than the value from the privileged source. <code>cdtrcts</code> Use a non-standard hardware flow control such as DTR/CTS to control the flow of data on the serial port. If the <code>crtsets</code>, <code>nocrtsets</code>, <code>cdtrcts</code> or <code>nocdtrcts</code> option is not specified, the hardware flow control setting for the serial port is left unchanged. Some serial ports lack a true RTS output. Such serial ports use this mode to implement true bi-directional flow control. Note that this flow control mode does not permit using DTR as a modem control line. <code>chap-interval n</code> If this option is given, <code>pppd</code> will rechallenge the peer every <i>n</i> seconds.

chap-max-challenge *n*

Set the maximum number of CHAP challenge transmissions to *n* (default 10).

chap-restart *n*

Set the CHAP restart interval (retransmission timeout for challenges) to *n* seconds. The default is 3.

connect-delay *n*

Wait for up to *n* milliseconds after the connect script finishes for a valid PPP packet from the peer. When the wait period elapses or when a valid PPP packet is received from the peer, pppd begins negotiation by sending its first LCP packet. The default value is 1000 (1 second). A wait period applies only if the `connect` or `pty` option is used.

datarate *n*

Set maximum data rate to *n* (in bytes per second) when using the `pty`, `notty`, `record`, or `socket` options.

debug

Enables connection debugging facilities. If this option is given, pppd logs the contents of all control packets sent or received in a readable form. The packets are logged through syslog with facility `daemon` and level `debug`. This information can be directed to a file by configuring `/etc/syslog.conf` appropriately.

default-asynctest

Disable asynctest negotiation, forcing all control characters to be escaped for both the transmit and the receive direction.

default-fcs

Disable FCS Alternatives negotiation entirely. By default, no FCS Alternatives option is sent to the peer, but the option is accepted. If this option is specified by the peer, then LCP Configure-Reject is sent.

default-mru

Disable MRU [Maximum Receive Unit] negotiation. With this option, pppd uses the default MRU value of 1500 bytes for the transmit and receive directions.

deflate *nr,nt,e*

Request that the peer compress packets that it sends, using the deflate scheme, with a maximum window size of 2^{*nr} bytes, and agree to compress packets sent to the peer with a maximum window size of 2^{*nt} bytes and effort level of *e* (1 to 9). If *nt* is not specified, it defaults to the value given for *nr*. If *e* is not specified, it defaults to 6. Values in the range 9 to 15 may be used for *nr* and *nt*; larger values provide better compression but consume more kernel memory for compression dictionaries. (Value 8 is not permitted due to a zlib bug.) Alternatively, a value of 0 for *nr* or *nt* disables compression in the corresponding direction. Use `nodeflate` or `deflate 0` to disable deflate compression entirely. (Note: pppd requests deflate compression in preference to BSD-Compress if the peer can do either.) If this option is read from a privileged source, a nonprivileged user may not specify a code size larger than the value from the privileged source.

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`demand`

Initiate the link only on demand, that is, when data traffic is present. With this option, the remote IP address must be specified by the user on the command line or in an options file. `pppd` initially configures and enables the interface for IP traffic without connecting to the peer. When traffic is available, `pppd` connects to the peer and performs negotiation, authentication and other actions. When completed, `pppd` passes data packets across the link. The `demand` option implies the `persist` option. If this behavior is not desired, use the `nopersist` option after the `demand` option. The `idle` and `holdoff` options can be used in conjunction with the `demand` option.

`domain d`

Append the domain name *d* to the local host name for authentication purposes. For example, if `gethostname()` returns the name `porsche`, but the fully qualified domain name is `porsche.Quotron.COM`, you could specify `domain Quotron.COM`. With this configuration, `pppd` uses the name `porsche.Quotron.COM` for accessing secrets in the secrets file and as the default name when authenticating to the peer. This option is privileged.

`endpoint endpoint-value`

Set the endpoint discriminator (normally used for RFC 1990 Multilink PPP operation). The *endpoint-value* consists of a class identifier and a class-dependent value. The class identifier is one of "null," "local," "IP," "MAC," "magic," "phone," or a decimal integer. If present, the class-dependent value is separated from the identifier by a colon (":") or period ("."). This value may be a standard dotted-decimal IP address for class "IP," an optionally colon-or-dot separated hex Ethernet address for class "MAC" (must have 6 numbers), or an arbitrary string of bytes specified in hex with optional colon or dot separators between bytes.

Although this option is available, this implementation does not support multilink.

`fcs fcs-type`

Set FCS type(s) desired for data sent by the peer. The *fcs-type* is a comma-separated list of `crc16`, `crc32`, `null`, or integers. By default, an FCS Alternatives option is not specified, and the medium-dependent FCS type is used. If this option is specified and the peer sends an LCP Configure-Nak, only the listed types are used. If none are in common, the FCS Alternatives option is omitted from the next LCP Configure-Request to drop back to the default.

`hide-password`

When logging the contents of PAP packets, this option causes `pppd` to exclude the password string from the log. This is the default.

`holdoff n`

Specifies how many seconds to wait before re-initiating the link after it terminates. This option is effective only if the `persist` or `demand` option is used. The holdoff period is not applied if the link is terminated because it was idle.

`ident string`

Set the LCP Identification string. The default value is a version string similar to that displayed by the `--version` option.

idle *n*

Specifies that pppd must disconnect if the link is idle for *n* seconds. The link is idle when no data packets (i.e. IP packets) are being sent or received. Do not use this option with the `persist` option but without the `demand` option.

ipcp-accept-local

With this option, pppd accepts the peer's idea of the local IP address, even if the local IP address is specified in an option.

ipcp-accept-remote

With this option, pppd accepts the peer's idea of its remote IP address, even if the remote IP address is specified in an option.

ipcp-max-configure *n*

Set the maximum number of IPCP Configure-Request transmissions to *n* (default 10).

ipcp-max-failure *n*

Set the maximum number of IPCP Configure-NAKs sent before sending Configure-Rejects instead to *n* (default 10).

ipcp-max-terminate *n*

Set the maximum number of IPCP terminate-request transmissions to *n* (default 3).

ipcp-restart *n*

Set the IPCP restart interval (retransmission timeout) to *n* seconds (default 3).

ipparam *string*

Provides an extra parameter to the ip-up and ip-down scripts. When this option is given, the *string* supplied is given as the sixth parameter to those scripts. See the Scripts section.

ipv6 <local_interface_identifier>, <remote_interface_identifier>

Set the local and/or remote 64-bit interface identifier. Either one may be omitted. The identifier must be specified in standard ASCII notation of IPv6 addresses (for example: ::dead:beef). If the `ipv6cp-use-ipaddr` option is given, the local and remote identifiers are derived from the respective IPv4 addresses (see above). The `ipv6cp-use-persistent` option can be used instead of the `ipv6 <local>, <remote>` option.

ipv6cp-accept-local

Accept peer's interface identifier for the local link identifier.

ipv6cp-max-configure *n*

Set the maximum number of IPv6CP Configure-Request transmissions to *n* (default 10).

ipv6cp-max-failure *n*

Set the maximum number of IPv6CP Configure-NAKs sent before sending Configure-Rejects instead to *n* (default 10).

ipv6cp-max-terminate *n*

Set the maximum number of IPv6CP terminate-request transmissions to *n* (default 3).

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ipv6cp-restart *n*

Set the IPv6CP restart interval (retransmission timeout) to *n* seconds (default 3).

ipv6cp-use-ipaddr

If either the local or remote IPv6 address is unspecified, use the corresponding configured IPv4 address as a default interface identifier. (This option uses the configured addresses, not the negotiated addresses. Do not use it with `lcp-accept-local` if the local IPv6 identifier is unspecified or with `lcp-accept-remote` if the remote IPv6 identifier is unspecified.)

ipv6cp-use-persistent

Use uniquely-available persistent value for link local address.

kdebug *n*

Enable debugging code in the kernel-level PPP driver. Argument *n* is the sum of the following values: 1 to enable general debug messages, 2 to request that contents of received packets be printed, and 4 to request contents of transmitted packets be printed. Messages printed by the kernel are logged by `syslogd(1M)` to a file directed in the `/etc/syslog.conf` configuration file. Do not use the `kdebug` option to debug failed links. Use the `debug` option instead.

lcp-echo-failure *n*

If this option is given, `pppd` presumes the peer to be dead if *n* LCP Echo-Requests are sent without receiving a valid LCP Echo-Reply. If this happens, `pppd` terminates the connection. This option requires a non-zero value for the `lcp-echo-interval` parameter. This option enables `pppd` to terminate after the physical connection is broken (for example, if the modem has hung up) in situations where no hardware modem control lines are available.

lcp-echo-interval *n*

If this option is given, `pppd` sends an LCP Echo-Request frame to the peer every *n* seconds. Normally the peer responds to the Echo-Request by sending an Echo-Reply. This option can be used with the `lcp-echo-failure` option to detect that the peer is no longer connected.

lcp-max-configure *n*

Set the maximum number of LCP Configure-Request transmissions to *n* (default 10).

lcp-max-failure *n*

Set the maximum number of LCP Configure-NAKs sent before starting to send Configure-Rejects instead to *n* (default 10).

lcp-max-terminate *n*

Set the maximum number of LCP Terminate-Request transmissions to *n* (default 3).

lcp-restart *n*

Set the LCP restart interval (retransmission timeout) to *n* seconds (default 3).

linkname *name*

Sets the logical name of the link to *name*. pppd creates a file named `ppp-name.pid` in `/var/run` containing its process ID. This is useful in determining which instance of pppd is responsible for the link to a given peer system. This is a privileged option.

local

Do not use modem control lines. With this option, pppd ignores the state of the CD (Carrier Detect) signal from the modem and does not change the state of the DTR (Data Terminal Ready) signal.

logfd *n*

Send log messages to file descriptor *n*. pppd sends log messages to (at most) one file or file descriptor (as well as sending the log messages to syslog), so this option and the `logfile` option are mutually exclusive. By default pppd sends log messages to `stdout` (file descriptor 1) unless the serial port is open on `stdout`.

logfile *filename*

Append log messages to the file *filename* (and send the log messages to syslog). The file is opened in append mode with the privileges of the user who invoked pppd.

login

Use the system password database for authenticating the peer using PAP, and record the user in the system `wtmp` file. Note that the peer must have an entry in the `/etc/ppp/pap-secrets` file and the system password database to be allowed access.

maxconnect *n*

Terminate the connection after it has been available for network traffic for *n* seconds (that is, *n* seconds after the first network control protocol starts). An LCP Time-Remaining message is sent when the first NCP starts, and again when 5, 2, and 0.5 minutes are remaining.

maxfail *n*

Terminate after *n* consecutive failed connection attempts. A value of 0 means no limit. The default value is 10.

modem

Use the modem control lines. This option is the default. With this option, pppd waits for the CD (Carrier Detect) signal from the modem to be asserted when opening the serial device (unless a connect script is specified), and drops the DTR (Data Terminal Ready) signal briefly when the connection is terminated and before executing the connect script.

ms-dns <*addr*>

If pppd is acting as a server for Microsoft Windows clients, this option allows pppd to supply one or two DNS (Domain Name Server) addresses to the clients. The first instance of this option specifies the primary DNS address; the second instance (if given) specifies the secondary DNS address. If the first instance specifies a name that resolves to multiple IP addresses, then the first two addresses are used. (This option is present in some older versions of pppd under the name `dns-addr`.)

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ms-lanman

If pppd connects as a client to a Microsoft server and uses MS-CHAPv1 for authentication, this option selects the LAN Manager password style instead of Microsoft NT.

ms-wins <addr>

If pppd acts as a server for Microsoft Windows or Samba clients, this option allows pppd to supply one or two WINS (Windows Internet Name Services) server addresses to the clients. The first instance of this option specifies the primary WINS address; the second instance (if given) specifies the secondary WINS address. As with `ms-dns`, if the name specified resolves to multiple IP addresses, then the first two will be taken as primary and secondary.

name *name*

Set the name of the local system for authentication purposes to *name*. This is a privileged option. With this option, pppd uses lines in the secrets files that have *name* as the second field to look for a secret to use in authenticating the peer. In addition, unless overridden with the `user` option, *name* is used as the name to send to the peer when authenticating the local system. (Note that pppd does not append the domain name to *name*.)

no-accm-test

Disable use of `asynmap` (ACCM) checking using LCP Echo-Request messages. If the `lcp-echo-failure` is used on an asynchronous line, pppd includes all control characters in the first *n* LCP Echo-Request messages. If the `asynmap` is set incorrectly, the link drops rather than continue operation with random failures. This option disables that feature.

noaccomp

Disable HDLC Address/Control compression in both directions (send and receive).

noauth

Do not require the peer to authenticate itself. This option is privileged.

nobsdcomp

Disables BSD-Compress compression; pppd will not request or agree to compress packets using the BSD-Compress scheme. This option is not necessary if `noccp` is specified.

noccp

Disable CCP (Compression Control Protocol) negotiation. This option should only be required if the peer has bugs or becomes confused by requests from pppd for CCP negotiation. If CCP is disabled, then BSD and deflate compression do not need to be separately disabled.

nocrtscts

Disable hardware flow control (i.e. RTS/CTS) on the serial port. If the `crtscts`, `nocrtscts`, `cdtrcts` or `nocdtrcts` options are not given, the hardware flow control setting for the serial port is left unchanged.

nocdtrcts

This option is a synonym for **nocrtscts**. Either option will disable both forms of hardware flow control.

nodefaultroute

Disable the **defaultroute** option. You can prevent non-root users from creating default routes with **pppd** by placing this option in the `/etc/ppp/options` file.

nodeflate

Disables deflate compression; **pppd** will not request or agree to compress packets using the deflate scheme. This option is not necessary if **noccp** is specified.

nodeflatedraft

Do not use Internet Draft (incorrectly assigned) algorithm number for deflate compression. This option is not necessary if **noccp** is specified.

nodetach

Do not detach from the controlling terminal. Without this option, **pppd** forks to become a background process if a serial device other than the terminal on the standard input is specified.

noendpoint

Do not send or accept the Multilink Endpoint Discriminator option.

noident

Disable use of LCP Identification. LCP Identification messages will not be sent to the peer, but received messages will be logged. (Specify this option twice to completely disable LCP Identification. In this case, **pppd** sends LCP Code-Reject in response to received LCP Identification messages.)

noip

Disable IPCP negotiation and IP communication. Use this option only if the peer has bugs or becomes confused by requests from **pppd** for IPCP negotiation.

noipv6

Disable IPv6CP negotiation and IPv6 communication. IPv6 is not enabled by default.

noipdefault

Disables the default behavior when no local IP address is specified, which is to determine (if possible) the local IP address from the hostname. With this option, the peer must supply the local IP address during IPCP negotiation (unless it specified explicitly on the command line or in an options file).

nolog

Do not send log messages to a file or file descriptor. This option cancels the **logfd** and **logfile** options. **nologfd** acts as an alias for this option.

nomagic

Disable magic number negotiation. With this option, **pppd** cannot detect a looped-back line. Use this option only if the peer has bugs. Do not use this option to work around the "Serial line is looped back" error message.

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nopam

This privileged option disables use of pluggable authentication modules. If this option is specified, pppd reverts to standard authentication mechanisms. The default is not to use PAM.

nopcomp

Disable protocol field compression negotiation in the receive and the transmit direction.

nopersist

Exit once a connection has been made and terminated. This is the default unless the persist or demand option is specified.

noplink

Cause pppd to use I_LINK instead of I_PLINK. This is the default. When I_LINK is used, the system cleans up terminated interfaces (even when SIGKILL is used) but does not allow ifconfig(1M) to unplumb PPP streams or insert or remove modules dynamically. Use the plink option if ifconfig(1M) modinsert, modremove or unplumb support is needed.

nopredictor1

Do not accept or agree to Predictor-1 compression. (This option is accepted for compatibility. The implementation does not support Predictor-1 compression.)

noproxyarp

Disable the proxyarp option. If you want to prevent users from creating proxy ARP entries with pppd, place this option in the /etc/ppp/options file.

notty

Normally, pppd requires a terminal device. With this option, pppd allocates itself a pseudo-tty master/slave pair and uses the slave as its terminal device. pppd creates a child process to act as a character shunt to transfer characters between the pseudo-tty master and its standard input and output. Thus, pppd transmits characters on its standard output and receives characters on its standard input even if they are not terminal devices. This option increases the latency and CPU overhead of transferring data over the ppp interface as all of the characters sent and received must flow through the character shunt process. An explicit device name may not be given if this option is used.

novj

Disable Van Jacobson style TCP/IP header compression in both the transmit and the receive direction.

novjccomp

Disable the connection-ID compression option in Van Jacobson style TCP/IP header compression. With this option, pppd does not omit the connection-ID byte from Van Jacobson compressed TCP/IP headers, nor does it ask the peer to do so. This option is unnecessary if novj is specified.

pam

This privileged option enables use of PAM. If this is specified, `pppd` uses the `pam(3PAM)` framework for user authentication with a service name of "ppp" if the `login` option and PAP authentication are used. The default is not to use PAM.

papcrypt

Indicates that `pppd` should not accept a password which, before encryption, is identical to the secret from the `/etc/ppp/pap-secrets` file. Use this option if the secrets in the `pap-secrets` file are in `crypt(3C)` format.

pap-max-authreq *n*

Set the maximum number of PAP authenticate-request transmissions to *n* (default 10).

pap-restart *n*

Set the PAP restart interval (retransmission timeout) to *n* seconds (default 3).

pap-timeout *n*

Set the maximum time that `pppd` waits for the peer to authenticate itself with PAP to *n* seconds (0= no limit). The default is 30 seconds.

password *string*

Password string for authentication to the peer.

persist

Do not exit after a connection is terminated; instead try to reopen the connection.

plink

Cause `pppd` to use `I_PLINK` instead of `I_LINK`. The default is to use `I_LINK`, which cleans up terminated interface (even if `SIGKILL` is used), but does not allow `ifconfig(1M)` to unplumb PPP streams or insert or remove modules dynamically. Use this option if `ifconfig(1M)` `modinsert/modremove/unplumb` support is needed. See also the `plumbed` option.

plugin *filename*

Load the shared library object file *filename* as a plugin. This is a privileged option. Unless the filename specifies an explicit path, `/etc/ppp/plugins` and `/usr/lib/inet/ppp` will be searched for the object to load in that order.

plumbed

This option indicates that `pppd` should find a plumbed interface and use that for the session. If IPv4 addresses or IPv6 interface IDs or link MTU are otherwise unspecified, they are copied from the interface selected. This mode mimics some of the functionality of the older `aspppd` implementation and may be helpful when `pppd` is used with external applications that use `ifconfig(1M)`.

pppmux *timer*

Enable PPP Multiplexing option negotiation and set transmit multiplexing timeout to *timer* microseconds.

privgroup *group-name*

Allows members of group *group-name* to use privileged options. This is a privileged option. Because there is no guarantee that members of *group-name* cannot use `pppd`

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to become root themselves, you should be careful using this option. Consider it equivalent to putting the members of *group-name* in the `root` or `sys` group.

proxyarp

Add an entry to the system's Address Resolution Protocol (ARP) table with the IP address of the peer and the Ethernet address of this system. When you use this option, the peer appears to other systems to be on the local Ethernet. The remote address on the PPP link must be in the same subnet as assigned to an Ethernet interface.

pty *script*

Specifies that the command *script*, and not a specific terminal device is used for serial communication. `pppd` allocates itself a pseudo-tty master/slave pair and uses the slave as its terminal device. *script* runs in a child process with the pseudo-tty master as its standard input and output. An explicit device name may not be given if this option is used. (Note: if the `record` option is used in conjunction with the `pty` option, the child process will have pipes on its standard input and output.)

receive-all

With this option, `pppd` accepts all control characters from the peer, including those marked in the receive `asynmap`. Without this option, `pppd` discards those characters as specified in *RFC 1662*. This option should be used only if the peer has bugs, as is often found with dial-back implementations.

record *filename*

Directs `pppd` to record all characters sent and received to a file named *filename*. *filename* is opened in append mode, using the user's user-ID and permissions. Because this option uses a pseudo-tty and a process to transfer characters between the pseudo-tty and the real serial device, it increases the latency and CPU overhead of transferring data over the PPP interface. Characters are stored in a tagged format with timestamps that can be displayed in readable form using the `pppdump(1M)` program. This option is generally used when debugging the kernel portion of `pppd` (especially CCP compression algorithms) and not for debugging link configuration problems. See the `debug` option.

remotename *name*

Set the assumed name of the remote system for authentication purposes to *name*. Microsoft WindowsNT does not provide a system name in its CHAP Challenge messages, and this option is often used to work around this problem.

refuse-chap

With this option, `pppd` will not agree to authenticate itself to the peer using standard Challenge Handshake Authentication Protocol (CHAP). (MS-CHAP is not affected.)

refuse-mschap

Do not agree to authenticate to peer with MS-CHAPv1. If this option is specified, requests for MS-CHAPv1 authentication from the peer are declined with LCP Configure-Nak. That option does not disable any other form of CHAP.

refuse-mschapv2

Do not agree to authenticate to peer with MS-CHAPv2. If specified, this option requests that MS-CHAPv2 authentication from the peer be declined with LCP Configure-Nak. That option does not disable any other form of CHAP.

refuse-pap

With this option, pppd will not agree to authenticate itself to the peer using Password Authentication Protocol (PAP).

require-chap

Require the peer to authenticate itself using standard CHAP authentication. MS-CHAP is not affected.

require-mschap

Require the peer to authenticate itself using MS-CHAPv1 authentication.

require-mschapv2

Require the peer to authenticate itself using MS-CHAPv2 authentication.

require-pap

Require the peer to authenticate itself using PAP authentication.

show-password

When logging contents of PAP packets, this option causes pppd to show the password string in the log message.

silent

With this option, pppd will not transmit LCP packets to initiate a connection until a valid LCP packet is received from the peer. This is like the “passive” option with older versions of pppd and is retained for compatibility, but the current *passive* option is preferred.

small-accm-test

When checking the *asynctest* (ACCM) setting, pppd uses all 256 possible values by default. See *no-accm-test*. This option restricts the test so that only the 32 values affected by standard ACCM negotiation are tested. This option is useful on very slow links.

socket *host:port*

Connect to given host and port using TCP and run PPP over this connection.

sync

Use synchronous HDLC serial encoding instead of asynchronous. The device used by pppd with this option must have sync support. Currently supports *zs*, *se*, and *hsi* drivers.

unit *n*

Set PPP interface unit number to *n*, if possible.

updetach

With this option, pppd detaches from its controlling terminal after establishing the PPP connection. When this is specified, messages sent to *stderr* by the connect script, usually *chat(1M)*, and debugging messages from the *debug* option are directed to pppd’s standard output.

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Obsolete Options

EXTENDED DESCRIPTION Security

usehostname	Enforce the use of the hostname with domain name appended, if given, as the name of the local system for authentication purposes. This overrides the name option. Because the name option is privileged, this option is normally not needed.
usepeerdns	Ask the peer for up to two DNS server addresses. Addresses supplied by the peer, if any, are passed to the <code>/etc/ppp/ip-up</code> script in the environment variables DNS1 and DNS2. In addition, pppd creates an <code>/etc/ppp/resolv.conf</code> file containing one or two nameserver lines with the address(es) supplied by the peer.
user <i>name</i>	Sets the name used for authenticating the local system to the peer to <i>name</i> .
vj-max-slots <i>n</i>	Sets the number of connection slots to be used by the Van Jacobson TCP/IP header compression and decompression code to <i>n</i> , which must be between 2 and 16 (inclusive).
welcome <i>script</i>	Run the executable or shell command specified by <i>script</i> before initiating PPP negotiation, after the connect script, if any, has completed. A value for this option from a privileged source cannot be overridden by a non-privileged user.
xonxoff	Use software flow control, that is, XON/XOFF, to control the flow of data on the serial port.
The following options are obsolete:	
+ua <i>name</i>	Read a PAP user name and password from the file <i>name</i> . This file must have two lines for name and password. Name and password are sent to the peer when the peer requests PAP authentication.
+ipv6	Enable IPv6 and IPv6CP without specifying interface identifiers.
--version	Show version number and exit.
--help	Show brief help message and exit.
The following sections discuss miscellaneous features of pppd:	
pppd allows system administrators to provide legitimate users with PPP access to a server machine without fear of compromising the security of the server or the network it runs on. Access control is provided by restricting IP addresses the peer may use based on its authenticated identity (if any), and through restrictions on options a non-privileged user may use. Options that permit potentially insecure configurations are privileged. Privileged options are accepted only in files that are under the control of the system administrator or when pppd is being run by root.	

By default, `pppd` allows an unauthenticated peer to use a given IP address only if the system does not already have a route to that IP address. For example, a system with a permanent connection to the wider Internet will normally have a default route, meaning all peers must authenticate themselves to set up a connection. On such a system, the `auth` option is the default. Conversely, a system with a PPP link that comprises the only connection to the Internet probably does not possess a default route, so the peer can use virtually any IP address without authenticating itself.

Security-sensitive options are privileged and cannot be accessed by a non-privileged user running `pppd`, either on the command line, in the user's `$HOME/.ppprc` file, or in an options file read using the `file` option. Privileged options may be used in `/etc/ppp/options` file or in an options file read using the `call` option. If `pppd` is run by the root user, privileged options can be used without restriction. If the `/etc/ppp/options` file does not exist, then only root may invoke `pppd`. The `/etc/ppp/options` file must be created (but may be empty) to allow ordinary non-root users to access `pppd`.

When opening the device, `pppd` uses the invoking user's user ID or the root UID (that is, 0), depending if the device name was specified by the user or the system administrator. If the device name comes from a privileged source, that is, `/etc/ppp/options` or an options file read using the `call` option, `pppd` uses full root privileges when opening the device. Thus, by creating an appropriate file under `/etc/ppp/peers`, the system administrator can allow users to establish a PPP connection via a device that they would not normally have access to. Otherwise `pppd` uses the invoking user's real UID when opening the device.

Authentication

During the authentication process, one peer convinces the other of its identity by sending its name and some secret information to the other. During authentication, the first peer becomes the "client" and the second becomes the "server." Authentication names can (but are not required to) correspond to the peer's Internet hostnames.

`pppd` supports four authentication protocols: the Password Authentication Protocol (PAP) and three forms of the Challenge Handshake Authentication Protocol (CHAP). With the PAP protocol, the client sends its name and a cleartext password to the server to authenticate itself. With CHAP, the server initiates the authentication exchange by sending a challenge to the client who must respond with its name and a hash value derived from the shared secret and the challenge.

The PPP protocol is symmetrical, meaning that each peer may be required to authenticate itself to the other. Different authentication protocols and names can be used for each exchange.

By default, `pppd` authenticates if requested and does not require authentication from the peer. However, `pppd` does not authenticate itself with a specific protocol if it has no secrets that can do so.

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pppd stores authentication secrets in the `/etc/ppp/pap-secrets` (for PAP), and `/etc/ppp/chap-secrets` (for CHAP) files. Both files use the same format. pppd uses secrets files to authenticate itself to other systems and to authenticate other systems to itself.

Secrets files contain one secret per line. Secrets are specific to a particular combination of client and server and can only be used by that client to authenticate itself to that server. Each line in a secrets file has a minimum of three fields that contain the client and server names followed by the secret. Often, these three fields are followed by IP addresses that are used by clients to connect to a server.

A secrets file is parsed into words, with client name, server name and secrets fields allocated one word each. Embedded spaces or other special characters within a word must be quoted or escaped. Case is significant in all three fields.

A secret beginning with an at sign ("@") is followed by the name of a file containing the secret. An asterisk (*) as the client or server name matches any name. When choosing a match, pppd selects the one with the fewest wildcards. Succeeding words on a line are interpreted by pppd as acceptable IP addresses for that client. IP addresses are disallowed if they appear in lines that contain only three words or lines whose first word begins with a hyphen ("-"). To allow any address, use "*". An address starting with an exclamation point ("!") indicates that the specified address is not acceptable. An address may be followed by "/" and a number *n* to indicate a whole subnet (all addresses that have the same value in the most significant *n* bits). In this form, the address may be followed by a plus sign ("+") to indicate that one address from the subnet is authorized, based on the ppp network interface unit number in use. In this case, the host part of the address is set to the unit number, plus one.

When authenticating the peer, pppd chooses a secret with the peer's name in the first field of the secrets file and the name of the local system in the second field. The local system name defaults to the hostname, with the domain name appended if the `domain` option is used. The default can be overridden with the `name` option unless the `usehostname` option is used.

When authenticating to the peer, pppd first determines the name it will use to identify itself to the peer. This name is specified with the `user` option. If the `user` option is not used, the name defaults to the host name of the local system. pppd then selects a secret from the secrets file by searching for an entry with a local name in the first field and the peer's name in the second field. pppd will know the name of the peer if standard CHAP authentication is used because the peer will have sent it in the Challenge packet. However, if MS-CHAP or PAP is being used, pppd must determine the peer's name from the options specified by the user. The user can specify the peer's name directly with the `remotename` option. Otherwise, if the remote IP address was specified by a name, rather than in numeric form, that name will be used as the peer's name. If that fails, pppd uses the null string as the peer's name.

When authenticating the peer with PAP, the supplied password is compared with data in the secrets file. If the password and secret do not match, the password is encrypted using `crypt()` and checked against the secret again. If the `papcrypt` option is given, the first unencrypted comparison is omitted for better security, and entries must thus be in encrypted `crypt(3C)` form.

If the `login` option is specified, the username and password are also checked against the system password database. This allows you to set up the `pap-secrets` file to enable PPP access only to certain users, and to restrict the set of IP addresses available to users. Typically, when using the `login` option, the secret in `/etc/ppp/pap-secrets` would be `"`, which matches any password supplied by the peer. This makes having the same secret in two places unnecessary. When `login` is used, the `pam` option enables access control through `pam(3PAM)`.

Authentication must be completed before IPCP (or other network protocol) can be started. If the peer is required to authenticate itself and fails, `pppd` closes LCP and terminates the link. If IPCP negotiates an unacceptable IP address for the remote host, IPCP is closed. IP packets are sent or received only when IPCP is open.

To allow hosts that cannot authenticate themselves to connect and use one of a restricted set of IP addresses, add a line to the `pap-secrets` file specifying the empty string for the client name and secret.

Additional `pppd` options for a given peer may be specified by placing them at the end of the secrets entry, separated by two dashes (`--`). For example

```
peername servername secret ip-address -- novj
```

Routing

When IPCP negotiation is complete, `pppd` informs the kernel of the local and remote IP addresses for the PPP interface and creates a host route to the remote end of the link that enables peers to exchange IP packets. Communication with other machines generally requires further modification to routing tables and/or Address Resolution Protocol (ARP) tables. In most cases the `defaultroute` and/or `proxyarp` options are sufficient for this, but further intervention may be necessary. If further intervention is required, use the `/etc/ppp/ip-up` script or a routing protocol daemon.

To add a default route through the remote host, use the `defaultroute` option. This option is typically used for “client” systems; that is, end-nodes that use the PPP link for access to the general Internet.

In some cases it is desirable to use proxy ARP, for example on a server machine connected to a LAN, to allow other hosts to communicate with the remote host. `proxyarp` instructs `pppd` to look for a network interface on the same subnet as the remote host. That is, an interface supporting broadcast and ARP that is not a point-to-point or loopback interface and that is currently up. If found, `pppd` creates a permanent, published ARP entry with the IP address of the remote host and the hardware address of the network interface.

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Scripts

When the demand option is used, the interface IP addresses are already set at the time when IPCP comes up. If pppd cannot negotiate the same addresses it used to configure the interface, it changes the interface IP addresses to the negotiated addresses. This may disrupt existing connections. Using demand dialing with peers that perform dynamic IP address assignment is not recommended.

pppd invokes scripts at various stages during processing that are used to perform site-specific ancillary processing. These scripts may be shell scripts or executable programs. pppd does not wait for the scripts to finish. The scripts are executed as root (with the real and effective user-id set to 0), enabling them to update routing tables, run privileged daemons, or perform other tasks. Be sure that the contents of these scripts do not compromise your system's security. pppd runs the scripts with standard input, output and error redirected to /dev/null, and with an environment that is empty except for some environment variables that give information about the link. The pppd environment variables are:

DEVICE	Name of the serial tty device.
IFNAME	Name of the network interface.
IPLOCAL	IP address for the link's local end. This is set only when IPCP has started.
IPREMOTE	IP address for the link's remote end. This is set only when IPCP has started.
PEERNAME	Authenticated name of the peer. This is set only if the peer authenticates itself.
SPEED	Baud rate of the tty device.
ORIG_UID	Real user-id of user who invoked pppd.
PPPLOGNAME	Username of the real user-id who invoked pppd. This is always set.

pppd also sets the following variables for the ip-down and auth-down scripts:

CONNECT_TIME	Number of seconds between the start of PPP negotiation and connection termination.
BYTES_SENT	Number of bytes sent at the level of the serial port during the connection.
BYTES_RCVD	Number of bytes received at the level of the serial port during the connection.
LINKNAME	Logical name of the link, set with the linkname option.

If they exist, pppd invokes the following scripts. It is not an error if they do not exist.

/etc/ppp/auth-up	Program or script executed after the remote system successfully authenticates itself. It is executed with five command-line arguments: interface-name

	peer-name user-name tty-device speed. Note that this script is not executed if the peer does not authenticate itself, for example, when the noauth option is used.
/etc/ppp/auth-down	Program or script executed when the link goes down if /etc/ppp/auth-up was previously executed. It is executed in the same manner with the same parameters as /etc/ppp/auth-up.
/etc/ppp/ip-up	A program or script that is executed when the link is available for sending and receiving IP packets (that is, IPCP has come up). It is executed with six command-line arguments: interface-name tty-device speed local-IP-address remote-IP-address ipparam.
/etc/ppp/ip-down	A program or script which is executed when the link is no longer available for sending and receiving IP packets. This script can be used for undoing the effects of the /etc/ppp/ip-up script. It is invoked in the same manner and with the same parameters as the ip-up script.
/etc/ppp/ipv6-up	Similar to /etc/ppp/ip-up, except that it is executed when the link is available for sending and receiving IPv6 packets. Executed with six command-line arguments: interface-name tty-device speed local-link-local-address remote-link-local-address ipparam.
/etc/ppp/ipv6-down	Similar to /etc/ppp/ip-down, but executed when IPv6 packets can no longer be transmitted on the link. Executed with the same parameters as the ipv6-up script.

EXAMPLES **EXAMPLE 1** Using the auth Option

The following examples assume that the /etc/ppp/options file contains the auth option.

pppd is commonly used to dial out to an ISP. You can do this using the “pppd call isp” command where the /etc/ppp/peers/isp file is set up to contain a line similar to the following:

```
cua/a 19200 crtscts connect '/usr/bin/chat -f /etc/ppp/chat-isp' noauth
```

For this example, chat(1M) is used to dial the ISP's modem and process any login sequence required. The /etc/ppp/chat-isp file is used by chat and could contain the following:

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EXAMPLE 1 Using the auth Option (Continued)

```
ABORT "NO CARRIER"
ABORT "NO DIALTONE"
ABORT "ERROR"
ABORT "NO ANSWER"
ABORT "BUSY"
ABORT "Username/Password Incorrect"
"" "at"
OK "at&f&d2&c1"
OK "atdt2468135"
"name:" "^Umyuserid"
"word:" "\qmypassword"
"ispts" "\q^Uppp"
"^^^Uppp^^"
```

See the chat(1M) man page for details of chat scripts.

EXAMPLE 2 Using pppd with proxyarp

pppd can also provide a dial-in ppp service for users. If the users already have login accounts, the simplest way to set up the ppp service is to let the users log in to their accounts and run pppd as shown in the following example:

```
example% pppd proxyarp
```

EXAMPLE 3 Providing a User with Access to PPP Facilities

To provide a user with access to the PPP facilities, allocate an IP address for the user's machine, create an entry in /etc/ppp/pap-secrets or /etc/ppp/chap-secrets. This enables the user's machine to authenticate itself. For example, to enable user "Joe" using machine "joespc" to dial in to machine "server" and use the IP address "joespc.my.net," add the following entry to the /etc/ppp/pap-secrets or /etc/ppp/chap-secrets files:

```
joespc      server      "joe's secret"      joespc.my.net
```

Alternatively, you can create another username, for example "ppp," whose login shell is /usr/bin/pppd and whose home directory is /etc/ppp. If you run pppd this way, add the options to the /etc/ppp/.ppprc file.

If your serial connection is complex, it may be useful to escape such control characters as XON (^Q) and XOFF (^S), using asyncmap a0000. If the path includes a telnet, escape ^] (asyncmap 200a0000). If the path includes a rlogin command, add escape ff option to the options, because rlogin removes the window-size-change sequence [0xff, 0xff, 0x73, 0x73, followed by any 8 bytes] from the stream.

EXIT STATUS

The pppd exit status indicates errors or specifies why a link was terminated. Exit status values are:

- 0 pppd has detached or the connection was successfully established and terminated at the peer's request.
- 1 An immediately fatal error occurred. For example, an essential system call failed.
- 2 An error was detected in the options given. For example, two mutually exclusive options were used, or `/etc/ppp/options` is missing and the user is not root.
- 3 pppd is not `setuid-root` and the invoking user is not root.
- 4 The kernel does not support PPP. For example, the PPP kernel driver is not included or cannot be loaded.
- 5 pppd terminated because it was sent a `SIGINT`, `SIGTERM` or `SIGHUP` signal.
- 6 The serial port could not be locked.
- 7 The serial port could not be opened.
- 8 The connect script failed and returned a non-zero exit status.
- 9 The command specified as the argument to the `pty` option could not be run.
- 10 The PPP negotiation failed because no network protocols were able to run.
- 11 The peer system failed or refused to authenticate itself.
- 12 The link was established successfully, but terminated because it was idle.
- 13 The link was established successfully, but terminated because the connect time limit was reached.
- 14 Callback was negotiated and an incoming call should arrive shortly.
- 15 The link was terminated because the peer is not responding to echo requests.
- 16 The link was terminated by the modem hanging up.
- 17 The PPP negotiation failed because serial loopback was detected.
- 18 The init script failed because a non-zero exit status was returned.
- 19 Authentication to the peer failed.

FILES	<code>/var/run/spppn.pid</code>	Process-ID for pppd process on PPP interface unit <i>n</i> .
	<code>/var/run/ppp-name.pid</code>	Process-ID for pppd process for logical link name (see the <code>linkname</code> option).
	<code>/etc/ppp/pap-secrets</code>	Username, passwords and IP addresses for PAP authentication. This file should be

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	owned by root and not readable or writable by any other user, otherwise pppd will log a warning.
<code>/etc/ppp/chap-secrets</code>	Names, secrets and IP addresses for all forms of CHAP authentication. The <code>/etc/ppp/pap-secrets</code> file should be owned by root should not readable or writable by any other user, otherwise, pppd will log a warning.
<code>/etc/ppp/options</code>	System default options for pppd, read before user default options or command-line options.
<code>\$HOME/.ppprc</code>	User default options, read before <code>/etc/ppp/options.ttyname</code> .
<code>/etc/ppp/options.ttyname</code>	System default options for the serial port in use; read after <code>\$HOME/.ppprc</code> . The <i>ttyname</i> component of this filename is formed when the initial <code>/dev/</code> is stripped from the port name (if present), and slashes (if any) are converted to dots.
<code>/etc/ppp/peers</code>	Directory with options files that may contain privileged options, even if pppd was invoked by a user other than root. The system administrator can create options files in this directory to permit non-privileged users to dial out without requiring the peer to authenticate, but only to certain trusted peers.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpppdu
Interface Stability	Evolving

SEE ALSO `chat(1M)`, `ifconfig(1M)`, `crypt(3C)`, `pam(3PAM)`, `attributes(5)`

Haskin, D., Allen, E. *RFC 2472 – IP Version 6 Over PPP*. Network Working Group. December 1998.

Jacobson, V. *RFC 1144, Compressing TCP/IP Headers for Low-Speed Serial Links*. Network Working Group. February, 1990

Lloyd, B., Simpson, W. *RFC 1334, PPP Authentication Protocols*. Network Working Group. October 1992.

McGregor, G. *RFC 1332, The PPP Internet Protocol Control Protocol (IPCP)*. Network Working Group. May 1992.

Rivest, R. *RFC 1321, The MD5 Message-Digest Algorithm*. Network Working Group. April 1992

Simpson, W. *RFC 1661, The Point-to-Point Protocol (PPP)*. Network Working Group. July 1994.

Simpson, W. *RFC 1662, HDLC-like Framing* . Network Working Group. July 1994.

NOTES These signals affect pppd behavior:

SIGINT, SIGTERM	Terminate the link, restore the serial device settings and exit.
SIGHUP	Terminate the link, restore the serial device settings and close the serial device. If the <code>persist</code> or <code>demand</code> option is specified, pppd attempts to reopen the serial device and start another connection after the holdoff period. Otherwise pppd exits. If received during the holdoff period, SIGHUP causes pppd to end the holdoff period immediately.
SIGUSR1	Toggles the state of the <code>debug</code> option and prints link status information to the log.
SIGUSR2	Causes pppd to renegotiate compression. This is useful to re-enable compression after it has been disabled as a result of a fatal decompression error. (Fatal decompression errors generally indicate a bug in an implementation.)

DIAGNOSTICS Messages are sent to the syslog daemon using facility `LOG_DAEMON`. To see error and debug messages, edit the `/etc/syslog.conf` file to direct the messages to the desired output device or file, or use the `updetach` or `logfile` options.

The `debug` option causes the contents of all LCP, PAP, CHAP or IPCP control packets sent or received to be logged. This is useful if PPP negotiation does not succeed or if authentication fails.

Debugging can also be enabled or disabled by sending a `SIGUSR1` signal, which acts as a toggle to the pppd process.

pppoec(1M)

NAME	pppoec – PPPoE chat utility
SYNOPSIS	pppoec [-o<i>milliseconds</i>] [-s<i>milliseconds</i>] [-v] <i>device</i> [<i>service</i> [[<i>except</i>] <i>server</i>... [<i>only</i>]]] pppoec [-o<i>milliseconds</i>] [-v] -i [<i>device</i>]
DESCRIPTION	The pppoec utility implements the client-side negotiation of PPPoE. It is intended to be used with the pppd(1M) connect option, in the same manner as the chat(1M) utility is used for asynchronous dial-up PPP. When given with the -i flag, pppoec sends out a broadcast query on the given interface named by the <i>device</i> parameter. You can specify no other arguments in this mode. All responding PPPoE servers and the offered services are displayed on standard output. Otherwise, when given without the -i flag, pppoec does the full PPPoE client-side negotiation. The <i>device</i> parameter is the intended Ethernet interface, and must already be plumbed with sppptun(1M). The optional <i>service</i> parameter specifies a particular service desired; other offered services will be ignored. The optional <i>server</i> parameter specifies a specific server desired. You can specify <i>server</i> as an Ethernet address in the usual x:x:x:x:x:x format (with "*" in any of the six byte positions interpreted to mean "any"), or as a symbolic name resolved through /etc/ethers (or NIS), or as a PPPoE access concentrator name. The sense of the match (true or false) can be inverted by specifying the keyword <i>except</i> before this string. This parameter can be specified more than once, and the first match is taken. If you specify the <i>server</i> parameter, then the selected servers become "preferred." If no preferred server responds, then the first responding server is used instead. To exclude non-matching servers entirely, append the keyword <i>only</i>.
OPTIONS	The following options are supported: -i Sends out broadcast query over interface specified by <i>device</i>. -o Sets the initial wait time in milliseconds for PADO from the server before PADI is retried. The default is 500 milliseconds for normal operation, or 3000 milliseconds (3 seconds) for inquiry (-i) mode. -s Sets the initial wait time in milliseconds for PADS from the server before PADR is retried. The default is 2000 milliseconds (2 seconds). -v Displays verbose progress messages, including all PPPoE messages sent, and all state machine transitions. You normally do not need to adjust the parameters set with -o and -s. They are provided for coping with unusually slow servers.
OPERANDS	The following operands are supported: <i>device</i> plumbed Ethernet interface

<i>server</i>	preferred server or, if you specify only, the specified server
<i>service</i>	desired service; other available services are ignored

EXAMPLES**EXAMPLE 1** Connecting to Any Service on hme0

The following command enables you to connect to any PPPoE service on hme0:

```
# /usr/bin/pppd sppptun plugin pppoe.so \
connect "/usr/lib/inet/pppoe hme0" debug
```

Often, a command such as the preceding is specified in an `/etc/ppp/peers` file instead. For example, enter the following in `/etc/ppp/peers/myisp`:

```
sppptun
plugin pppoe.so
connect "/usr/lib/inet/pppoe hme0"
debug
```

To invoke the PPP connection described in the file, enter:

```
% /usr/bin/pppd call myisp
```

Note that, because the `/etc/ppp/peers` files are considered privileged by `pppd`, you need not be root to invoke the preceding command.

EXAMPLE 2 Connecting to a Particular Service

A more complex example: on hme0, connect to only the internet service offered by PPPoE servers with access concentrator name `isp`, but not to any Ethernet addresses starting with `40:0:1a`.

```
# /usr/lib/inet/pppoe hme0 internet except 40:0:1a:*:*:* isp only
```

Note that the `except 40:0:1a:*:*:*` filter must come before `isp`, because the filters are first-match.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
>0	An error occurred.

FILES

<code>/usr/lib/inet/pppoe</code>	executable command
<code>/dev/sppptun</code>	Solaris PPP tunneling device driver.
<code>/etc/ppp/connect-errors</code>	usual location of error output (see DIAGNOSTICS , below)

pppoec(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpppdt

SEE ALSO pppd(1M), sppptun(1M), pppoe(1M), sppptun(7M)

RFC 2516, Method for Transmitting PPP Over Ethernet (PPPoE), Mamakos et al, February 1999

DIAGNOSTICS Error messages are written to standard error, which is normally redirected by pppd to /etc/ppp/connect-errors. The errors can also be redirected to pppd's standard output by using the updetach option.

If you specify the -v, verbose progress messages are displayed, including all PPPoE messages sent, and all state machine transitions. Specifying the updetach or nodetach pppd option is helpful when using verbose mode.

NAME	pppoed – PPPoE server daemon
SYNOPSIS	pppoed [<i>options</i>]
DESCRIPTION	The pppoed daemon implements the server-side negotiation of PPPoE. When a client requests service from this daemon, a copy of pppd(1M) is invoked to handle the actual PPP communication. At startup, options are read from the command line and the <code>/etc/ppp/pppoe</code> file. After these options have been read, options in the per-device <code>/etc/ppp/pppoe.device</code> files are read, using the device names specified on the command line or in <code>/etc/ppp/pppoe</code>. Device names are not permitted in the per-device files. It is not an error if any of these files are absent; missing files are ignored. Options are reread in the same order on <code>SIGHUP</code>. Except for the possibility of short delays due to the processing time, <code>SIGHUP</code> does not interfere with any client operations. Current status, including options read, is dumped to <code>/tmp/pppoed.pid</code> on <code>SIGINT</code>. The options are used to set up a list of services to be offered to PPPoE clients on the broadcast domains (Ethernet subnets) specified by the named devices. Option parsing is always in one of two modes, either global mode or service mode. The initial mode at the beginning of each file (and the command line) is global mode. Options specified in global mode serve as default values for subsequently defined services. Service mode is entered by the <code>service name</code> option. In this mode, the named option is defined. Options that appear in this mode override any global mode definitions for the current service. The option parsing follows standard shell tokenizing rules, using whitespace to delimit tokens, quotes to enclose strings that can contain whitespace, and escape sequences for special characters. Environment variables are substituted using familiar <code>\$VAR</code> and <code>\${VAR}</code> syntax and set using <code>NEWVAR=string</code>. Variables are both usable in subsequent options and provided to the pppd(1M) processes spawned for each client, but they are interpreted as they are encountered during option processing. Thus, all set variables are seen by all processes spawned; position in the configuration files has no effect on this.
OPTIONS	The pppoed daemon supports the following options: <code>client [except] client-list</code> This option restricts the clients that may receive the service. If the <code>except</code> keyword is given, then the clients on the list cannot access the service, but others can. If this keyword is not given, then only the listed clients can access the service. This option can be specified more than once for a given service. For a given client, first match among all listed options encountered specifies the handling. If it

pppoed(1M)

	matches an option with <code>except</code> specified, then access is denied. Otherwise, it is granted. The <code>client</code> list within a service is prepended to any list specified in the global context. If no <code>client</code> options are given or if all options are specified with <code>except</code>, then all clients are permitted by default. If any <code>client</code> options without <code>except</code> are specified, then no clients are permitted by default. The <i>client-list</i> is a comma-separated list of client identifiers. The match is made if any client on the list matches; thus, these are logically "ORed" together. Each client identifier can be either a symbolic name (resolved through <code>/etc/ethers</code> or NIS, as defined by <code>/etc/nsswitch.conf</code>) or a hexadecimal Ethernet address in the format <code>x:x:x:x:x:x</code>. In the latter case, any byte of the address can be "*", which matches any value in that position. For example, <code>40:0:1a:*:*:</code> matches Ethernet adapters from the manufacturer assigned block <code>40:0:1a</code>.
<code>debug</code>	Increase debug logging detail level by one. The detail levels are 0 (no logging), 1 (errors only; the default), 2 (warnings), 3 (informational messages), and 4 (debug messages). Log messages are written by default to <code>syslog(3C)</code> using facility <i>daemon</i> (see the <code>log</code> option below). When specified on the command line or in the global context of the <code>/etc/ppp/pppoe</code> file, this option also sets the daemon's default (non-service-related) detail level.
<code>device device-list</code>	Specify the devices on which the service is available. The <i>device-list</i> is a comma-separated list of logical device names (without the leading <code>/dev/</code>), such as <code>hme0</code>. This option is ignored if encountered in the per-device <code>/etc/ppp/pppoe.device</code> files.
<code>extra string</code>	Specifies extra options to <code>pppd(1M)</code>. It defaults to <code>"plugin pppoe.so directtty"</code> and usually does not need to be overridden.
<code>file path</code>	Suspends parsing of the current file, returns to global mode, and reads options from <i>path</i>. This file must be present and readable; if it is not, an error is logged. When the end of that file is reached, processing returns to the current file and the mode is reset to global again.

	The global mode options specified in files read by this command use the options set in the current file's global mode; this condition extends to any file included by those files. All files read are parsed as though the command line had specified this option, and thus inherit the command line's global modes. This option can be used to revert to global mode at any point in an option file by specifying file <code>/dev/null</code>.
<i>group name</i>	Specifies the group ID (symbolic or numeric) under which <code>pppd</code> is executed. If <code>pppoed</code> is not run as root, this option is ignored.
<i>log path</i>	Specifies an alternate debug logging file. Debug messages are sent to this file instead of <code>syslog</code> . The special name <code>syslog</code> is recognized to switch logging back to <code>syslog</code> . When specified on the command line or in the global context of the <code>/etc/ppp/pppoe</code> file, this option also sets the daemon's default (non-service-related) log file.
<i>nodebug</i>	Set debug logging detail level to 0 (no logging). When specified on the command line or in the global context of the <code>/etc/ppp/pppoe</code> file, this option also sets the daemon's default (non-service-related) detail level.
<i>nowildcard</i>	Specifies that the current service should not be included in response to clients requesting "any" service. The client must ask for this service by name. When specified on the command line or in the global context of the <code>/etc/ppp/pppoe</code> file, this option causes <code>pppoed</code> to ignore all wildcard service requests.
<i>path path</i>	Specifies the path to the <code>pppd</code> executable. Defaults to <code>/usr/bin/pppd</code> .
<i>pppd string</i>	Passes command-line arguments to <code>pppd</code> . It can be used to set the IP addresses or configure security for the session. The default value is the empty string.
<i>server string</i>	Specifies the PPPoE Access Concentrator name to be sent to the client. It defaults to "Solaris PPPoE".
<i>service name</i>	Closes any service being defined and begins definition of a new service. The same service name can be used without conflict on multiple devices. If the same service name is used on a single device, then the last definition encountered during parsing overrides all previous definitions.

pppoed(1M)

	<i>user name</i>	Specifies the user ID, symbolic or numeric, under which pppd is executed. If pppoe is not run as root, this option is ignored.												
	wildcard	Specifies that the service should be included in responses to client queries that request "any" service, which is done by requesting a service name of length zero. When specified on the command line or in the global context of the /etc/ppp/pppoe file, this option causes pppoe to ignore all wildcard service requests. This is the default.												
EXAMPLES	EXAMPLE 1 Configuring for Particular Services In the /etc/ppp/pppoe file: <pre>service internet device \$DEV pppd "proxyarp 192.168.1.1:" service debugging device hme0,\$DEV pppd "debug proxyarp 192.168.1.1:"</pre> You then invoke the daemon with: <pre>example% /usr/lib/inet/pppoe DEV=le0</pre> The lines in /etc/ppp/pppoe and the preceding command result in offering services "internet" and "debugging" (and responding to wildcard queries) on interface le0, and offering only service "debugging" on interface hme0.													
SIGNALS	The pppoe daemon responds to the following signals: <table><tr><td>SIGHUP</td><td>Causes pppoe to reparse the original command line and all configuration files, and close and reopen any log files.</td></tr><tr><td>SIGINT</td><td>Causes a snapshot of the state of the pppoe daemon to be written to /tmp/pppoe.pid (where pid is the decimal process ID of the daemon).</td></tr></table>		SIGHUP	Causes pppoe to reparse the original command line and all configuration files, and close and reopen any log files.	SIGINT	Causes a snapshot of the state of the pppoe daemon to be written to /tmp/pppoe.pid (where pid is the decimal process ID of the daemon).								
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FILES	<table><tr><td>/usr/lib/inet/pppoe</td><td>executable command</td></tr><tr><td>/dev/sppptun</td><td>Solaris PPP tunneling device driver</td></tr><tr><td>/etc/ppp/pppoe</td><td>main configuration option file</td></tr><tr><td>/etc/ppp/pppoe.device</td><td>per-device configuration option file</td></tr><tr><td>/etc/ppp/pppoe-errors</td><td>location of output from pppd's stderr</td></tr><tr><td>/etc/ppp/pppoe.if</td><td>list of Ethernet interfaces to be plumbed at boot time</td></tr></table>	/usr/lib/inet/pppoe	executable command	/dev/sppptun	Solaris PPP tunneling device driver	/etc/ppp/pppoe	main configuration option file	/etc/ppp/pppoe.device	per-device configuration option file	/etc/ppp/pppoe-errors	location of output from pppd's stderr	/etc/ppp/pppoe.if	list of Ethernet interfaces to be plumbed at boot time	
/usr/lib/inet/pppoe	executable command													
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/etc/ppp/pppoe.if	list of Ethernet interfaces to be plumbed at boot time													

pppoed(1M)

/tmp/pppoed.pid ASCII text file containing dumped pppoed state information

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpppd

SEE ALSO pppd(1M), pppoec(1M), sppptun(1M), sppptun(7M)

Mamakos, L., et al. *RFC 2516, A Method for Transmitting PPP Over Ethernet (PPPoE)*. Network Working Group. February 1999

NOTES Because pppd is installed setuid root, this daemon need not be run as root. However, if it is not run as root, the user and group options are ignored.

The Ethernet interfaces to be used must be plumbed for PPPoE using the sppptun(1M) utility before services can be offered.

The daemon operate runs even if there are no services to offer. If you want to modify a configuration, it is not necessary to terminate the daemon. Simply use `kill -HUP pppoed` after updating the configuration files.

The PPPoE protocol is far from perfect. Because it runs directly over Ethernet, there is no possibility of security and the MTU is limited to 1492 (violating RFC 1661's default value of 1500). It is also not possible to run the client and the server of a given session on a single machine with a single Ethernet interface for testing purposes. The client and server portions of a single session must be run on separate Ethernet interfaces with different MAC addresses.

pppstats(1M)

NAME	pppstats – print PPP statistics												
SYNOPSIS	pppstats [-a] [-v] [-r] [-z] [-c <count>] [-w <secs>] [<i>interface</i>]												
DESCRIPTION	The <code>pppstats</code> utility reports PPP-related statistics at regular intervals for the specified PPP interface. If the interface is unspecified, <code>pppstats</code> defaults to <code>sppp0</code> . The display is split horizontally into input and output sections containing columns of statistics describing the properties and volume of packets received and transmitted by the interface.												
OPTIONS	The <code>pppstats</code> options are: -a Display absolute values rather than deltas. With this option, all reports show statistics for the time elapsed since the link was initiated. Without this option, the second and subsequent reports show statistics for the time since the last report. -c <i>count</i> Repeat the display <i>count</i> times. If this option is not specified, the default repeat count is 1 if the -w option is not specified, otherwise infinity. -r Display additional statistics summarizing the compression ratio achieved by the packet compression algorithm in use. -v Display additional statistics relating to the performance of the Van Jacobson TCP header compression algorithm. -w <i>wait</i> Pause <i>wait</i> seconds between each display. If this option is not specified, the default interval is five seconds. -z Instead of the standard display, show statistics indicating the performance of the packet compression algorithm in use.												
EXTENDED DESCRIPTION	The following fields are printed on the input side when the -z option is not used: <table> <tr> <td>IN</td><td>Total number of bytes received by this interface.</td></tr> <tr> <td>PACK</td><td>Total number of packets received by this interface.</td></tr> <tr> <td>VJCOMP</td><td>Number of header-compressed TCP packets received by this interface.</td></tr> <tr> <td>VJUNC</td><td>Number of header-uncompressed TCP packets received by this interface. Not reported when the -r option is specified.</td></tr> <tr> <td>VJERR</td><td>Number of corrupted or bogus header-compressed TCP packets received by this interface. Not reported when the -r option is specified.</td></tr> <tr> <td>VJTOSS</td><td>Number of VJ header-compressed TCP packets dropped on reception by this interface because of preceding errors. Only reported when the -v option is specified.</td></tr> </table>	IN	Total number of bytes received by this interface.	PACK	Total number of packets received by this interface.	VJCOMP	Number of header-compressed TCP packets received by this interface.	VJUNC	Number of header-uncompressed TCP packets received by this interface. Not reported when the -r option is specified.	VJERR	Number of corrupted or bogus header-compressed TCP packets received by this interface. Not reported when the -r option is specified.	VJTOSS	Number of VJ header-compressed TCP packets dropped on reception by this interface because of preceding errors. Only reported when the -v option is specified.
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VJCOMP	Number of header-compressed TCP packets received by this interface.												
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VJERR	Number of corrupted or bogus header-compressed TCP packets received by this interface. Not reported when the -r option is specified.												
VJTOSS	Number of VJ header-compressed TCP packets dropped on reception by this interface because of preceding errors. Only reported when the -v option is specified.												

NON-VJ	Total number of non-TCP packets received by this interface. Only reported when the <code>-v</code> option is specified.
RATIO	Compression ratio achieved for received packets by the packet compression scheme in use, defined as the uncompressed size divided by the compressed size. Only reported when the <code>-r</code> option is specified.
UBYTE	Total number of bytes received, after decompression of compressed packets. Only reported when the <code>-r</code> option is specified.

The following fields are printed on the output side:

OUT	Total number of bytes transmitted from this interface.
PACK	Total number of packets transmitted from this interface.
VJCOMP	Number of TCP packets transmitted from this interface with VJ-compressed TCP headers.
VJUNC	Number of TCP packets transmitted from this interface with VJ-uncompressed TCP headers. Not reported when the <code>-r</code> option is specified.
NON-VJ	Total number of non-TCP packets transmitted from this interface. Not reported when the <code>-r</code> option is specified.
VJSRCH	Number of searches for the cached header entry for a VJ header compressed TCP packet. Only reported when the <code>-v</code> option is specified.
VJMISS	Number of failed searches for the cached header entry for a VJ header compressed TCP packet. Only reported when the <code>-v</code> option is specified.
RATIO	Compression ratio achieved for transmitted packets by the packet compression scheme in use, defined as the size before compression divided by the compressed size. Only reported when the <code>-r</code> option is specified.
UBYTE	Total number of bytes to be transmitted before packet compression is applied. Only reported when the <code>-r</code> option is specified.

When the `-z` option is specified, `pppstats` displays the following fields relating to the packet compression algorithm currently in use. If packet compression is not in use, these fields display zeroes. The fields displayed on the input side are:

COMPRESSED BYTE	Number of bytes of compressed packets received.
COMPRESSED PACK	Number of compressed packets received.

pppstats(1M)

INCOMPRESSIBLE BYTE	Number of bytes of incompressible packets (that is, those which were transmitted in uncompressed form) received.
INCOMPRESSIBLE PACK	Number of incompressible packets received.
COMP RATIO	Recent compression ratio for incoming packets, defined as the uncompressed size divided by the compressed size (including both compressible and incompressible packets).

The fields displayed on the output side are:

COMPRESSED BYTE	Number of bytes of compressed packets transmitted.
COMPRESSED PACK	Number of compressed packets transmitted.
INCOMPRESSIBLE BYTE	Number of bytes of incompressible packets received; that is, those that were transmitted by the peer in uncompressed form.
INCOMPRESSIBLE PACK	Number of incompressible packets transmitted.
COMP RATIO	Recent compression ratio for outgoing packets.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpppdu
Interface Stability	Evolving

SEE ALSO

`pppd(1M)`, `attributes(5)`

NAME	praudit – print contents of an audit trail file							
SYNOPSIS	praudit [-lrsx] [-ddel] [filename...]							
DESCRIPTION	praudit reads the listed <i>filenames</i> (or standard input, if no <i>filename</i> is specified) and interprets the data as audit trail records as defined in <code>audit.log(4)</code> . By default, times, user and group IDs (UIDs and GIDs, respectively) are converted to their ASCII representation. Record type and event fields are converted to their ASCII representation. A maximum of 100 audit files can be specified on the command line.							
OPTIONS	The following options are supported: -ddel Use <i>del</i> as the field delimiter instead of the default delimiter, which is the comma. If <i>del</i> has special meaning for the shell, it must be quoted. The maximum size of a delimiter is three characters. The delimiter is not meaningful and is not used when the -x option is specified. -l Print one line per record. -r Print records in their raw form. Times, UIDs, GIDs, record types, and events are displayed as integers. This option and the -s option are exclusive. If both are used, a format usage error message is output. -s Print records in their short form. All numeric fields are converted to ASCII and displayed. The short ASCII representations for the record type and event fields are used. This option and the -r option are exclusive. If both are used, a format usage error message is output. -x Print records in XML form. Tags are included in the output to identify tokens and fields within tokens. Output begins with a valid XML prolog, which includes identification of the DTD which can be used to parse the XML.							
FILES	/etc/security/audit_event	Audit event definition and class mappings.						
	/etc/security/audit_class	Audit class definitions.						
	/usr/share/lib/xml/dtd	Directory containing the versioned DTD file referenced in XML output, for example, <code>adt_record.dtd.1</code> .						
	/usr/share/lib/xml/style	Directory containing the versioned XSL file referenced in XML output, for example, <code>adt_record.xsl.1</code> .						
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:							
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr><tr><td>Interface Stability</td><td>See below</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu	Interface Stability	See below
ATTRIBUTE TYPE	ATTRIBUTE VALUE							
Availability	SUNWcsu							
Interface Stability	See below							

praudit(1M)

The command stability is evolving. The output format is unstable.

SEE ALSO bsmconv(1M), audit(2), getauditflags(3BSM), audit.log(4), audit_class(4), audit_event(4), group(4), passwd(4), attributes(5)

NOTES This functionality is available only if the Basic Security Module (BSM) has been enabled. See bsmconv(1M) for more information.

NAME	printmgr – Solaris Print Manager is a graphical user interface for managing printers in a network
SYNOPSIS	<code>/usr/sadm/admin/bin/printmgr</code>
DESCRIPTION	Solaris Print Manager is a Java-based graphical user interface that enables you to manage local and remote printer access. This tool can be used in the following name service environments: LDAP, NIS, NIS+, NIS+ with Federated Naming Service (FNS), and files. You must be logged in as superuser to use this tool. Using Solaris Printer Manager is the preferred method for managing printer access instead of <code>admintool:printers</code> because Solaris Print Manager centralizes printer information when it is used in a name service environment. Adding printer information to a name service makes access to printers available to all systems on the network and generally makes printer administration easier because all the information about printers is centralized. Solaris Print Manager may be run on a remote system with the display sent to the local system. See the <i>System Administration Guide: Advanced Administration</i> for instructions on setting the <code>DISPLAY</code> environment variable. Using Solaris Print Manager to perform printer-related tasks automatically updates the appropriate printer databases. Solaris Print Manager also includes a command-line console that displays the <code>lp</code> command line for the add, modify, and delete printer operations. Errors and warnings may also be displayed when Printer Manager operations are performed. Help is available by clicking the Help button.
USAGE	Solaris Print Manager enables you to do the following tasks: Select a Name Service Select a name service for retrieving or changing printer information. Add Access to a Printer Add printer access on a printer client using Solaris Print Manager. Add an Attached Printer After physically attaching the printer to a system, use Solaris Print Manager to install a local printer and make it available for printing. Add a Network Printer After physically attaching the printer to a system, use Solaris Print Manager to install a local printer and make it available for printing. Modify Printer Properties After adding access to a printer or adding an attached or network printer, you can modify certain printer attributes. Delete a Printer Delete access to a printer from the print client or delete a printer from the print server or from the name service environment.

printmgr(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWppm

SEE ALSO `ldap(1)`, `lpget(1M)`, `lpset(1M)`, `attributes(5)`

System Administration Guide: Advanced Administration

NOTES Be mindful of the following if the LDAP database is used as the name service.

1. Because the domain information for the printer being updated is extracted from the `ldapclient(1M)` configuration, the LDAP server being updated must host the same domain that is used by the current `ldapclient(1M)` server.
2. If the LDAP server being updated is a replica LDAP server, the updates will be referred to the master LDAP server and completed there. The updates might be out of sync and not appear immediately, as the replica server may not have been updated by the master server. For example, a printer that you deleted by using `lpset` may still appear in the printer list you display with `lpget` until the replica is updated from the master. Replica servers vary as to how often they are updated from the master. See *System Administration Guide: Advanced Administration* for information on LDAP server replication.
3. Although users can use the LDAP command line utilities `ldapadd(1)` and `ldapmodify(1)` to update printer entries in the directory, the preferred method is to use `lpset`. Otherwise, if the `lpadd` and `lpmodify` utilities are used, the administrator must ensure that the `printer-name` attribute value is unique within the `ou=printers` container on the LDAP server. If the value is not unique, the result of modifications done using `lpset` or the Solaris Print Manager, `printmgr(1M)` may be unpredictable.

NAME	privatepw – administer FTP Server enhanced group access file
SYNOPSIS	privatepw [-c] [-f <i>ftpgroups</i>] [-g <i>real_group_name</i>] <i>accessgroup</i> privatepw -d [-f <i>ftpgroups</i>] <i>accessgroup</i> privatepw -l [-f <i>ftpgroups</i>] privatepw -v
DESCRIPTION	The <i>privatepw</i> utility is an administrative tool to add, delete and list enhanced access group information in the <i>ftpgroups</i> file. See <i>ftpgroups</i>(4). When <i>privatepw</i> is used without options, the help usage message is displayed. The <i>privatepw</i> utility prompts for a password when adding an enhanced access group entry or modifying an existing one.
OPTIONS	The following options are supported by the <i>privatepw</i> utility: -c Create a new <i>ftpgroups</i> file for the specified <i>accessgroup</i>. -d Delete information about the specified <i>accessgroup</i> from the <i>ftpgroups</i> file. -f <i>ftpgroups</i> Use the specified <i>ftpgroups</i> file for all updates. -g <i>group</i> Set the real system group to the <i>group</i> specified. <i>group</i> is a valid group name returned by <i>getgrnam</i>(3C). If the real system group is not supplied with the -g option when adding an enhanced access group entry, the <i>privatepw</i> utility prompts for it. -l List the contents of the <i>ftpgroups</i> file. -v Display program copyright and version information, then terminate.
OPERANDS	The following operands are supported: <i>accessgroup</i> The name of the enhanced access group to create or update. It consists of an arbitrary string of alphanumeric and punctuation characters. See <i>ftpgroups</i>(4).
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.
FILES	/etc/ftpd/ftpgroups /etc/group

privatepw(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWftpu

SEE ALSO `in.ftpd(1M)`, `getgrnam(3C)`, `ftpgroups(4)`, `attributes(5)`

NAME	prodreg – Solaris Product Registry administration
SYNOPSIS	prodreg [--help] [<i>subcommand operand ...</i>]
DESCRIPTION	The prodreg utility browses, unregisters, and uninstalls components in the Solaris Product Registry. Some installers make use of the libwsreg(3LIB) interface to register information. The Solaris Product Registry contains information about this installed software. The database associated with the Solaris Product Registry is relative to the root of the installed file system. Normally, this is the root of the file system (/). Sometimes, an alternate root, with a different Solaris Product Registry install database is used, as during live upgrade installation. See live_upgrade(5). The Registry database informs installers about installed software. The Registry and the prodreg utility do not directly perform installation or deinstallation. prodreg supports installers which are executed externally and launched by the prodreg utility or other means. Depending on the subcommand, the prodreg command offers equivalent functions from the command line or a GUI viewer. Two versions of the GUI viewer are available. The default is the Java Swing GUI. The other version, the Java awt GUI is provided for environments without Java Swing support. The only feature which exists in the CLI which is not present in the GUI is the unregister subcommand. It is possible for the product registry to become corrupted, if for example, some software is removed manually instead of by means of an uninstaller program. These entries can confuse installers which are run subsequently. The unregister subcommand allows stale entries to be removed, even forcefully. Care should be exercised when unregistering software with the recursive or force options so that valid entries in the registry are not removed by mistake. The prodreg command, whether it launches the GUI or the command line interface browser, displays the contents of the registry at that time only. If software is installed or uninstalled subsequent to or concurrent with launching either prodreg viewer, the view can be inconsistent with the Solaris Product Registry.
SUBCOMMANDS	You can specify options to the prodreg command without specifying a subcommand. If the subcommand is omitted, the swing subcommand is assumed. The following subcommands are supported: awt Launch the Java awt GUI. The awt subcommand has the following format: <pre>awt [-R <i>alt_root</i> --help]</pre>

prodreg(1M)

browse

Display the Solaris Product Registry using a command line interface. The text output of this command displays identifying information of any component in the product registry tree, including its ancestors and children. If you repeatedly invoke this subcommand, you can interactively browse the product registry.

The database components are related as a tree. Components may have one or more children. Except for the root, components have one parent. This subcommand displays the ancestors and children for a given component in the Solaris Product Registry database.

Each time the `prodreg browse` subcommand is executed, one component in the Registry is shown, along with its ancestry to the root of the Registry, as well as the component's children. To browse in the `prodreg` GUI, a user selects a node to expand and clicks on it. The analogous activity using the command line interface is to browse on children of nodes successively, which effectively expands a view into the registry.

Start by browsing the root of the Registry with `prodreg browse`. Select components to expand the scope of the browsing activity. Use browse numbers as a convenience during this interactive browsing, but not in scripts. Browse numbers can change from one session to the next or on different systems. This is because browse numbers are generated as they are first used, by a given user on a particular system.

The browse subcommand has the following format:

```
browse [-R alt_root] [-u uuid [-i instance | -p location]]
browse [-R alt_root] -n bnum [-i instance | -p location]
browse [-R alt_root] -m name
browse --help
```

The following information is output for each component:

BROWSE

This is the browse number associated with each component. This number can be used as an argument to either the `prodreg browse` or `info` subcommands as a convenience

+/-/.

The + indicates a component in the tree with children who are not shown. -

indicates a component with children of which at least one child is being shown.

The . indicates a component which has no children. This field is arranged so that each space (reading left to right) depicts a successive generation.

UUID

This is the component's unique identifier.

#

This is the instance number of the component. Software components can be installed multiple times. The software registry assigns a unique instance to each one.

NAME

Each component in the Solaris Product Registry database has a localized name which is displayed in this field. It is possible that this name may not be unique in the registry since there could be another component that has the same name.

The `browse` subcommand provides four distinct options for viewing the registry database. If multiple instances are associated with the same component, then the output of the subcommand is the ambiguous list. The request must be made unambiguous. The instance or location operands can be used to disambiguate the `browse` subcommand when used with the `-u` or `-n` options.

- If no operand information is given, the root of the registry tree is displayed, as well as its children. This is the starting point for interactive browsing of the entire registry database.
- If the browse number is given, the component associated is output.
- If the `uuid` is given, the component associated with it is output.
- If the name is given, the component associated with it is output.

info

Display attributes for any component in the Solaris Product Registry by supplying identifying information for the component.

Components in the product registry are associated with attributes. These attributes are composed of a *name* and a single *value* string.

This subcommand outputs attribute information associated with components in the Solaris Product Registry. Individual components in the product registry are specified as for the `browse` subcommand, except that either the *uuid*, *name* or *bnum* must be specified.

If a component requested is ambiguous as it has more than one instance or the name is assigned to more than one component in the registry, the list of possibilities is output, not the attribute information.

The default output of this subcommand is a complete list of each attributes, each on a new line. The attribute name is followed by a colon (:) and a SPACE. The attribute value follows, after which a RETURN is appended. Other options include can be specified using `-a` and `-d`.

The `info` subcommand has the following format:

```
info --help
info [-R alt_root] -u uuid [-i instance | -p location]
info [-R alt_root] -n bnum [-i instance | -p location]
info [-R alt_root] -m name [-a attr | -d ]
```

`help | --help | -?`

Display help text.

The `help` subcommand has the following format:

```
help | --help | -?
```

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swing

Launch the Java Swing GUI. If the Java Swing GUI is not available, this subcommand fails.

The swing subcommand has the following format:

```
swing [-R alt_root | --help]
```

version | --version | -V

Outputs a current version string.

The version subcommand has the following format:

```
version | --version | -V
```

unregister

Unregister an entry in the registry.

Remove a component from the Solaris Product Registry. The component corresponding to the *uuid* specified with the *-u* option must be a single instance. If it is not, the subcommand fails and returns the list of instances with the associated *uuid*. The subcommand must be reissued using either *-p* or *-i* to uniquely determine which component instance to unregister.

The unregister subcommand fails if there are components in the registry which depend on the component which is to be unregistered.

The unregister subcommand fails if the user does not have write access to the registry. See `wsreg_can_access_registry(3WSREG)`. The unregister subcommand fails if the user attempts to unregister a system component, instead of a component registered with the Solaris Product Registry. System components include those which include the attribute `PKG` and certain special Registry nodes including the following:

UUID	Name
=====	=====
root	System Registry
a01ee8dd-1dd1-11b2-a3f2-0800209a5b6b	Solaris System Software
8f64eabf-1dd2-11b2-a3f1-0800209a5b6b	Unclassified Software
b96ae9a9-1dd1-11b2-a3f2-0800209a5b6b	System Software Localizations
b1c43601-1dd1-11b2-a3f2-0800209a5b6b	Additional System Software
a8dcab4f-1dd1-11b2-a3f2-0800209a5b6b	Software Localizations

Before the unregister subcommand with the *-f* option is used, you should carefully review what components depend upon the component which is to be unregistered. The *-r* option is even more dangerous, since all children and software components depending upon the component are also deregistered. You can obtain the list of dependent components for a component with UUID *uuid* using :

```
prodreg info -u uuid -a "Dependent Components"
```

You can obtain a list of required components using:

```
prodreg info -u <uuid> -a "Required Components"
```

The output lists the name, UUID and instance of the component.

The `unregister` subcommand has the following format:

```
unregister [-R alt_root] [-fx] -u uuid [-p location | -i instance]
unregister --help
```

uninstall

Launch an uninstaller program.

Each component in the registry can have an uninstaller associated with it. This subcommand executes this associated installer, if there is one, for a component in the registry given by the `-u` option. If there is no uninstaller associated with the component, the subcommand fails. If the component given by the `-u` option is not unique (as there is more than one instance of the component installed), the subcommand outputs a list of all instances. The subcommand must then be reissued using `-i` or `-p` to disambiguate the `uuid` given with the `-u` option. Finally, if the component to uninstall is depended upon by other components, the command fails.

The command may also launch an uninstaller with a `-x` option. No checks for whether this uninstalls a component upon which other components depend in this case.

The `uninstall` command is not executed if the user does not have write access to the registry. See `wsreg_can_access_registry(3WSREG)`.

The `uninstall` command has the following format:

```
uninstall [-R alt_root] [-f] -u uuid -p location
uninstall [-R alt_root] -i instance [arguments ...]
uninstall --help
```

OPTIONS

The `awt` subcommand supports the following options:

- `--help` Display help text, do not launch the viewer.
- `-R alt_root` Use the specified alternate root to locate the database to display with the GUI viewer.
- See OPERANDS for information regarding specification of *alt_root*.

The `browse` subcommand supports the following options:

- `-help` Display help text, do not execute the browse subcommand.
- `-i instance` Output the specified component instance.
- `-m name` Output the component instances associated with the name.
- `-n bnum` Output the component instances associated with the browse number.
- `-p location` Output the component instance installed in the specified location. The install location for a component can be obtained using the 'info' subcommand.

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-R <i>alt_root</i>	Use the specified alternate root to locate the database.
-u <i>uuid</i>	Output the component instances associated with the <i>uuid</i> .
The <code>info</code> subcommand supports the following options:	
-a <i>attr</i>	Output only the attribute whose name is given by the operand ' <i>attr</i> ', instead of all attributes of the specified component.
-d	Output only the attribute whose name is <code>isDamaged</code> , instead of all attributes of the specified component. If the value is set to <code>true</code> , this attribute indicates that the component in the registry
--help	Output help text, do not execute the <code>browse</code> subcommand.
-i <i>instance</i>	The instance operand distinguishes among multiple instances of components with the same <i>uuid</i> or browse number.
-m <i>name</i>	The name operand indicates one or more components in the registry.
-n <i>bnum</i>	Output the attributes of the component instance associated with the browse number <i>bnum</i> . If there is more than one instance, the command must be disambiguated using the <code>-i</code> or <code>-p</code> options.
-p <i>location</i>	The install location indicated distinguishes among multiple instances of components with the same <i>uuid</i> or browse number.
-R <i>alt_root</i>	Use the specified alternate root to locate the database.
-u <i>uuid</i>	Output the attributes of the component instance associated with the <i>uuid</i> . If there is more than one instance, the subcommand must be disambiguated using the <code>-i</code> or <code>-p</code> options.
The <code>swing</code> subcommand supports the following options:	
--help	Output help text, do not execute the <code>install</code> subcommand.
-R <i>alt_root</i>	Use the specified alternate root to locate the database.
The <code>uninstall</code> subcommand supports the following options:	
-f	Force the uninstall. A forced subcommand uninstalls all instances of a component, even if there are multiple ambiguous instances of the <i>uuid</i> operand.
--help	Output help text, do not execute the <code>unregister</code> subcommand.
-i <i>instance</i>	Disambiguate the <i>uuid</i> operand.
-p <i>location</i>	Disambiguate the <i>uuid</i> operand. <i>location</i> corresponds to the where the software component was installed.
-R <i>alt_root</i>	Use the specified alternate root to locate the database.

-u *uuid* Unregister the *uuid* component. If this component has been installed multiple times, the instance to unregister must be indicated unambiguously by using the **-i** or **-p** option.

The `unregister` subcommand supports the following options:

-f Force the unregistration. A forced subcommand unregisters a component even if there are other components which are dependent on this component.

--help Output help text, do not execute the `unregister` subcommand.

-i *instance* Disambiguate the *uuid* operand.

-p *location* Disambiguate the *uuid* operand. The *location* corresponds to the where the software component was installed.

-r Causes a recursive deregistration of a component as well as that component's children and dependencies.

-R *alt_root* Use the specified alternate root to locate the database.

-u *uuid* Unregister component *uuid* of the component to unregister. If this component has been installed multiple times, the instance to unregister must be indicated unambiguously by using the **-i** or **-p** option.

OPERANDS

The following operands are supported:

alt_root Pathname to a file indicating an alternate root. The Solaris Product Registry database is located relative to the alternate root. If database relative to this location does not exist, it is created.

attr Name of an attribute. This operand is used only with the `info` subcommand. If *attr* is associated with a component, the attribute name and value is displayed.

bnum The browse number.

Each component in the Solaris Product Registry is associated with a browse number. This number is generated for the convenience of an interactive user. The browse number can change if the system is rebooted or reinstalled. Do not store or use the browse number except to facilitate the `browse` and `info` subcommands. Browse numbers are always output by the `prodreg browse` subcommand. Only these values can be used as input values to the `browse` or `info` subcommand.

instance Software can be installed in more than one location. The Solaris Product Registry associates a unique instance number for each. The `browse` subcommand shows the instance number associated

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	with each component in the registry. The instance operand is used to distinguish between installed, and possibly different, copies of software, when such exist.
<i>location</i>	A path to a specific file or directory in the file system. This operand indicates the installed location of registered software. For instance, if software is installed relative to <code>/usr/local</code> the value of this operand would be <code>/usr/local</code> . The install location is used to installer or to indicate the location of an installer or to diambiguate which instance is intended, of a software component which can have multiple instances.
<i>name</i>	Each software component in the Solaris Product Registry is associated with a name. This name is output by the <code>browse</code> subcommand. Some subcommands allow the user to input the software by name as an operand as a convenience. These names might not be unique. If the user supplies an ambiguous name, for which more than one components exist, the subcommand outputs a list of possible choices. The name can be localized; depending on the language setting the name can differ.
<i>uuid</i>	Each software component in the Solaris Product Registry is associated with a unique identifier. This identifier is a handle which accesses an entry in the registry database. The uuid corresponds to the componnet irrespective of how many instances of the component have been installed, and what the localized name of the component is.

EXAMPLES

EXAMPLE 1 Using the `prodreg` Command to Browse

Browsing is performed by means of the `prodreg browse` subcommand. Using these requests iteratively, one can peruse the tree, much as one would using a GUI by expanding components which are collections of other components. Browsing using browse numbers for convenience should be done only during this iterative browsing process, since the numbers are generated as a result of the browsing operation.

Evoking the `browse` subcommand without any arguments browses from the top of the registry. The output varies depending on the software installed on a particular system.

```
$ prodreg browse
BROWSE # +/-/.  UUID                                     #  NAME
=====
1      -      root                                     1  System
                                           Registry
2      +      a01ee8dd-1dd1-11b2-a3f2-0800209a5b6b  1  Solaris 10
                                           System
                                           Software
3      +      8f64eabf-1dd2-11b2-a3f1-0800209a5b6b  1  Unclassified
                                           Software
```

EXAMPLE 1 Using the prodreg Command to Browse (Continued)

The output of this command lists the browse number, UUID, instance number and name of the root component and its children. The ancestors of a component, each parent up to the root, are also shown. The +/-. column indicates whether the component in the tree is an expanded parent (-), a child with children (+) or a child without children (.).

EXAMPLE 2 Requesting Information About the Components in a Tree

The UUID, name and browse number fields can be used to request browsing information about components in the tree. The next example shows how a component can be browsed by UUID.

```
$ prodreg browse -u a01ee8dd-1dd1-11b2-a3f2-0800209a5b6b
BROWSE # +/-. UUID # NAME
=====
1 - root 1 System
Registry
2 - a01ee8dd-1dd1-11b2-a3f2-0800209a5b6b 1 Solaris 10
System
Software
4 + b96ae9a9-1dd1-11b2-a3f2-0800209a5b6b 1 System
Software
Localizations
5 + SUNWCall 1 Entire
Distribution
```

EXAMPLE 3 Browsing a Node by Name

The following example shows how a node can be browsed by name.

```
$ prodreg browse -m "System Software Localizations"
BROWSE # +/-. UUID # NAME
=====
1 - root 1 System
Registry
2 - a01ee8dd-1dd1-11b2-a3f2-0800209a5b6b 1 Solaris 10
System
Software
4 - b96ae9a9-1dd1-11b2-a3f2-0800209a5b6b 1 System
Software
Localizations
316 . SUNWceuow 1 Central
Europe OW
Support
317 . SUNWcsfw 1 Simplified
Chinese
freeware
message
318 . SUNWceux 1 Central
Europe
64-bit OS
```

EXAMPLE 3 Browsing a Node by Name (Continued)

Support

EXAMPLE 4 Browsing Iteratively

Additional output has been omitted. As a convenience, the browse number can be used for iterative browsing. This number should not be stored, as it differs depending on which system the prodreg command is run on, which user is running the command, and the log in session in which the command is run.

```
$ prodreg browse -n 3
```

BROWSE #	+/-/.	UUID	#	NAME
1	-	root	1	System Registry
2	-	a01ee8dd-1dd1-11b2-a3f2-0800209a5b6b	1	Solaris 10 System Software
5	-	SUNWCall	1	Entire Software Distribution
6	.	SUNWrsmo	1	RSMPI Operations Registration Module
7	+	SUNWCjvx	1	JavaVM (64-bit)
8	.	SUNWrsmx	1	Remote Shared Memory (64-bit)
9	+	SUNWCacc	1	System Accounting

EXAMPLE 5 Browsing Using an Ambiguous Value

If the requested value is ambiguous, the list of ambiguous instances are displayed. In the following example, there are two distinct software components with the same name.

```
$ ./prodreg browse -m JavaVM
```

The request failed because multiple components correspond to the criteria given. Use the list of possible components given below, select one and try again.

BROWSE #	+/-/.	UUID	#	NAME
12	.	org.spybeam.javavm	1	JavaVM
51	.	SUNWCjv	1	JavaVM

Issue one of the following requests again:

EXAMPLE 5 Browsing Using an Ambiguous Value (Continued)

```
$ prodreg browse -u SUNWCjv
```

or

```
$ prodreg browse -u org.spybeam.javavm
```

EXAMPLE 6 Browsing Multiple Installations of Software

Another possible ambiguous response arises when a particular software component is installed multiple times. In the example below Example software is registered three times.

```
$ prodreg browse -m Example
```

The request failed because multiple components correspond to the criteria given. Use the list of possible components given below, select one and try again.

BROWSE #	+/-/. UUID	#	NAME
7	. org.spybeam.example	2	Example
7	. org.spybeam.example	3	Example
7	. org.spybeam.example	1	Example

The component requested could not be found.

EXAMPLE 7 Browsing Using a Particular Instance

The request can be repeated specifying a particular instance to disambiguate it. It is also possible to disambiguate a request with the `-p` option, followed by the install location. In this case, to browse the first instance of the Example software, one would use the command:

```
$ prodreg browse -u org.spybeam.example -i 1
```

EXAMPLE 8 Using the `info` Subcommand

The install location, as well as other attributes of a component can be obtained with the `info` subcommand. The `info` subcommand accepts the same disambiguating options and returns all the attributes of a component, each on a single line.

```
$ prodreg info -m Example
```

The request failed because multiple components correspond to the criteria given. Use the list of possible components given below, select one and try again.

BROWSE #	+/-/. UUID	#	NAME
7	. org.spybeam.example	2	Example
7	. org.spybeam.example	3	Example
7	. org.spybeam.example	1	Example

The component requested could not be found.

EXAMPLE 8 Using the `info` Subcommand (Continued)

This variation of the `info` subcommand outputs all information associated with instance 1 of the `Example` component. The output from this variation is not displayed

```
$ prodreg info -u org.spybeam.example -i 1
```

EXAMPLE 9 Obtaining Information on the Install Location

You can use the `info` subcommand to obtain the install location and other attributes of a component. The `info` subcommand accepts the same disambiguating options as the `browse` subcommand. It returns all the attributes of a component, each on a single line. You can also request a single attribute.

The following command outputs the value of the install location attribute:

```
$ prodreg info -n 23 -a Location
```

EXAMPLE 10 Identifying and Unregistering Damaged Software

Removing installed software without using the associated uninstaller can damage the software in the registry. A damaged component indicates that certain software is installed, when in fact it is not present. A component can be damaged by removing files or packages directly, without running the associated uninstaller. The general rule to follow is: If software has been installed by an installer program, it should be uninstalled using the supplied uninstaller program.

This example shows how to identify and repair damaged software components so that software can be reinstalled.

Browsing for `Examplesoft`, produces the following:

```
$ prodreg browse -m Examplesoft
BROWSE #  +/-.  UUID                                     #  NAME
=====  =====  =====
1          -      root                                     1  System
                                           Registry
2          +      a01ee8dd-1dd1-11b2-a3f2-0800209a5b6b  1  Solaris 10
                                           System
                                           Software
3          +      8f64eabf-1dd2-11b2-a3f1-0800209a5b6b  1  Unclassified
                                           Software
4          -      95842091-725a-8501-ef29-0472985982be  1  ExampleSoft
233         .      90209809-9785-b89e-c821-0472985982be  1  Example Doc
234         .      EXSOzzt                                1
235         .      EXSOblob                                1  Example Data
```

The `Examplesoft` child `EXSOzzt`, representing a package component of registered software does not display its name. This is likely to be because the software `Examplesoft` is damaged. Verify this with the following command:

```
$ prodreg info -u 95842091-725a-8501-ef29-0472985982be \
-i 1 -d
```


EXAMPLE 10 Identifying and Unregistering Damaged Software (Continued)

```
isDamaged=TRUE
```

Since Damaged is TRUE, some part of Examplesoft is damaged. The following command lists the packages which make up Examplesoft:

```
$ prodreg info \
  -u 95842091-725a-8501-ef29-0472985982be\
  -i 1 -a PKGS pkgs:
EXSOzzt EXSOblob
```

Use the pkginfo command to verify if EXSO is installed:

```
$ pkginfo EXSOzzt
ERROR: information for "EXSOzzt" was not found
$ pkginfo EXSOblob
application EXSOblob      Example Data
```

The output of these commands shows that the package EXSOzzt has been removed, probably with the pkgrm command. The Examplesoft software will probably not function. To repair the software, one should run the uninstaller registered with Examplesoft. You probably need to run the uninstaller with root permissions, as it unregisters the software and runs pkgrm commands. Both of these operations require root permissions.

```
# prodreg uninstall -u 95842091-725a-8501-ef29-0472985982be -i 1
The install program requested could not be found.
```

Something is wrong, or else you would be able to access uninstall program to uninstall the software.. One possibility is that the uninstaller program has been removed manually. It is possible to determine where the uninstaller is located by requesting the uninstallprogram attribute:

```
$ prodreg info -m ExampleSoft -a uninstallprogram
uninstallprogram: /usr/bin/java -mx64m -classpath
/var/sadm/prod/org.example.ExampleSoft/987573587 uninstall_ExampleSoft
```

Check to see if there is an uninstaller in the registered location.

```
# ls /var/sadm/prod/org.example.ExampleSoft/987573587
/var/sadm/prod/org.example.ExampleSoft/987573587:
No such file or directory
```

Since there is no uninstaller at the desired location, you have two options. One is to load the uninstaller from back up storage and run it manually. Use the command line stored in the registry:

```
# /usr/bin/java -mmx64m -classpath \
  /var/sadm/prod/org.example.ExampleSoft/987573587 \
  uninstall_ExampleSoft
```

If there is no other possibility, manually unregister the software.

```
# prodreg unregister -u 95842091-725a-8501-ef29-0472985982be -i 1
```

This does not remove the remaining package EXSOblob. You must do this manually.

```
# pkgrm EXSOblob
```

EXAMPLE 10 Identifying and Unregistering Damaged Software (Continued)**EXAMPLE 11** Removing Multiple Components

Component A has children B and C, and C has children D and E, and the you wish to remove all of the components at once. This is useful if the whole hierarchy has to be reinstalled and the uninstaller has been lost or cannot be run

```
$ prodreg browse -u UUID-of-C
BROWSE #  +/-.  UUID                                     #  NAME
=====  =====
1          -      root                                     1  System
                                           Registry
2          +      a01ee8dd-1dd1-11b2-a3f2-0800209a5b6b  1  Solaris 10
                                           System
                                           Software
3          +      8f64eabf-1dd2-11b2-a3f1-0800209a5b6b  1  Unclassified
                                           Software
1423       -      UUID-of-A                               1  Example A
1436       .      UUID-of-B                               1  Example B
1437       -      UUID-of-C                               1  Example C
1462       .      UUID-of-D                               1  Example D
1463       .      UUID-of-E                               1  Example E

# prodreg uninstall -u UUID-of-A -i 1
```

The `uninstall` subcommand can fail various ways, for example if the java classes have been removed, if the user has insufficient permissions or if Java software is not present on the system. The recursive unregistration subcommand is very powerful and dangerous. Not only does it unregister every child of a component, it also unregisters every component which depends upon the component to unregister. It is a good idea to view all information about the component to determine if any components will be unintentionally unregistered with `UUID-of-A`.

```
$ prodreg info -u UUID-of-A
Title: Example A Software
Version: 5.8.0.2001.11.02
Location: /usr
Vendor: Example Vendor
uninstallprogram: /usr/bin/java -mx64m -classpath
/var/sadm/prod/org.example.ExampleA/90820965 uninstall_ExampleA
vendorurl: http://www.example.org
description: Example A Software has many uses
Supported Languages: en

Child Components:
Name                               UUID                                     #
-----
Example B                          UUID-of-B                               1
Example C                          UUID-of-C                               1

Required Components:
Name                               UUID                                     #
-----
Example B                          UUID-of-B                               1
```

EXAMPLE 11 Removing Multiple Components *(Continued)*

Example C	UUID-of-C	1

No software depends on Example A, or else an additional field, Dependent Components would be shown. To further ensure that there are no surprises, one should examine the dependent components and children of UUID-of-B and UUID-of-C, all the components which depend on UUID-of-B, UUID-of-C and their children, and so on.

If you examine the browse tree, you know the entire list of descendants of UUID-of-A. You can also examine the dependent component attributes of all of Example A's descendants.

```
$ prodreg info -u UUID-of-B -i 1 -a "Dependent Components"
Dependent Components:
```

Name	UUID	#
-----		-
Example A	UUID-of-A	1

```
$ prodreg info -u UUID-of-C -i 1 -a "Dependent Components"
Dependent Components:
```

Name	UUID	#
-----		-
Example A	UUID-of-A	1

```
$ prodreg info -u UUID-of-D -i 1 -a "Dependent Components"
Dependent Components:
```

Name	UUID	#
-----		-
Example C	UUID-of-C	1

```
$ prodreg info -u UUID-of-E -i 1 -a "Dependent Components"
Dependent Components:
```

Name	UUID	#
-----		-
Example C	UUID-of-C	1

A recursive unregistration of Example A only results in unregistering Example A and its descendents, as intended.

```
# prodreg unregister -r -u UUID-of-A -i 1
```

EXAMPLE 12 Reinstalling a Damaged Component

In this example, there is a component, Software ZZZ which is depended upon by other software. Software ZZZ has been damaged and you need to reinstall it. The reinstallation is impossible until Software ZZZ is unregistered.

First, you check what depends upon Software ZZZ:

```
$ prodreg info -m "Software ZZZ" -a "Dependent Components"
Dependent Components:
```

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EXAMPLE 12 Reinstalling a Damaged Component (Continued)

Name	UUID	#
-----	-----	-
Software Foobar	d9723500-9823-1432-810c-0100e09832ff	1

Normally, you would have to uninstall Software Foobar before unregistering Software ZZZ, since Software Foobar depends on Software ZZZ. You decide that it is impossible or unreasonable to reinstall Software Foobar. Performing a recursive unregister of Software ZZZ is not an option as it would unregister Software Foobar as well. Instead you can do a forced unregister of Software ZZZ. The UUID of Software ZZZ is 90843fb1-9874-3a20-9b88-984b32098432.

```
# prodreg unregister -f -u 90843fb1-9874-3a20-9b88-984b32098432 -i 1
```

You can then reinstall Software ZZZ:

```
# /usr/bin/java -cp /usr/installers/org.example.softwarezzz
```

BUGS

The registry can become out of date because of software being manually removed, or removed using pkgrm(1M) directly. To avoid damaging the registry, use uninstall programs to remove software which was initially installed using an install program.

**ENVIRONMENT
VARIABLES**

The following environment variable affects the execution of prodreg:

PKG_INSTALL_ROOT	If present, defines the full path name of a directory to use as the system's PKG_INSTALL_ROOT path. All product and package information files are then looked for in the directory tree, starting with the specified PKG_INSTALL_ROOT path. If not present, the default system path of / is used.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
>0	An error occurred.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwsr2, SUNWwsrv
Interface Stability	Evolving

SEE ALSO

pkgadd(1M), pkgrm(1M), wsreg_can_access_registry(3WSREG), libwsreg(3LIB), live_upgrade(5), attributes(5)

Application Packaging Developer's Guide

NOTES	The prodreg GUI and command line interface view both the Solaris Product Registry and the package database. Both look like components in the registry, but some of these cannot be unregistered or uninstalled. Packages do not have an associated uninstaller, so they cannot be uninstalled using the <code>prodreg uninstall</code> subcommand. Solaris packages cannot be unregistered using the <code>prodreg unregister</code> subcommand. Packages are removed using the <code>pkgrm(1M)</code> command, after which time the packages do not appear in the GUI or CLI prodreg viewer. It is preferable to remove software using the uninstaller associated with the software installed than to remove individual packages using <code>pkgrm(1M)</code>, since the uninstaller software takes care of comprehensive removal of all resources associated with the installed software, including unregistering information in Registry and removing the appropriate packages. The <code>prodreg uninstall</code> subcommand launches an external program. The command line conventions of these programs have to be used to indicate the alternate root for the product registry. Another possibility is to use the <code>PKG_INSTALL_ROOT</code> environment variable for this purpose as the install program is executed in the same environment as prodreg. Uninstall programs are frequently java classes which require Java to be installed. If Java software has been removed or is missing from a Solaris distribution, it is impossible to run java based uninstallers. Only the <code>prodreg unregister</code> and <code>uninstall</code> subcommands can only be run with root permissions. This is because they modify the product registry in the case of <code>unregister</code>, and remove packages in the case of <code>uninstall</code>. The other operations merely read the registry and can be run with any user permissions. The <code>prodreg uninstall</code> subcommand might require root permissions as well, as installers can execute commands such as <code>pkgadd(1M)</code> or <code>pkgrm(1M)</code> which require root permissions to run. Attributes associated with components are documented in various places -primarily in the <i>Application Packaging Developer's Guide</i>. The attributes associated with the Solaris Product Registry itself are described in the following glossary. Dependent Components List of components upon which the component depends. Location The location relative to which software was installed. pkgs List of packages which correspond to the component. These packages are added with <code>pkgadd</code> after the component is registered. They are removed with <code>pkgrm</code> before the component is unregistered. Required Components List of components on which the component depends. Source Media from which the install was done. Supported Languages List of locales for which there are registered titles.

prodreg(1M)

Title

Name given by the `prodreg browse` subcommand. This name can be localized to the locale in which the shell is running.

Unique Name

Name used by previous versions of the Solaris Product Registry. This value is often set to the package name corresponding to a given component in the registry.

Vendor

Vendor who produced the component.

Version

Version string associated with the component.

The Registry can contain components which do not correspond to software actually installed on the system. This can be detected several ways. The easiest is to check using the `info` subcommand if a component is damaged. Another way is to determine where software was installed using the `info` subcommand, and verify it is still there.

NAME	projadd – administer a new project on the system
SYNOPSIS	projadd [-c <i>comment</i>] [-U <i>user</i> [, <i>user</i> ...]] [-G <i>group</i> [, <i>group</i> ...]] [-p <i>projid</i> [<i>projid</i> ...]] <i>project</i>
DESCRIPTION	projadd adds a new project entry to the /etc/project file. If the files backend is being used for the project database, the new project is available for use immediately upon the completion of the projadd command.
OPTIONS	The following options are supported: -c <i>comment</i> Add a project comment. Comments are stored in the project's entry in the /etc/project file. Generally, comments contain a short description of the project and are used as the field for the project's full name. - Specify <i>comment</i> as a text string. <i>comment</i> cannot contain a colon (:) or NEWLINE. -G <i>group</i> Make <i>group</i> a member group of project. - Specify <i>group</i> as a group ID or name. -o Enable duplication of a project ID. -p <i>projid</i> Set the project ID of the new project. - Specify <i>projid</i> as a non-negative decimal integer below UID_MAX as defined in limits.h. <i>projid</i> defaults to the next available unique number above the highest number currently assigned. For example, if <i>projids</i> 100, 105, and 200 are assigned, the next default <i>projid</i> is 201. <i>projids</i> between 0-99 are reserved by SunOS. -U Add the existing users (as specified either by user ID or name), to member users of project.
OPERANDS	The following operands are supported: <i>project</i> The name of the project to create. The <i>project</i> operand is a string consisting of characters from the set of alphabetic characters, numeric characters, underline (_), and hyphen (-). The period ('.') is reserved for projects with special meaning to the operating system. The first character of the project name must be a letter. A warning message is displayed if these restrictions are not met.
EXIT STATUS	The following exit values are returned: 0 Successful completion. 2 The command syntax was invalid. A usage message for projadd is displayed. 3 An invalid argument was provided to an option.

projadd(1M)

- 4 The *projid* given with the *-p* option is already in use.
- 5 The project files contain an error. See *project*(4).
- 6 The project to be modified, group, or user does not exist.
- 9 The project is already in use.
- 10 Cannot update the */etc/project* file.

FILES */etc/project* System project file

ATTRIBUTES See *attributes*(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWesu

SEE ALSO *projects*(1), *groupadd*(1M), *groupdel*(1M), *groupmod*(1M), *grpchk*(1M),
projdel(1M), *projmod*(1M), *useradd*(1M), *userdel*(1M), *usermod*(1M),
project(4), *attributes*(5)

NOTES In case of an error, *projadd* prints an error message and exits with a non-zero status.

projadd adds a project definition only on the local system. If a network name service such as NIS or LDAP is being used to supplement the local */etc/project* file with additional entries, *projadd* cannot change information supplied by the network name service.

NAME	projdel – delete a project from the system				
SYNOPSIS	projdel <i>project</i>				
DESCRIPTION	The projdel utility deletes a project from the system and makes the appropriate changes to the system file.				
OPERANDS	The following operands are supported: <i>project</i> The name of the project to be deleted.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. 2 The command syntax was invalid. A usage message for projdel is displayed. 3 An invalid argument was provided to an option. 4 The <i>projid</i> given with the -p option is already in use. 5 The project files contain an error. See project(4) . 6 The project to be modified, group, or user does not exist. 9 The project is already in use. 10 Cannot update the /etc/project file.				
FILES	/etc/project System project file				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWesu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWesu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWesu				
SEE ALSO	projects(1) , groupadd(1M) , groupdel(1M) , groupmod(1M) , grpchk(1M) , logins(1M) , projadd(1M) , projmod(1M) , useradd(1M) , userdel(1M) , usermod(1M) , project(4) , attributes(5)				
DIAGNOSTICS	In case of an error, projdel prints an error message and exits with a non-zero status.				
NOTES	projdel deletes a project definition only on the local system. If a network name service such as NIS or LDAP is being used to supplement the local /etc/project file with additional entries, projdel cannot change information supplied by the network name service.				

projmod(1M)

NAME	projmod – modify a project’s information on the system	
SYNOPSIS	projmod [-p <i>projid</i> [-o] [-a -r]] [-U <i>user</i> [, <i>user...</i>]] [-G <i>group</i> [, <i>group...</i>]] [-c <i>comment</i>] [-l <i>new_projectname</i>] <i>project</i>	
DESCRIPTION	The <i>projmod</i> utility modifies a project’s definition on the system. <i>projmod</i> changes the definition of the specified project and makes the appropriate project-related system file and file system changes.	
OPTIONS	The following options are supported: -c <i>comment</i> Specify <i>comment</i> as a text string. Generally, <i>comment</i> contains a short description of the project. This information is stored in the project’s <i>/etc/project</i> entry. -G <i>group</i> [,<i>group...</i>] Specify a replacement list of member groups of the project, or with -a or -r, a list of groups to be added or removed from the project. -l <i>new_projectname</i> Specify the new project name for the project. The <i>new_projectname</i> argument is a string consisting of characters from the set of alphabetic characters, numeric characters, period (.), underline (_), and hyphen (-). The first character should be alphabetic. A warning message is written if these restrictions are not met. -o This option allows the specified project ID to be duplicated (non-unique). -a This option specifies that the users or groups specified by the -U or -G flags should be added to the project, rather than replacing the existing member list. -r This option specifies that the users or groups specified by the -U or -G flags should be removed from the project, rather than replacing the existing member list. -p <i>projid</i> Specify a new project ID for the project. It must be a non-negative decimal integer less than MAXUID as defined in <i>param.h</i>. -U <i>user</i> [,<i>user...</i>] Specify a replacement list of member users of the project, or with -a or -r, a list of users to be added or removed from the project.	
OPERANDS	The following operands are supported: <i>project</i> An existing project name to be modified.	
EXIT STATUS	In case of an error, <i>projmod</i> prints an error message and exits with one of the following values:	

The following exit values are returned:

- 0 Successful completion.
- 2 The command syntax was invalid. A usage message for projmod is displayed.
- 3 An invalid argument was provided to an option.
- 4 The *projid* given with the *-p* option is already in use.
- 5 The project files contain an error. See *project*(4).
- 6 The project to be modified, group, or user does not exist.
- 9 The project is already in use.
- 10 Cannot update the */etc/project* file.

FILES	<i>/etc/group</i>	System file containing group definitions
	<i>/etc/project</i>	System project file
	<i>/etc/passwd</i>	System password file
	<i>/etc/shadow</i>	System file containing users' encrypted passwords and related information

ATTRIBUTES See *attributes*(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWesu

SEE ALSO *groupadd*(1M), *groupdel*(1M), *groupmod*(1M), *projadd*(1M), *projdel*(1M), *useradd*(1M), *userdel*(1M), *usermod*(1M), *passwd*(4), *project*(4), *attributes*(5)

NOTES The *projmod* utility modifies project definitions only in the local */etc/project* file. If a network name service such as NIS or LDAP is being used to supplement the local files with additional entries, *projmod* cannot change information supplied by the network name service. However *projmod* verifies the uniqueness of project name and project ID against the external name service.

prstat(1M)

NAME	prstat – report active process statistics
SYNOPSIS	prstat [-acJLmRtTv] [-C <i>psrsetlist</i>] [-j <i>projlist</i>] [-k <i>tasklist</i>] [-n <i>ntop</i> [, <i>nbottom</i>]] [-p <i>pidlist</i>] [-P <i>cpulist</i>] [-s <i>key</i> -S <i>key</i>] [-u <i>euidlist</i>] [-U <i>uidlist</i>] [<i>interval</i> [<i>count</i>]]
DESCRIPTION	The prstat utility iteratively examines all active processes on the system and reports statistics based on the selected output mode and sort order. prstat provides options to examine only processes matching specified PIDs, UIDs, CPU IDs, and processor set IDs. The -j, -k, -C, -p, -P, -u, and -U options accept lists as arguments. Items in a list can be either separated by commas or enclosed in quotes and separated by commas or spaces. If you do not specify an option, prstat examines all processes and reports statistics sorted by CPU usage.
OPTIONS	The following options are supported: -a Report information about processes and users. In this mode prstat displays separate reports about processes and users at the same time. -c Print new reports below previous reports instead of overprinting them. -C <i>psrsetlist</i> Report only processes or lwps that are bound to processor sets in the given list. Each processor set is identified by an integer as reported by psrset(1M). The load averages displayed are the sum of the load averages of the specified processor sets (see pset_getloadavg(3C)). -j <i>projlist</i> Report only processes or lwps whose project ID is in the given list. Each project ID can be specified as either a project name or a numerical project ID. See project(4). -J Report information about processes and projects. In this mode prstat displays separate reports about processes and projects at the same time. -k <i>tasklist</i> Report only processes or lwps whose task ID is in <i>tasklist</i>. -L Report statistics for each light-weight process (LWP). By default, prstat reports only the number of LWPs for each process. -m Report microstate process accounting information. In addition to all fields listed in -v mode, this mode also

	includes the percentage of time the process has spent processing system traps, text page faults, data page faults, waiting for user locks and waiting for CPU (latency time).
<code>-n ntop[,nbottom]</code>	Restrict number of output lines. The <i>ntop</i> argument determines how many lines of process or lwp statistics are reported, and the <i>nbottom</i> argument determines how many lines of user, task, or projects statistics are reported if the <code>-a</code> , <code>-t</code> , <code>-T</code> , or <code>-J</code> options are specified. By default, <code>prstat</code> displays as many lines of output that fit in a window or terminal. When you specify the <code>-c</code> option or direct the output to a file, the default values for <i>ntop</i> and <i>nbottom</i> are 15 and 5.
<code>-p pidlist</code>	Report only processes whose process ID is in the given list.
<code>-P cpulist</code>	Report only processes or lwps which have most recently executed on a CPU in the given list. Each CPU is identified by an integer as reported by <code>psrinfo(1M)</code> .
<code>-R</code>	Put <code>prstat</code> in the real time scheduling class. When this option is used, <code>prstat</code> is given priority over time-sharing and interactive processes. This option is available only for superuser.
<code>-s key</code>	Sort output lines (that is, processes, lwps, or users) by <i>key</i> in descending order. Only one <i>key</i> can be used as an argument. There are five possible key values: cpu Sort by process CPU usage. This is the default. pri Sort by process priority. rss Sort by resident set size. size Sort by size of process image. time Sort by process execution time.
<code>-S key</code>	Sort output lines by <i>key</i> in ascending order. Possible <i>key</i> values are the same as for the <code>-s</code> option. See <code>-s</code> .

prstat(1M)

	-t	Report total usage summary for each user. The summary includes the total number of processes or LWPs owned by the user, total size of process images, total resident set size, total cpu time, and percentages of recent cpu time and system memory.
	-T	Report information about processes and tasks. In this mode <code>prstat</code> displays separate reports about processes and tasks at the same time.
	-u <i>euidlist</i>	Report only processes whose effective user ID is in the given list. Each user ID may be specified as either a login name or a numerical user ID.
	-U <i>uidlist</i>	Report only processes whose real user ID is in the given list. Each user ID may be specified as either a login name or a numerical user ID.
	-v	Report verbose process usage. This output format includes the percentage of time the process has spent in user mode, in system mode, and sleeping. It also includes the number of voluntary and involuntary context switches, system calls and the number of signals received. Statistics that are not reported are marked with the - sign.
OUTPUT	The following list defines the column headings and the meanings of a <code>prstat</code> report:	
	PID	The process ID of the process.
	USERNAME	The real user (login) name or real user ID.
	SIZE	The total virtual memory size of the process, including all mapped files and devices, in kilobytes (K), megabytes (M), or gigabytes (G). The resident set size of the process (RSS), in kilobytes (K), megabytes (M), or gigabytes (G).
	STATE	The state of the process:
	cpuN	Process is running on CPU N.
	sleep	Sleeping: process is waiting for an event to complete.
	run	Runnable: process in on run queue.
	zombie	Zombie state: process terminated and parent not waiting.

stop

Process is stopped.

PRI	The priority of the process. Larger numbers mean higher priority.
NICE	Nice value used in priority computation. Only processes in certain scheduling classes have a nice value.
TIME	The cumulative execution time for the process.
CPU	The percentage of recent CPU time used by the process.
PROCESS	The name of the process (name of executed file).
LWPID	The lwp ID of the lwp being reported.
NLWP	The number of lwps in the process.

The following columns are displayed when the `-v` or `-m` option is specified

USR	The percentage of time the process has spent in user mode.
SYS	The percentage of time the process has spent in system mode.
TRP	The percentage of time the process has spent in processing system traps.
TFL	The percentage of time the process has spent processing text page faults.
DFL	The percentage of time the process has spent processing data page faults.
LCK	The percentage of time the process has spent waiting for user locks.
SLP	The percentage of time the process has spent sleeping.
LAT	The percentage of time the process has spent waiting for CPU.
VCX	The number of voluntary context switches.
ICX	The number of involuntary context switches.
SCL	The number of system calls.
SIG	The number of signals received.

Under the `-l` option, one line is printed for each lwp in the process and some reporting fields show the values for the lwp, not the process.

OPERANDS The following operands are supported:

prstat(1M)

<i>count</i>	Specifies the number of times that the statistics are repeated. By default, <code>prstat</code> reports statistics until a termination signal is received.
<i>interval</i>	Specifies the sampling interval in seconds; the default interval is 5 seconds.

EXAMPLES

EXAMPLE 1 Reporting the Five Most Active Super-User Processes

The following command reports the five most active super-user processes running on CPU1 and CPU2:

```
example% prstat -u root -n 5 -P 1,2 1 1
```

PID	USERNAME	SIZE	RSS	STATE	PRI	NICE	TIME	CPU	PROCESS/LWP
306	root	3024K	1448K	sleep	58	0	0:00.00	0.3%	sendmail/1
102	root	1600K	592K	sleep	59	0	0:00.00	0.1%	in.rdisc/1
250	root	1000K	552K	sleep	58	0	0:00.00	0.0%	utmpd/1
288	root	1720K	1032K	sleep	58	0	0:00.00	0.0%	sac/1
1	root	744K	168K	sleep	58	0	0:00.00	0.0%	init/1
TOTAL: 25, load averages: 0.05, 0.08, 0.12									

EXAMPLE 2 Displaying Verbose Process Usage Information

The following command displays verbose process usage information about processes with lowest resident set sizes owned by users `root` and `john`.

```
example% prstat -S rss -n 5 -vc -u root,john
```

PID	USERNAME	USR	SYS	TRP	TFL	DFL	LCK	SLP	LAT	VCX	ICX	SCL	SIG	PROCESS/LWP
1	root	0.0	0.0	-	-	-	-	100	-	0	0	0	0	init/1
102	root	0.0	0.0	-	-	-	-	100	-	0	0	3	0	in.rdisc/1
250	root	0.0	0.0	-	-	-	-	100	-	0	0	0	0	utmpd/1
1185	john	0.0	0.0	-	-	-	-	100	-	0	0	0	0	csch/1
240	root	0.0	0.0	-	-	-	-	100	-	0	0	0	0	powerd/4
TOTAL: 71, load averages: 0.02, 0.04, 0.08														

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	An error occurred.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

prstat(1M)

SEE ALSO `proc(1)`, `psrinfo(1M)`, `psrset(1M)`, `sar(1M)`, `pset_getloadavg(3C)`, `proc(4)`, `project(4)`, `attributes(5)`

NOTES The snapshot of system usage displayed by `prstat` is true only for a split-second, and it may not be accurate by the time it is displayed. When the `-m` option is specified, `prstat` tries to turn on microstate accounting for each process; the original state is restored when `prstat` exits. See `proc(4)` for additional information about the microstate accounting facility.

prtconf(1M)

NAME	prtconf – print system configuration
SYNOPSIS	
SPARC	<code>/usr/sbin/prtconf [-V] [-F] [-x] [-vpPD]</code>
x86	<code>/usr/sbin/prtconf [-V] [-x] [-vpPD]</code>
DESCRIPTION	The <code>prtconf</code> command prints the system configuration information. The output includes the total amount of memory, and the configuration of system peripherals formatted as a device tree.
OPTIONS	The following options are supported: -D For each system peripheral in the device tree, displays the name of the device driver used to manage the peripheral. -F Returns the device path name of the console frame buffer, if one exists. If there is no frame buffer, <code>prtconf</code> returns a non-zero exit code. This flag must be used by itself. It returns only the name of the console, frame buffer device or a non-zero exit code. For example, if the console frame buffer on a SPARCstation 1 is <code>cgthree</code> in SBus slot #3, the command returns: <code>/sbus@1, f80000000/cgthree@3, 0</code>. This option could be used to create a symlink for <code>/dev/fb</code> to the actual console device. -p Displays information derived from the device tree provided by the firmware (PROM) on SPARC platforms or the booting system on x86 platforms. The device tree information displayed using this option is a snapshot of the initial configuration and may not accurately reflect reconfiguration events that occur later. -P Includes information about pseudo devices. By default, information regarding pseudo devices is omitted. -v Specifies verbose mode. -V Displays platform-dependent PROM (on SPARC platforms) or booting system (on x86 platforms) version information. This flag must be used by itself. The output is a string. The format of the string is arbitrary and platform-dependent. -x Reports if the firmware on this system is 64-bit ready. Some existing platforms may need a firmware upgrade in order to run the 64-bit kernel. If the operation is not applicable to this platform or the firmware is already 64-bit ready, it exits silently with a return code of zero. If the operation is applicable to this platform and the firmware is not 64-bit ready, it displays a descriptive message on the standard output and exits with a non-zero return code. The hardware platform documentation contains more information about the platforms that may need a firmware upgrade in order to run the 64-bit kernel. This flag overrides all other flags and must be used by itself.

EXIT STATUS	The following exit values are returned:						
	0	No error occurred.					
	non-zero	With the -F option (SPARC only), a non-zero return value means that the output device is not a frame buffer. With the -x option, a non-zero return value means that the firmware is not 64-bit ready. In all other cases, a non-zero return value means that an error occurred.					
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:						
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td rowspan="2">Availability</td><td>SUNWesu (32-bit)</td></tr><tr><td>SUNWesxu (64-bit)</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWesu (32-bit)	SUNWesxu (64-bit)
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWesu (32-bit)						
	SUNWesxu (64-bit)						
SEE ALSO	modinfo(1M), sysdef(1M), attributes(5) <i>Sun Hardware Platform Guide</i>						
SPARC Only	openprom(7D)						
NOTES	The output of the prtconf command is highly dependent on the version of the PROM installed in the system. The output will be affected in potentially all circumstances. The driver not attached message means that no driver is currently attached to that instance of the device. In general, drivers are loaded and installed (and attached to hardware instances) on demand, and when needed, and may be uninstalled and unloaded when the device is not in use.						

prtdiag(1M)

NAME	prtdiag – display system diagnostic information				
SYNOPSIS	/usr/platform/platform-name/sbin/prtdiag [-v] [-l]				
DESCRIPTION	prtdiag displays system configuration and diagnostic information on sun4u systems. The diagnostic information lists any failed field replaceable units (FRUs) in the system. The interface, output, and location in the directory hierarchy for prtdiag are uncommitted and subject to change in future releases. <i>platform-name</i> is the name of the platform implementation and can be found using the -i option of uname(1). Note – prtdiag does not display diagnostic information and environmental status when executed on the Sun Enterprise 10000 server. See the /var/opt/SUNWssp/adm/\${SUNW_HOSTNAME}/messages file on the system service processor (SSP) to obtain such information for this server.				
OPTIONS	The following options are supported: -l Log output. If failures or errors exist in the system, output this information to syslogd(1M) only. -v Verbose mode. Displays the time of the most recent AC Power failure, and the most recent hardware fatal error information, and (if applicable) environmental status. The hardware fatal error information is useful to repair and manufacturing for detailed diagnostics of FRUs.				
EXIT STATUS	The following exit values are returned: 0 No failures or errors are detected in the system. 1 Failures or errors are detected in the system. 2 An internal prtdiag error occurred, for example, out of memory.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWkvm</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWkvm
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWkvm				
SEE ALSO	uname(1), modinfo(1M), prtconf(1M), psrinfo(1M), sysdef(1M), syslogd(1M), attributes(5), openprom(7D)				

NAME	prtfru – print FRUID-specific information about the FRUs on a system or domain				
SYNOPSIS	/usr/sbin/prtfru [-d] [-clx] [<i>container</i>]				
DESCRIPTION	The prtfru utility is used to obtain FRUID data from the system or domain. Its output is that of a tree structure echoing the path in the FRU (Field-Replaceable Unit) tree to each container. When a container is found, the data from that container is printed in a tree-like structure as well. prtfru without any arguments will print the FRU hierarchy and all of the FRUID container data. prtfru prints to stdout which may be redirected to a file.				
OPTIONS	The following options are supported: -c Prints <i>only</i> the containers and their data. This option does not print the FRU tree hierarchy. -d Prints a DTD for the current registry to stdout. -l Prints <i>only</i> the FRU tree hierarchy. This option does not print the container data. -x Prints in XML format with a system identifier (SYSTEM) of prtfrureg.dtd. Options -c and -l can be used together to obtain a list of the containers.				
OPERANDS	The following operand is supported: <i>container</i> The name of a particular container in the FRU hierarchy, that is, either the name or path/name of a container as displayed in the -l option.				
EXIT STATUS	The following exit values are returned: 0 All information was found and printed successfully. >0 An error has occurred.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWfruid</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWfruid
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWfruid				
SEE ALSO	fruadm(1M), attributes(5)				

prtpicl(1M)

NAME	prtpicl – print PICL tree				
SYNOPSIS	/usr/sbin/prtpicl [-c <i>picl_class</i>] [-v]				
DESCRIPTION	The <code>prtpicl</code> command prints the PICL tree maintained by the PICL daemon. The output of <code>prtpicl</code> includes the name and PICL class of the nodes.				
OPTIONS	The following options are supported: <table><tr><td>-c <i>picl_class</i></td><td>Print only the nodes of the named PICL class.</td></tr><tr><td>-v</td><td>Print in verbose mode. In verbose mode, <code>prtpicl</code> prints a list of properties and values for each node. Verbose mode is disabled by default.</td></tr></table>	-c <i>picl_class</i>	Print only the nodes of the named PICL class.	-v	Print in verbose mode. In verbose mode, <code>prtpicl</code> prints a list of properties and values for each node. Verbose mode is disabled by default.
-c <i>picl_class</i>	Print only the nodes of the named PICL class.				
-v	Print in verbose mode. In verbose mode, <code>prtpicl</code> prints a list of properties and values for each node. Verbose mode is disabled by default.				
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>non-zero</td><td>An error occurred.</td></tr></table>	0	Successful completion.	non-zero	An error occurred.
0	Successful completion.				
non-zero	An error occurred.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWpiclu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWpiclu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWpiclu				
SEE ALSO	<code>picld(1M)</code> , <code>attributes(5)</code>				

NAME	prvtoc – report information about a disk geometry and partitioning
SYNOPSIS	prvtoc [-fhs] [-t <i>vfstab</i>] [-m <i>mnttab</i>] <i>device</i>
DESCRIPTION	The prvtoc command allows the contents of the label to be viewed. The command can be used only by the super-user. The <i>device</i> name can be the file name of a raw device in the form of <code>/dev/rdisk/c?t?d?s2</code> or can be the file name of a block device in the form of <code>/dev/dsk/c?t?d?s2</code>.
OPTIONS	The following options are supported: -f Report on the disk free space, including the starting block address of the free space, number of blocks, and unused partitions. -h Omit the headers from the normal output. -m <i>mnttab</i> Use <i>mnttab</i> as the list of mounted filesystems, in place of <code>/etc/mnttab</code>. -s Omit all headers but the column header from the normal output. -t <i>vfstab</i> Use <i>vfstab</i> as the list of filesystem defaults, in place of <code>/etc/vfstab</code>.
EXAMPLES	EXAMPLE 1 Using the prvtoc Command The following example uses the prvtoc command on a 424-megabyte hard disk: <pre>example# prvtoc /dev/rdisk/c0t3d0s2 * /dev/rdisk/c0t3d0s2 partition map * * Dimension: * 512 bytes/sector * 80 sectors/track * 9 tracks/cylinder * 720 sectors/cylinder * 2500 cylinders * 1151 accessible cylinders * * Flags: * 1: unmountable * 10: read-only * * * * * Partition Tag Flags First Sector Last * Partition Tag Flags Sector Count Sector Mount Directory * 0 2 00 0 76320 76319 / * 1 3 01 76320 132480 208799 * 2 5 00 0 828720 828719 * 5 6 00 208800 131760 340559 /opt * 6 4 00 340560 447120 787679 /usr * 7 8 00 787680 41040 828719 /export/home example#</pre> The data in the Tag column above indicates the type of partition, as follows:

EXAMPLE 1 Using the prvtoc Command (Continued)

<i>Name</i>	<i>Number</i>
UNASSIGNED	0x00
BOOT	0x01
ROOT	0x02
SWAP	0x03
USR	0x04
BACKUP	0x05
STAND	0x06
VAR	0x07
HOME	0x08
ALTSCTR	0x09
CACHE	0x0a
RESERVED	0x0b

The data in the Flags column above indicates how the partition is to be mounted, as follows:

<i>Name</i>	<i>Number</i>
MOUNTABLE, READ AND WRITE	0x00
NOT MOUNTABLE	0x01
MOUNTABLE, READ ONLY	0x10

EXAMPLE 2 Using the prvtoc Command with the -f Option

The following example uses the prvtoc command with the -f option on a 424-megabyte hard disk:

```
example# prvtoc -f /dev/rdisk/c0t3d0s2
FREE_START=0 FREE_SIZE=0 FREE_COUNT=0 FREE_PART=34
```

EXAMPLE 3 Using the prvtoc Command on a Disk Over One Terabyte

The following example uses the prvtoc command on a disk over one terabyte:.

```
example# prvtoc /dev/rdisk/c1t1d0s2
* /dev/rdisk/c1t1d0s2 partition map
*
```


EXAMPLE 3 Using the prvtoc Command on a Disk Over One Terabyte (Continued)

```

* Dimensions:
*   512 bytes/sector
* 3187630080 sectors
* 3187630013 accessible sectors
*
* Flags:
*   1: unmountable
*  10: read-only
*
*
* Partition  Tag  Flags      First      Sector      Last
* Partition  Tag  Flags      Sector      Count      Sector  Mount Directory
0         2    00          34      262144      262177
1         3    01      262178      262144      524321
6         4    00      524322 3187089340 3187613661
8        11    00 3187613662      16384 318763004

```

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO devinfo(1M), fmthard(1M), format(1M), mount(1M), attributes(5)

WARNINGS The mount command does not check the "not mountable" bit.

psradm(1M)

NAME	psradm – change processor operational status
SYNOPSIS	psradm -f -i -n [-v] <i>processor_id</i>... psradm -a-f -i -n [-v]
DESCRIPTION	The psradm utility changes the operational status of processors. The legal states for the processor are <i>on-line</i>, <i>off-line</i>, and <i>no-intr</i>. An <i>on-line</i> processor processes LWPs (lightweight processes) and may be interrupted by I/O devices in the system. An <i>off-line</i> processor does not process any LWPs. Usually, an <i>off-line</i> processor is not interruptible by I/O devices in the system. On some processors or under certain conditions, it may not be possible to disable interrupts for an <i>off-line</i> processor. Thus, the actual effect of being <i>off-line</i> may vary from machine to machine. A <i>no-intr</i> processor processes LWPs but is not interruptible by I/O devices. A processor may not be taken <i>off-line</i> if there are LWPs that are bound to the processor. On some architectures, it might not be possible to take certain processors <i>off-line</i> if, for example, the system depends on some resource provided by the processor. At least one processor in the system must be able to process LWPs. At least one processor must also be able to be interrupted. Since an <i>off-line</i> processor may be interruptible, it is possible to have an operational system with one processor <i>no-intr</i> and all other processors <i>off-line</i> but with one or more accepting interrupts. If any of the specified processors are powered off, psradm may power on one or more processors. Only superusers can use the psradm utility.
OPTIONS	The following options are supported: -a Perform the action on all processors, or as many as possible. -f Take the specified processors <i>off-line</i>. -i Set the specified processors <i>no-intr</i>. -n Bring the specified processors <i>on-line</i>. -v Output a message giving the results of each attempted operation.
OPERANDS	The following operands are supported: <i>processor_id</i> The processor ID of the processor to be set <i>on-line</i> or <i>off-line</i> or <i>no-intr</i>. Specify <i>processor_id</i> as an individual processor number (for example, 3), multiple processor numbers separated by spaces (for example, 1 2 3), or a range of processor numbers (for example,

1-4). It is also possible to combine ranges and (individual or multiple) *processor_ids* (for example, 1-3 5 7-8 9).

EXAMPLES

EXAMPLE 1 Examples of psradm.

The following example sets processors 2 and 3 off-line.

```
psradm -f 2 3
```

The following example sets processors 1 and 2 no-intr.

```
psradm -i 1 2
```

The following example sets all processors on-line.

```
psradm -a -n
```

EXIT STATUS

The following exit values are returned:

0 Successful completion.
>0 An error occurred.

FILES

/etc/wtmpx records logging processor status changes

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

psrinfo(1M), psrset(1M), p_online(2), attributes(5)

DIAGNOSTICS

psradm: processor 4: Invalid argument

The specified processor does not exist in the configuration.

psradm: processor 3: Device busy

The specified processor could not be taken off-line because it either has LWPs bound to it, is the last on-line processor in the system, or is needed by the system because it provides some essential service.

psradm: processor 3: Device busy

The specified processor could not be set no-intr because it is the last interruptible processor in the system, or or it is the only processor in the system that can service interrupts needed by the system.

psradm: processor 3: Device busy

The specified processor is powered off, and it cannot be powered on because some platform-specific resource is unavailable.

psradm: processor 0: Not owner

The user does not have permission to change processor status.

psradm(1M)

psradm: processor 2: Operation not supported

The specified processor is powered off, and the platform does not support power on of individual processors.

NAME	psrinfo – displays information about processors
SYNOPSIS	psrinfo [-p] [-v] [<i>processor_id</i> ...] psrinfo [-p] -s <i>processor_id</i>
DESCRIPTION	psrinfo displays information about processors. Each physical processor may support multiple virtual processors. Each virtual processor is an entity with its own interrupt ID, capable of executing independent threads. Without the <i>processor_id</i> operand, psrinfo displays one line for each configured processor, displaying whether it is on-line, non-interruptible (designated by <code>no-intr</code>), off-line, or powered off, and when that status last changed. Use the <i>processor_id</i> operand to display information about a specific processor. See OPERANDS.
OPTIONS	The following options are supported: -s <i>processor_id</i> Silent mode. Displays 1 if the specified processor is fully on-line, and 0 if the specified processor is non-interruptible, off-line, or powered off. Use silent mode when using psrinfo in shell scripts. -p Display the number of physical processors in a system. When combined with the -v option, reports additional information about each physical processor. -v Verbose mode. Displays additional information about the specified processors, including: processor type, floating point unit type and clock speed. If any of this information cannot be determined, psrinfo displays unknown. When combined with the -p option, reports additional information about each physical processor.
OPERANDS	The following operands are supported: <i>processor_id</i> The processor ID of the processor about which information is to be displayed. Specify <i>processor_id</i> as an individual processor number (for example, 3), multiple processor numbers separated by spaces (for example, 1 2 3), or a range of processor numbers (for example, 1 -4). It is also possible to combine ranges and (individual or multiple) <i>processor_ids</i> (for example, 1-3 5 7-8 9).
EXAMPLES	EXAMPLE 1 Displaying Information About All Configured Processors in Verbose Mode The following example displays information about all configured processors in verbose mode. <pre>psrinfo -v</pre>

psrinfo(1M)

EXAMPLE 2 Determining If a Processor is On-line

The following example uses `psrinfo` in a shell script to determine if a processor is on-line.

```
if [ "`psrinfo -s 3 2> /dev/null`" -eq 1 ]
then
    echo "processor 3 is up"
fi
```

EXAMPLE 3 Displaying Information About the Physical Processors in the System

With no additional arguments, the `-p` option displays a single integer: the number of physical processors in the system:

```
> psrinfo -p
8
```

`psrinfo` also accepts command line arguments (processor IDs):

```
> psrinfo -p 0 512    # IDs 0 and 512 exist on the
1                    # same physical processor

> psrinfo -p 0 1      # IDs 0 and 1 exist on different
2                    # physical processors
```

In this example, virtual processors 0 and 512 exist on the same physical processor. Virtual processors 0 and 1 do not. This is specific to this example and is not a general rule.

EXIT STATUS The following exit values are returned:

```
0          Successful completion.
>0         An error occurred.
```

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `psradm(1M)`, `p_online(2)`, `processor_info(2)`, `attributes(5)`

DIAGNOSTICS `psrinfo: processor 9: Invalid argument`
The specified processor does not exist.

NAME	psrset – creation and management of processor sets
SYNOPSIS	<pre> psrset -a <i>processor_set_id</i> <i>processor_id...</i> psrset -b <i>processor_set_id</i> <i>pid...</i> psrset -c [<i>processor_id...</i>] psrset -d <i>processor_set_id</i> psrset -e <i>processor_set_id</i> <i>command</i> [<i>argument(s)</i>] psrset -f <i>processor_set_id</i> psrset [-i] [<i>processor_set_id...</i>] psrset -n <i>processor_set_id</i> psrset -p [<i>processor_id...</i>] psrset -q [<i>pid...</i>] psrset -r <i>processor_id...</i> psrset -u <i>pid...</i> </pre>
DESCRIPTION	The psrset utility controls the management of processor sets. Processor sets allow the binding of processes to groups of processors, rather than just a single processor. Processors assigned to processor sets can run only LWPs that have been bound to that processor set.
OPTIONS	The following options are supported: -a Assign the specified processors to the specified processor set. This option is restricted to use by the super-user. -b Bind all the LWPs of the specified processes to the specified processor set. LWPs bound to a processor set are restricted to run only on the processors in that set. Processes can only be bound to non-empty processor sets, that is, processor sets that have had processors assigned to them. Bindings are inherited, so new LWPs and processes created by a bound LWP have the same binding. Binding an interactive shell to a processor, for example, binds all commands executed by the shell. This option is restricted to use by the super-user. -c Create a new processor set and displays the new processor set ID. If a list of processors is given, it also attempts to assign those processors to the processor set. If this succeeds, the processors are idle until LWPs are bound to the processor set. This option is restricted to use by the super-user.

psrset(1M)

Only a limited number of processor sets can be active (created and not destroyed) at a given time. This limit is always be greater than the number of processors in the system. If the `-c` option is used when the maximum number of processor sets is already active, the command fails.

The following format is used for the first line of output of the `-c` option when the `LC_MESSAGES` locale category specifies the "C" locale. In other locales, the strings `created`, `processor`, and `set` can be replaced with more appropriate strings corresponding to the locale.

```
"created processor set %d\n" processor set ID
```

- d Remove the specified processor set, releasing all processors and processes associated with it.

This option is restricted to use by the super-user.

- e Execute a command (with optional arguments) in the specified processor set.

The command process and any child processes are executed only by processors in the processor set.

This option is restricted to use by the super-user.

- f Disables interrupts for all processors within the specified processor set. See `psradm(1M)`.

If some processors in the set cannot have their interrupts disabled, the other processors still have their interrupts disabled, and the command reports an error and return non-zero exit status.

This option is restricted to use by the super-user.

- i Display a list of processors assigned to each named processor set. If no argument is given, a list of all processor sets and the processors assigned to them is displayed. This is also the default operation if the `psrset` command is not given an option.

- n Enable interrupts for all processors within the specified processor set. See `psradm(1M)`.

This option is restricted to use by the super-user.

- p Display the processor set assignments for the specified list of processors. If no argument is given, the processor set assignments for all processors in the system is given.

- q Display the processor set bindings of the specified processes. If a process is composed of multiple LWPs, which have different bindings, the bindings of only one of the bound LWPs is shown. If no argument is given, the processor set bindings of all processes in the system is displayed.

- r** Remove a list of processors from their current processor sets. Processors that are removed return to the general pool of processors.
- Processors with LWPs bound to them using `pbind(1M)` cannot be assigned to or removed from processor sets.
- This option is restricted to use by the super-user.
- u** Remove the processor set bindings from all the LWPs of the specified processes, allowing them to be executed on any on-line processor if they are not bound to individual processors through `pbind`.
- The super-user can unbind any process from any active processor set. Other users can unbind processes from processor sets that do not have the `PSET_NOESCAPE` attribute set. In addition, the user must have permission to control the affected processes; the real or effective user ID of the user must match the real or saved user ID of the target processes.

OPERANDS The following operands are supported:

<i>pid</i>	Specify <i>pid</i> as a process ID.
<i>processor_id</i>	Specify <i>processor_id</i> as an individual processor number (for example, 3), multiple processor numbers separated by spaces (for example, 1 2 3), or a range of processor numbers (for example, 1-4). It is also possible to combine ranges and (individual or multiple) <i>processor_ids</i> (for example, 1-3 5 7-8 9).
<i>processor_set_id</i>	Specify <i>processor_set_id</i> as a processor set ID.

EXIT STATUS The following exit values are returned:

0	Successful completion.
non-0	An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Stability Level	Stable

SEE ALSO `pbind(1M)`, `psradm(1M)`, `psrinfo(1M)`, `processor_bind(2)`, `processor_info(2)`, `pset_bind(2)`, `pset_create(2)`, `pset_info(2)`, `sysconf(3C)`, `attributes(5)`

DIAGNOSTICS `psrset: cannot query pid 31: No such process`
The process specified did not exist or has exited.

psrset(1M)

psrset: cannot bind pid 31: Not owner
The user does not have permission to bind the process.

psrset: cannot assign processor 4: Not owner
The user does not have permission to assign the processor.

psrset: cannot assign processor 8: Invalid argument
The specified processor is not on-line, or the specified processor does not exist.

psrset: cannot bind pid 67: Device busy
An LWP in the specified process is bound to a processor and cannot be bound to a processor set that does not include that processor.

psrset: cannot assign processor 7: Device busy
The specified processor could not be added to the processor set. This can be due to bound LWPs on that processor, or because that processor cannot be combined in the same processor set with other processors in that set, or because the processor is the last one in its current processor set.

psrset: cannot execute in processor set 8: Invalid argument
The specified processor set does not exist.

psrset: cannot create processor set: Not enough space
The maximum number of processor sets allowed in the system is already active.

NAME	putdev – edits device table
SYNOPSIS	putdev -a <i>alias</i> [<i>attribute=value</i> [...]] putdev -m <i>device attribute=value</i> [<i>attribute = value</i> [...]] putdev -d <i>device</i> [<i>attribute</i> [...]]
DESCRIPTION	putdev adds a new device to the device table, modifies an existing device description or removes a device entry from the table. The first synopsis is used to add a device. The second synopsis is used to modify existing entries by adding or changing attributes. If a specified attribute is not defined, this option adds that attribute to the device definition. If a specified attribute is already defined, it modifies the attribute definition. The third synopsis is used to delete either an entire device entry or, if the attribute argument is used, to delete an attribute assignment for a device.
OPTIONS	The following options are supported: -a Add a device to the device table using the specified attributes. The device must be referenced by its <i>alias</i>. -d Remove a device from the device table, when executed without the <i>attributes</i> argument. Used with the <i>attribute</i> argument, it deletes the given attribute specification for <i>device</i> from the table. -m Modify a device entry in the device table. If an entry already exists, it adds any specified attributes that are not defined. It also modifies any attributes which already have a value with the value specified by this command.
OPERANDS	The following operands are supported: <i>alias</i> Designates the alias of the device to be added. <i>attribute</i> Designates a device attribute to be added, modified, or deleted. Can be any of the device attributes described under DEVICE ATTRIBUTES except <i>alias</i>. This prevents an accidental modification or deletion of a device's alias from the table. <i>device</i> Designates the pathname or alias of the device whose attribute is to be added, modified, or removed. <i>value</i> Designates the value to be assigned to a device's attribute.
DEVICE ATTRIBUTES	The following list shows the standard device attributes, used by applications such as ufsdump(1M) and ufsrestore(1M), which can be defined for a device. You are not limited to this list, you can define any attribute you like. <i>alias</i> The unique name by which a device is known. No two devices in the database may share the same alias name. The name is limited in length to 14 characters and should contain only alphanumeric characters and the following special characters if they are escaped with a backslash: underscore (_), dollar sign (\$), hyphen (-), and period (.).

putdev(1M)

bdevice	The pathname to the block special device node associated with the device, if any. The associated major/minor combination should be unique within the database and should match that associated with the cdevice field, if any. (It is the administrator's responsibility to ensure that these major/minor numbers are unique in the database.)
capacity	The capacity of the device or of the typical volume, if removable.
cdevice	The pathname to the character special device node associated with the device, if any. The associated major/minor combination should be unique within the database and should match that associated with the bdevice field, if any. (It is the administrator's responsibility to ensure that these major/minor numbers are unique in the database.)
cyl	Used by the command specified in the mkfscmd attribute.
desc	A description of any instance of a volume associated with this device (such as floppy diskette).
dpartlist	The list of disk partitions associated with this device. Used only if type=disk. The list should contain device aliases, each of which must have type=dpart.
dparttype	The type of disk partition represented by this device. Used only if type=dpart. It should be either fs (for file system) or dp (for data partition).
erasescmd	The command string that, when executed, erases the device.
fmtcmd	The command string that, when executed, formats the device.
fsname	The file system name on the file system administered on this partition, as supplied to the /usr/sbin/labelit command. This attribute is specified only if type=dpart and dparttype=fs.
gap	Used by the command specified in the mkfscmd attribute.
mkfscmd	The command string that, when executed, places a file system on a previously formatted device.
mountpt	The default mount point to use for the device. Used only if the device is mountable. For disk partitions where type=dpart and dparttype=fs, this attribute should specify the location where the partition is normally mounted.
nblocks	The number of blocks in the file system administered on this partition. Used only if type=dpart and dparttype=fs.
ninodes	The number of inodes in the file system administered on this partition. Used only if type=dpart and dparttype=fs.

	norewind	The name of the character special device node that allows access to the serial device without rewinding when the device is closed.				
	pathname	Defines the pathname to an i-node describing the device (used for non-block or character device pathnames, such as directories).				
	type	A token that represents inherent qualities of the device. Standard types include: 9-track, ctape, disk, directory, diskette, dpart, and qtape.				
	volname	The volume name on the file system administered on this partition, as supplied to the <code>/usr/sbin/labelit</code> command. Used only if <code>type=dpart</code> and <code>dparttype=fs</code> .				
	volume	A text string used to describe any instance of a volume associated with this device. This attribute should not be defined for devices which are not removable.				
EXIT STATUS	The following exit values are returned:					
	0	Successful completion.				
	1	Command syntax was incorrect, an invalid option was used, or an internal error occurred.				
	2	The device table could not be opened for reading, or a new device table could not be created.				
	3	If executed with the <code>-a</code> option, indicates that an entry in the device table with the alias <code>alias</code> already exists. If executed with the <code>-m</code> or <code>-d</code> options, indicates that no entry exists for device <i>device</i> .				
	4	Indicates that <code>-d</code> was requested and one or more of the specified attributes were not defined for the device.				
FILES	<code>/etc/device.tab</code>					
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:					
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE					
Availability	SUNWcsu					
SEE ALSO	<code>devattr(1M)</code> , <code>putdgrp(1M)</code> , <code>ufsdump(1M)</code> , <code>ufsrestore(1M)</code> , <code>attributes(5)</code> <i>System Administration Guide: Basic Administration</i>					

putdgrp(1M)

NAME	putdgrp – edits device group table										
SYNOPSIS	putdgrp [-d] <i>dgroup</i> [<i>device...</i>]										
DESCRIPTION	putdgrp modifies the device group table. It performs two kinds of modification. It can modify the table by creating a new device group or removing a device group. It can also change group definitions by adding or removing a device from the group definition. When the command is invoked with only a <i>dgroup</i> specification, the command adds the specified group name to the device group table if it does not already exist. If the -d option is also used with only the <i>dgroup</i> specification, the command deletes the group from the table. When the command is invoked with both a <i>dgroup</i> and a <i>device</i> specification, it adds the given device name(s) to the group definition. When invoked with both arguments and the -d option, the command deletes the device name(s) from the group definition. When the command is invoked with both a <i>dgroup</i> and a <i>device</i> specification and the device group does not exist, it creates the group and adds the specified devices to that new group.										
OPTIONS	The following options are supported: -d Delete the group or, if used with <i>device</i>, delete the device from a group definition.										
OPERANDS	The following operands are supported: <i>dgroup</i> Specify a device group name. <i>device</i> Specify the pathname or alias of the device that is to be added to, or deleted from, the device group.										
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>1</td><td>Command syntax was incorrect, an invalid option was used, or an internal error occurred.</td></tr><tr><td>2</td><td>Device group table could not be opened for reading or a new device group table could not be created.</td></tr><tr><td>3</td><td>If executed with the -d option, indicates that an entry in the device group table for the device group <i>dgroup</i> does not exist and so cannot be deleted. Otherwise, indicates that the device group <i>dgroup</i> already exists and cannot be added.</td></tr><tr><td>4</td><td>If executed with the -d option, indicates that the device group <i>dgroup</i> does not have as members one or more of the specified devices. Otherwise, indicates that the device group <i>dgroup</i> already has one or more of the specified devices as members.</td></tr></table>	0	Successful completion.	1	Command syntax was incorrect, an invalid option was used, or an internal error occurred.	2	Device group table could not be opened for reading or a new device group table could not be created.	3	If executed with the -d option, indicates that an entry in the device group table for the device group <i>dgroup</i> does not exist and so cannot be deleted. Otherwise, indicates that the device group <i>dgroup</i> already exists and cannot be added.	4	If executed with the -d option, indicates that the device group <i>dgroup</i> does not have as members one or more of the specified devices. Otherwise, indicates that the device group <i>dgroup</i> already has one or more of the specified devices as members.
0	Successful completion.										
1	Command syntax was incorrect, an invalid option was used, or an internal error occurred.										
2	Device group table could not be opened for reading or a new device group table could not be created.										
3	If executed with the -d option, indicates that an entry in the device group table for the device group <i>dgroup</i> does not exist and so cannot be deleted. Otherwise, indicates that the device group <i>dgroup</i> already exists and cannot be added.										
4	If executed with the -d option, indicates that the device group <i>dgroup</i> does not have as members one or more of the specified devices. Otherwise, indicates that the device group <i>dgroup</i> already has one or more of the specified devices as members.										

EXAMPLES**EXAMPLE 1** Adding a new device group.

The following example adds a new device group:

example# putdgrp floppies

EXAMPLE 2 Adding a device to a device group.

The following example adds a device to a device group:

example# putdgrp floppies diskette2

EXAMPLE 3 Deleting a device group.

The following example deletes a device group:

example# putdgrp -d floppies

EXAMPLE 4 Deleting a device from a device group.

The following example deletes a device from a device group:

example# putdgrp -d floppies diskette2

FILES

/etc/dgroup.tab

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

listdgrp(1M), putdev(1M), attributes(5)

pwck(1M)

NAME	pwck, grpck – password/group file checkers				
SYNOPSIS	/usr/sbin/pwck [<i>filename</i>] /usr/sbin/grpck [<i>filename</i>]				
DESCRIPTION	pwck scans the password file and notes any inconsistencies. The checks include validation of the number of fields, login name, user ID, group ID, and whether the login directory and the program-to-use-as-shell exist. The default password file is <code>/etc/passwd</code>. grpck verifies all entries in the group file. This verification includes a check of the number of fields, group name, group ID, whether any login names belong to more than <code>NGROUPS_MAX</code> groups, and that all login names appear in the password file. The default group file is <code>/etc/group</code>. All messages regarding inconsistent entries are placed on the <code>stderr</code> stream.				
FILES	<code>/etc/group</code> <code>/etc/passwd</code>				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>getpwent(3C)</code> , <code>group(4)</code> , <code>passwd(4)</code> , <code>attributes(5)</code>				
DIAGNOSTICS	Group entries in <code>/etc/group</code> with no login names are flagged. Group file '<i>filename</i>' is empty The <code>/etc/passwd</code> or <code>/etc/group</code> file is an empty file. cannot open file <i>filename</i>: No such file or directory The <code>/etc/passwd</code> or <code>/etc/group</code> file does not exist.				
NOTES	If no <code>filename</code> argument is given, <code>grpck</code> checks the local group file, <code>/etc/group</code> , and also makes sure that all login names encountered in the checked group file are known to the system <code>getpwent(3C)</code> routine. This means that the login names may be supplied by a network name service.				

NAME	pwconv – installs and updates /etc/shadow with information from /etc/passwd				
SYNOPSIS	pwconv				
DESCRIPTION	The pwconv command creates and updates /etc/shadow with information from /etc/passwd. pwconv relies on a special value of 'x' in the password field of /etc/passwd. This value of 'x' indicates that the password for the user is already in /etc/shadow and should not be modified. If the /etc/shadow file does not exist, this command will create /etc/shadow with information from /etc/passwd. The command populates /etc/shadow with the user's login name, password, and password aging information. If password aging information does not exist in /etc/passwd for a given user, none will be added to /etc/shadow. However, the last changed information will always be updated. If the /etc/shadow file does exist, the following tasks will be performed: - Entries that are in the /etc/passwd file and not in the /etc/shadow file will be added to the /etc/shadow file. - Entries that are in the /etc/shadow file and not in the /etc/passwd file will be removed from /etc/shadow. - Password attributes (for example, password and aging information) that exist in an /etc/passwd entry will be moved to the corresponding entry in /etc/shadow. The pwconv command can only be used by the super-user.				
FILES	/etc/opasswd /etc/oshadow /etc/passwd /etc/shadow				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	passwd(1), passmgmt(1M), usermod(1M), passwd(4), attributes(5)				
DIAGNOSTICS	pwconv exits with one of the following values: <table> <tr> <td>0</td><td>SUCCESS.</td></tr> <tr> <td>1</td><td>Permission denied.</td></tr> </table>	0	SUCCESS.	1	Permission denied.
0	SUCCESS.				
1	Permission denied.				

pwconv(1M)

2	Invalid command syntax.
3	Unexpected failure. Conversion not done.
4	Unexpected failure. Password file(s) missing.
5	Password file(s) busy. Try again later.
6	Bad entry in <code>/etc/shadow</code> file.

quot(1M)

NAME	quot – summarize file system ownership
SYNOPSIS	quot [-acfhnv] <i>filesystem</i> . . . quot -a [-cfhnv]
DESCRIPTION	quot displays the number of blocks (1024 bytes) in the named <i>filesystem</i> (one or more) currently owned by each user. There is a limit of 2048 blocks. Files larger than this will be counted as a 2048 block file, but the total block count will be correct.
OPTIONS	The following options are supported: -a Generate a report for all mounted file systems. -c Display three columns giving a file size in blocks, the number of files of that size, and a cumulative total of blocks containing files of that size or a smaller size. -f Display three columns giving, for each user, the number of blocks owned, the count of number of files, and the user name. This option is incompatible with the -c and -v options. -h Estimate the number of blocks in the file. This does not account for files with holes in them. -n Attach names to the list of files read from standard input. quot -n cannot be used alone, because it expects data from standard input. For example, the pipeline ncheck myfilesystem sort +0n quot -n myfilesystem will produce a list of all files and their owners. This option is incompatible with all other options. -v In addition to the default output, display three columns containing the number of blocks not accessed in the last 30, 60, and 90 days.
OPERANDS	<i>filesystem</i> mount-point of the filesystem(s) being checked
USAGE	See <code>largefile(5)</code> for the description of the behavior of quot when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).
EXIT STATUS	0 Successful operation. 32 Error condition (bad or missing argument, bad path, or other error).
FILES	/etc/mnttab Lists mounted file systems. /etc/passwd Used to obtain user names

quot(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `du(1)`, `mnttab(4)`, `passwd(4)`, `attributes(5)`, `largefile(5)`

NOTES This command can only be used by the super-user.

NAME	quota – display a user’s ufs file system disk quota and usage				
SYNOPSIS	quota [-v] [<i>username</i>]				
DESCRIPTION	quota displays users’ ufs disk usage and limits. Only the super-user may use the optional <i>username</i> argument to view the limits of other users. quota without options only display warnings about mounted file systems where usage is over quota. Remotely mounted file systems which do not have quotas turned on are ignored. <i>username</i> can be the numeric UID of a user.				
OPTIONS	-v Display user’s quota on all mounted file systems where quotas exist.				
USAGE	See largefile(5) for the description of the behavior of quota when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).				
FILES	/etc/mnttab list of currently mounted filesystems				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	edquota(1M), quotaon(1M), quotacheck(1M), repquota(1M), rquotad(1M), attributes(5), largefile(5)				
NOTES	quota will also display quotas for NFS mounted ufs-based file systems if the rquotad daemon is running. See rquotad(1M). quota may display entries for the same file system multiple times for multiple mount points. For example, <pre>quota -v user1</pre> may display identical quota information for user1 at the mount points /home/user1, /home/user2, and /home/user, if all three mount points are mounted from the same file system with quotas turned on.				

quotacheck(1M)

NAME	quotacheck – ufs file system quota consistency checker				
SYNOPSIS	quotacheck [-fp] [-v] <i>filesystem...</i> quotacheck -a [-fpv]				
DESCRIPTION	quotacheck examines each mounted ufs file system, builds a table of current disk usage, and compares this table against the information stored in the file system's disk quota file. If any inconsistencies are detected, both the quota file and the current system copy of the incorrect quotas are updated. <i>filesystem</i> is either a file system mount point or the block device on which the file system resides. quotacheck expects each file system to be checked to have a quota file named <i>quotas</i> in the root directory. If none is present, quotacheck will not check the file system. quotacheck accesses the character special device in calculating the actual disk usage for each user. Thus, the file systems that are checked should be quiescent while quotacheck is running.				
OPTIONS	The following options are supported: -a Check the file systems which <i>/etc/mnttab</i> indicates are ufs file systems. These file systems must be read-write mounted with disk quotas enabled, and have an <i>rq</i> entry in the <i>mntopts</i> field in <i>/etc/vfstab</i>. -f Force check on file systems with logging enabled. Use in combination with the -p option. -p Check quotas of file systems in parallel. For file systems with logging enabled, no check is performed unless the -f option is also specified. -v Indicate the calculated disk quotas for each user on a particular file system. quotacheck normally reports only those quotas modified.				
USAGE	See <i>largefile(5)</i> for the description of the behavior of quotacheck when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).				
FILES	<i>/etc/mnttab</i> Mounted file systems <i>/etc/vfstab</i> List of default parameters for each file system				
ATTRIBUTES	See <i>attributes(5)</i> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<i>edquota(1M)</i> , <i>quota(1M)</i> , <i>quotaon(1M)</i> , <i>repquota(1M)</i> , <i>attributes(5)</i> , <i>largefile(5)</i> , <i>quotactl(7I)</i> , <i>mount_ufs(1M)</i>				

NAME	quotaon, quotaoff – turn ufs file system quotas on and off
SYNOPSIS	quotaon [-v] <i>filesystem</i> ... quotaon -a [-v] quotaoff [-v] <i>filesystem</i> ... quotaoff -a [-v]
DESCRIPTION	quotaon turns on disk quotas for one or more ufs file systems. Before a file system may have quotas enabled, a file named <i>quotas</i>, owned by root, must exist in the root directory of the file system. See <i>edquota</i>(1M) for details on how to modify the contents of this file. quotaoff turns off disk quotas for one or more ufs file systems. The file systems specified must already be mounted. These commands update the <i>mntopts</i> field of the appropriate entries in <i>/etc/mnttab</i> to indicate when quotas are on or off for each file system. If quotas are on, the string <i>quota</i> will be added to <i>mntopts</i>; if quotas are off, the <i>quota</i> string is not present. <i>filesystem</i> must be either the mount point of a file system, or the block device on which the file system resides.
OPTIONS	
quotaon	-a This option is normally used at boot time to enable quotas. It applies only to those file systems in <i>/etc/vfstab</i> which have “rq” in the <i>mntopts</i> field, are currently mounted “rw”, and have a <i>quotas</i> file in the root directory. -v Display a message for each file system after quotas are turned on.
quotaoff	-a Force all file systems in <i>/etc/mnttab</i> to have their quotas disabled. -v Display a message for each file system affected.
USAGE	See <i>largefile</i> (5) for the description of the behavior of <i>quotaon</i> and <i>quotaoff</i> when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).
FILES	<i>/etc/mnttab</i> mounted file systems <i>/etc/vfstab</i> list of default parameters for each file system
ATTRIBUTES	See <i>attributes</i> (5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

quotaon(1M)

SEE ALSO edquota(1M), quota(1M), quotacheck(1M), repquota(1M), mnttab(4),
vfstab(4), attributes(5), largefile(5), quotactl(7I)

NAME	raidctl – RAID hardware utility										
SYNOPSIS	<pre> raidctl -c <i>disk1 disk2</i> raidctl -d <i>disk1</i> raidctl [-f] -F <i>filename controller...</i> raidctl -l [<i>controller...</i>] </pre>										
DESCRIPTION	The raidctl utility creates, deletes, or displays RAID volumes of the LSI1030 HW Raid controller. The raidctl utility requires privileges that are controlled by the underlying file-system permissions. Only privileged users can manipulate the RAID system configuration. If a non-privileged user attempts to create or delete a RAID volume, the command fails with EPERM. Without options, raidctl displays the current RAID configuration on all existing controllers.										
OPTIONS	The following options are supported: <table> <tr> <td>-c <i>disk1 disk2</i></td><td> Create a mirror using <i>disk1</i> and <i>disk2</i>. Replace the contents of <i>disk2</i> with the contents of <i>disk1</i>. Specify <i>disk1</i> and <i>disk2</i> in canonical form, for example, <i>c0t0d0</i>. When you create a RAID volume, the RAID volume assumes the identity of the first target in the disk pair (<i>disk1</i>). The second target (<i>disk2</i>) disappears from the system. Therefore, the RAID volume appears as one disk. To have a successful RAID creation, there must not already be a RAID configuration present on the specified controller. Additionally, the secondary disk must not be mounted, as it has all its data erased and replaced with the primary disk's data. </td></tr> <tr> <td>-d <i>disk1</i></td><td> Delete the RAID volume specified as <i>disk1</i>. Specify <i>disk1</i> in canonical form, for example, <i>c0t0d0</i>. </td></tr> <tr> <td>-f</td><td>Force an update. Do not prompt.</td></tr> <tr> <td>-F <i>filename controller</i></td><td>Update the firmware running on the specified controller (<i>controller</i>).</td></tr> <tr> <td>-l [<i>controller ...</i>]</td><td> List the system's RAID configuration. If <i>controller</i> is specified, list RAID configurations for <i>controller</i>. Output from the -l lists the following information: </td></tr> </table>	-c <i>disk1 disk2</i>	Create a mirror using <i>disk1</i> and <i>disk2</i>. Replace the contents of <i>disk2</i> with the contents of <i>disk1</i>. Specify <i>disk1</i> and <i>disk2</i> in canonical form, for example, <i>c0t0d0</i>. When you create a RAID volume, the RAID volume assumes the identity of the first target in the disk pair (<i>disk1</i>). The second target (<i>disk2</i>) disappears from the system. Therefore, the RAID volume appears as one disk. To have a successful RAID creation, there must not already be a RAID configuration present on the specified controller. Additionally, the secondary disk must not be mounted, as it has all its data erased and replaced with the primary disk's data.	-d <i>disk1</i>	Delete the RAID volume specified as <i>disk1</i>. Specify <i>disk1</i> in canonical form, for example, <i>c0t0d0</i>.	-f	Force an update. Do not prompt.	-F <i>filename controller</i>	Update the firmware running on the specified controller (<i>controller</i>).	-l [<i>controller ...</i>]	List the system's RAID configuration. If <i>controller</i> is specified, list RAID configurations for <i>controller</i>. Output from the -l lists the following information:
-c <i>disk1 disk2</i>	Create a mirror using <i>disk1</i> and <i>disk2</i>. Replace the contents of <i>disk2</i> with the contents of <i>disk1</i>. Specify <i>disk1</i> and <i>disk2</i> in canonical form, for example, <i>c0t0d0</i>. When you create a RAID volume, the RAID volume assumes the identity of the first target in the disk pair (<i>disk1</i>). The second target (<i>disk2</i>) disappears from the system. Therefore, the RAID volume appears as one disk. To have a successful RAID creation, there must not already be a RAID configuration present on the specified controller. Additionally, the secondary disk must not be mounted, as it has all its data erased and replaced with the primary disk's data.										
-d <i>disk1</i>	Delete the RAID volume specified as <i>disk1</i>. Specify <i>disk1</i> in canonical form, for example, <i>c0t0d0</i>.										
-f	Force an update. Do not prompt.										
-F <i>filename controller</i>	Update the firmware running on the specified controller (<i>controller</i>).										
-l [<i>controller ...</i>]	List the system's RAID configuration. If <i>controller</i> is specified, list RAID configurations for <i>controller</i>. Output from the -l lists the following information:										

raidctl(1M)

RAID Volume	Displays logical RAID volume name.
RAID Status	Displays RAID status as either RESYNCING (disks are syncing), DEGRADED RAID is operating with reduced functionality), OK (operating optimally), or FAILED (non-functional).
RAID Disk	Displays RAID disk name.
Disk Status	Displays disk status as either OK or FAILED.

EXAMPLES

EXAMPLE 1 Creating the RAID Configuration

The following command creates the RAID configuration:

```
# raidctl -c c0t0d0 c0t1d0
RAID Volume 'c0t0d0' created
```

EXAMPLE 2 Displaying the RAID Configuration

The following command displays the RAID configuration:

```
# raidctl
RAID      RAID      RAID      Disk
Volume    Status    Disk      Status
-----
c0t0d0    RESYNCING c0t0d0    OK
                  c0t1d0    OK
```

EXAMPLE 3 Deleting the RAID Configuration

The following command deletes the RAID configuration:

```
# raidctl -d c0t0d0
RAID Volume 'c0t0d0' deleted
```

EXAMPLE 4 Updating Flash Images on the Controller

The following command updates flash images on the controller:

```
# raidctl -F lsi1030.fw 0
Update flash image on controller 0? (y/N): y
Flash updated successfully
```

EXIT STATUS

The following exit values are returned:

```
0          Successful completion.
```

raidctl(1M)

- 1 Invalid command line input.
- 2 Request operation failed.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO attributes(5)
System Administration Guide: Basic Administration

ramdiskadm(1M)

NAME	ramdiskadm – administer ramdisk pseudo device
SYNOPSIS	<pre> /usr/sbin/ramdiskadm -a <i>name size</i> [g m k b] /usr/sbin/ramdiskadm -d <i>name</i> /usr/sbin/ramdiskadm </pre>
DESCRIPTION	The <code>ramdiskadm</code> command administers <code>ramdisk(7D)</code>, the ramdisk driver. Use <code>ramdiskadm</code> to create a new named ramdisk device, delete an existing named ramdisk, or list information about existing ramdisks. Ramdisks created using <code>ramdiskadm</code> are not persistent across reboots.
OPTIONS	The following options are supported: -a <i>name size</i> Create a ramdisk named <i>name</i> of size <i>size</i> and its corresponding block and character device nodes. <i>name</i> must be composed only of the characters a-z, A-Z, 0-9, _ (underbar), and - (hyphen), but it must not begin with a hyphen. It must be no more than 32 characters long. Ramdisk names must be unique. The size can be a decimal number, or, when prefixed with 0x, a hexadecimal number, and can specify the size in bytes (no suffix), 512-byte blocks (suffix b), kilobytes (suffix k), megabytes (suffix m) or gigabytes (suffix g). The size of the ramdisk actually created might be larger than that specified, depending on the hardware implementation. If the named ramdisk is successfully created, its block device path is printed on standard out. -d <i>name</i> Delete an existing ramdisk of the name <i>name</i>. This command succeeds only when the named ramdisk is not open. The associated memory is freed and the device nodes are removed. You can delete only ramdisks created using <code>ramdiskadm</code>. It is not possible to delete a ramdisk that was created during the boot process. Without options, <code>ramdiskadm</code> lists any existing ramdisks, their sizes (in decimal), and whether they can be removed by <code>ramdiskadm</code> (see the description of the <code>-d</code> option, above).
EXAMPLES	EXAMPLE 1 Creating a 2MB Ramdisk Named <code>mydisk</code> <pre> # ramdiskadm -a mydisk 2m /dev/ramdisk/mydisk </pre> EXAMPLE 2 Listing All Ramdisks <pre> # ramdiskadm Block Device Size Removable /dev/ramdisk/miniroot 134217728 No </pre>

EXAMPLE 2 Listing All Ramdisks *(Continued)*

```

/dev/ramdisk/certfs      1048576    No
/dev/ramdisk/mydisk      2097152    Yes

```

EXIT STATUS ramdiskadm returns the following exit values:

```

0
    Successful completion.

>0
    An error occurred.

```

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsr
Interface Stability	Evolving

SEE ALSO attributes(5), ramdisk(7D)

NOTES The abilities of ramdiskadm and the privilege level of the person who uses the utility are controlled by the permissions of /dev/ramdiskctl. Read access allows query operations, for example, listing device information. Write access is required to do any state-changing operations, for example, creating or deleting ramdisks.

As shipped, /dev/ramdiskctl is owned by root, in group sys, and mode 0644, so all users can do query operations but only root can perform state-changing operations. An administrator can give write access to non-privileged users, allowing them to add or delete ramdisks. However, granting such ability entails considerable risk; such privileges should be given only to a trusted group.

rcapadm(1M)

NAME	rcapadm – configure resource capping daemon
SYNOPSIS	rcapadm rcapadm [[-n] -E -D] [-i <i>interval=value</i> , . . . , <i>interval=value</i>] [-c <i>percent</i>]
DESCRIPTION	The rcapadm command allows a user with the privileges described below to configure various attributes of the resource capping daemon. If used without arguments, rcapadm displays the current status of the resource capping daemon if it has been configured. See rcapd(1M) for more information. In Solaris 9, rcapadm is available to users who have the Process Management profile in their list of profiles. The System Administrator role includes the Process Management profile. The resource capping daemon (rcapd(1M)) is an optional feature.
OPTIONS	-n Do not affect the running state of the resource capping daemon when enabling or disabling it. -E Enable the resource capping daemon so that it will be started each time the system is booted. Also start the resource capping daemon now, if the -n option is not specified and it is not currently running. -D Disable the resource capping daemon so that it will not be started when the system is booted. Also stop the resource capping daemon now, if the -n option is not specified and it is currently running. -i interval=value,...,interval=value Set intervals for various periodic operations performed by rcapd. All intervals are specified in seconds. You can set the following intervals: scan The interval at which rcapd scans for new processes. The default scan interval is every 15 seconds. The minimum value is 1 second. sample The interval of process resident set size sampling. The default sample interval is every 5 seconds. The minimum value is 1 second. report The interval at which various paging statistics are updated by rcapd, in seconds. These statistics can be viewed by using rcapstat(1SRM). The default reporting interval is every 5 seconds. When the interval is set to 0, statistics will not be updated. Note – Paging refers to the act of relocating portions of memory, called pages, to or from physical memory. rcapd pages out the most infrequently used pages.

config

The reconfiguration interval, in seconds. At each reconfiguration event, `rcapd` checks its configuration file for updates, and scans the project databases for new project caps. The default reconfiguration interval is every 60 seconds. The minimum interval is 0. When the interval is set to 0, no periodic reconfiguration occurs, although the running daemon can still be reconfigured by sending it `SIGHUP`.

-c percent

Set the minimum physical memory utilization for memory cap enforcement. Caps will not be enforced until the physical memory available to processes is low. The *percent* value should be in the range 0 to 100. The minimum (and default) value is 0, which means that memory caps are always enforced.

EXAMPLES **EXAMPLE 1** Configuring the Resource Capping Daemon with Immediate Enforcement

```
# rcapadm -E -i scan=15,sample=5,report=5,config=60 -c 0
```

EXIT STATUS The following exit values are returned:

- 0 Successful completion. The modifications to the current configuration were valid and made successfully.
- 1 An error occurred. A fatal error occurred either in obtaining or modifying the resource capping configuration.
- 2 Invalid command-line options were specified.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWrcapu
Interface Stability	Evolving

SEE ALSO `rcapstat(1)`, `rcapd(1M)`, `project(4)`, `attributes(5)`

“Physical Memory Control Using the Resource Capping Daemon” in *System Administration Guide: Resource Management and Network Services*

rcapd(1M)

NAME	rcapd – resource cap enforcement daemon
SYNOPSIS	rcapd [-d]
DESCRIPTION	The rcapd daemon enforces resource caps on collections of processes. Per-project physical memory caps are supported. For information about projects, see project(4). When the resident set size (RSS) of a collection of processes exceeds its cap, rcapd takes action and reduces the RSS of the collection. The virtual memory system divides physical memory into segments known as pages. To read data from a file into memory, the virtual memory system reads in individual pages. To reduce resource consumption, the daemon can page out, or relocate, infrequently used pages to an area outside of physical memory. In the project file, caps are defined for projects that have positive values for the following project attribute: rcap.max-rss The total amount of physical memory, in bytes, that is available to the project's member processes See project(4) for a description of project attributes. You can configure rcapd through the use of rcapadm(1M). The daemon can be monitored with rcapstat(1). Configuration changes are incorporated into rcapd by sending it SIGHUP (see kill(1)), or according to the configuration interval (see rcapadm(1M)). rcapd is an optional feature.
OPTIONS	The following option is supported: -d Enable debug mode. Messages are displayed on the invoking user's terminal.
EXAMPLES	EXAMPLE 1 Setting Resident Set Size Cap Attribute The following line in the /etc/project database sets an RSS cap of 1073741824 bytes for a project named foo. <pre>foo:100::foo,root::rcap.max-rss=10737418240</pre>
EXIT STATUS	The following exit values are returned: 0 Successful completion. 1 An error occurred. 2 Invalid command-line options were specified.
FILES	/etc/project Project database.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWrcapu
Interface Stability	Evolving

SEE ALSO rcapstat(1), rcapadm(1M), project(4), attributes(5)

“Physical Memory Control Using the Resource Capping Daemon” in *System Administration Guide: Resource Management and Network Services*

NOTES If killed with SIGKILL, rcapd can leave processes in a stopped state. Use SIGTERM to cause rcapd to terminate properly.

A collection’s RSS can exceed its cap for some time before the cap is enforced, even if sufficient pageable memory is available. This period of time can be reduced by shortening the RSS sampling interval with rcapadm.

rctladm(1M)

NAME	rctladm – display or modify global state of system resource controls
SYNOPSIS	rctladm [-lu] [-e <i>action</i>] [-d <i>action</i>] [<i>name</i> ...]
DESCRIPTION	The rctladm command allows the examination and modification of active resource controls on the running system. An instance of a resource control is referred to as an <i>rctl</i> . See setrctl(2) for further description of an <i>rctl</i> . Logging of <i>rctl</i> violations can be activated or deactivated system-wide and active <i>rctls</i> (and their state) can be listed.
OPTIONS	The following options are supported: -d <i>action</i> -e <i>action</i> Disable (-d) or enable (-e) the global action on the specified <i>rctls</i>. If no <i>rctl</i> is specified, no action is taken and an error status is returned. You can use the special token <i>all</i> with the disable option to deactivate all global actions on a resource control. - You can set the syslog action to a specific degree by assigning a severity level. To do this, specify <i>syslog=level</i>, where <i>level</i> is one of the string tokens given as valid severity levels in syslog(3C). You can omit the common <i>LOG_</i> prefix on the severity level. -l List available <i>rctls</i> with event status. This option displays the global event actions available for each <i>rctl</i>, and by the action name used with the enable (-e) and disable (-d) options below. The global flag values for the control are also displayed. If one or more name operands are specified, only those <i>rctls</i> matching the given names is displayed. - This is the default action if no options are specified. -u Configure resource controls based on the contents of <i>/etc/rctladm.conf</i>. Any name operands are ignored.
OPERANDS	The following operands are supported: <i>name</i> The name of the <i>rctl</i> to operate on. You can specify multiple <i>rctl</i> names may be specified. If no names are specified, and the list action has been specified, then all <i>rctls</i> are listed. If the enable or disable action is specified, one or more <i>rctl</i> names must be specified.
EXAMPLES	EXAMPLE 1 Activating System Logging for Specific Violations The following command activates system logging of all violations of <i>task.max-lwps</i>. <pre>example# rctladm -e syslog task.max-lwps example#</pre>

EXAMPLE 2 Examining Current Status of a Specific Resource

The following command examines the current status of the `task.max-lwps` resource.

```
example$ rctladm -l task.max-lwps
task.max-lwps          syslog=DEBUG
example$
```

EXIT STATUS The following exit values are returned:

- 0 Successful completion.
- 1 Fatal error occurred.
- 2 Invalid command line options were specified

FILES `/etc/rctladm.conf` Each time `rctladm` is executed, it updates the contents of `rctladm.conf` with the current configuration.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWesu

SEE ALSO `setrctl(2)`, `getrctl(2)`, `prctl(1)`, `rctlblk_get_global_flags(3C)`, `rctlblk_get_global_action(3C)`, `attributes(5)`

NOTES The base operating system provides a variety of controls by default:

```
process.max-address-space
process.max-file-descriptor
process.max-core-size
process.max-stack-size
process.max-data-size
process.max-file-size
process.max-cpu-time
```

```
task.max-cpu-time
task.max-lwps
```

```
project.cpu-shares
```

The default properties of the process resource controls are described on `setrlimit(2)`. Task and project resource controls are unenforced by default.

By default, there is no global logging of `rctl` violations.

rdate(1M)

NAME	rdate – set system date from a remote host				
SYNOPSIS	rdate <i>hostname</i>				
DESCRIPTION	rdate sets the local date and time from the <i>hostname</i> given as an argument. You must have the authorization <code>solaris.system.date</code> on the local system. Typically, <code>rdate</code> is used in a startup script. The <code>inetd</code> daemon responds to <code>rdate</code> requests. To enable <code>inetd</code> response, the lines invoking the <code>time</code> command in <code>inetd.conf</code> must not be commented out.				
USAGE	The <code>rdate</code> command is IPv6-enabled. See <code>ip6(7P)</code> .				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:				
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWrcmdc</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWrcmdc
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWrcmdc				
SEE ALSO	<code>inetd(1M)</code> , <code>inetd.conf(4)</code> , <code>attributes(5)</code> , <code>ip6(7P)</code>				

NAME	reboot – restart the operating system
SYNOPSIS	/usr/sbin/reboot [-dlnq] [<i>boot_arguments</i>]
DESCRIPTION	The reboot utility restarts the kernel. The kernel is loaded into memory by the PROM monitor, which transfers control to the loaded kernel. Although reboot can be run by the super-user at any time, shutdown(1M) is normally used first to warn all users logged in of the impending loss of service. See shutdown(1M) for details. The reboot utility performs a sync(1M) operation on the disks, and then a multi-user reboot is initiated. See init(1M) for details. The reboot utility normally logs the reboot to the system log daemon, syslogd(1M), and places a shutdown record in the login accounting file /var/adm/wtmpx. These actions are inhibited if the -n or -q options are present. Normally, the system reboots itself at power-up or after crashes.
OPTIONS	The following options are supported: -d Force a system crash dump before rebooting. See dumpadm(1M) for information on configuring system crash dumps. -l Suppress sending a message to the system log daemon, syslogd(1M) about who executed reboot. -n Avoid calling sync(2) and do not log the reboot to syslogd(1M) or to /var/adm/wtmpx. The kernel still attempts to sync filesystems prior to reboot, except if the -d option is also present. If -d is used with -n, the kernel does not attempt to sync filesystems. -q Quick. Reboot quickly and ungracefully, without shutting down running processes first.
OPERANDS	The following operands are supported: <i>boot_arguments</i> An optional <i>boot_arguments</i> string can be used to specify arguments to the uadmin(2) function that will be passed to the boot program and kernel upon restart. The form and list of arguments is described in the boot(1M) and kernel(1M) man pages. If multiple arguments are specified, they must be quoted for the shell, as shown in the EXAMPLES section. If the <i>boot_arguments</i> begin with a hyphen, they must be preceded by the -- delimiter (two hyphens) to denote the end of the reboot argument list.
EXAMPLES	EXAMPLE 1 Passing the -r and -v Arguments to boot In the following example, the delimiter -- (two hyphens) must be used to separate the options of reboot from the arguments of boot(1M).

reboot(1M)

EXAMPLE 1 Passing the -r and -v Arguments to boot (Continued)

```
example# reboot -dl -- -rv
```

EXAMPLE 2 Rebooting Using a Specific Disk and Kernel

The following example reboots using a specific disk and kernel. Note that multiple boot arguments are quoted.

```
example# reboot "disk1 kernel.test/unix"
```

FILES /var/adm/wtmpx login accounting file

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO mdb(1), boot(1M), dumpadm(1M), fsck(1M), halt(1M), init(1M), kernel(1M), shutdown(1M), sync(1M), syslogd(1M), sync(2), uadmin(2), reboot(3C), attributes(5)

NOTES The reboot utility does not execute the scripts in /etc/rcnum.d or execute shutdown actions in inittab(4). To ensure a complete shutdown of system services, use shutdown(1M) or init(1M) to reboot a Solaris system.

NAME	rem_drv – remove a device driver from the system				
SYNOPSIS	rem_drv [-b <i>basedir</i>] <i>device_driver</i>				
DESCRIPTION	The <code>rem_drv</code> command informs the system that the device driver <i>device_driver</i> is no longer valid. If possible, <code>rem_drv</code> unloads <i>device_driver</i> from memory. Entries for the device in the <code>/devices</code> namespace are removed. <code>rem_drv</code> also updates the system driver configuration files. If <code>rem_drv</code> has been executed, the next time the system is rebooted it automatically performs a reconfiguration boot (see <code>kernel(1M)</code>).				
OPTIONS	The following options are supported: -b <i>basedir</i> Sets the path to the root directory of the diskless client. Used on the server to execute <code>rem_drv</code> for a client. The client machine must be rebooted to unload the driver.				
EXAMPLES	EXAMPLE 1 Removing the sd Driver The following example removes the <code>sd</code> driver from use: <pre>example% rem_drv sd</pre> EXAMPLE 2 Removing a Diskless Client The next example removes the driver from the <code>sun1</code> diskless client. The driver is not uninstalled or unloaded until the client machine is rebooted. <pre>example% rem_drv -b /export/root/sun1 sd</pre>				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>add_drv(1M)</code> , <code>drvconfig(1M)</code> , <code>kernel(1M)</code> , <code>attributes(5)</code>				

removef(1M)

NAME	removef – remove a file from software database
SYNOPSIS	<pre>removef [[-M] -R <i>root_path</i>] [-V <i>fs_file</i>] <i>pkginst path</i>...</pre> <pre>removef [[-M] -R <i>root_path</i>] [-V <i>fs_file</i>] -f <i>pkginst</i></pre>
DESCRIPTION	removef informs the system that the user, or software, intends to remove a pathname. Output from removef is the list of input pathnames that may be safely removed (no other packages have a dependency on them).
OPTIONS	The following options are supported: -f After all files have been processed, removef should be invoked with the -f option to indicate that the removal phase is complete. -M Instruct removef not to use the <i>\$root_path/etc/vfstab</i> file for determining the client's mount points. This option assumes the mount points are correct on the server and it behaves consistently with Solaris 2.5 and earlier releases. -R <i>root_path</i> Define the full path name of a directory to use as the <i>root_path</i>. All files, including package system information files, are relocated to a directory tree starting in the specified <i>root_path</i>. The <i>root_path</i> may be specified when installing to a client from a server (for example, <i>/export/root/client1</i>). -V <i>fs_file</i> Specify an alternative <i>fs_file</i> to map the client's file systems. For example, used in situations where the <i>\$root_path/etc/vfstab</i> file is non-existent or unreliable.
OPERANDS	The following operands are supported: <i>path</i> The pathname to be removed. <i>pkginst</i> The package instance from which the pathname is being removed.
EXAMPLES	EXAMPLE 1 Using removef The following example uses the removef command in an optional pre-install script: <pre>echo "The following files are no longer part of this package and are being removed." removef \$PKGINST /dev/xt[0-9][0-9][0-9] while read pathname do echo "\$pathname" rm -f \$pathname done removef -f \$PKGINST exit 2</pre>
EXIT STATUS	0 Successful completion. >0 An error occurred.

removef(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO pkginfo(1), pkgmk(1), pkgparam(1), pkgproto(1), pkgtrans(1), installf(1M), pkgadd(1M), pkgask(1M), pkgchk(1M), attributes(5)

Application Packaging Developer's Guide

repquota(1M)

NAME	repquota – summarize quotas for a ufs file system				
SYNOPSIS	repquota [-v] <i>filesystem</i> ... repquota -a [-v]				
DESCRIPTION	repquota prints a summary of the disk usage and quotas for the specified ufs file systems. The current number of files and amount of space (in kilobytes) is printed for each user along with any quotas created with edquota(1M). The <i>filesystem</i> must have the file quotas in its root directory. Only the super-user may view quotas which are not their own.				
OPTIONS	The following options are supported: -a Report on all mounted ufs file systems that have <i>rq</i> in the <i>mntopts</i> field of the <i>/etc/vfstab</i> file. -v Report quotas for all users, even those who do not consume resources.				
USAGE	See <i>largefile</i> (5) for the description of the behavior of <i>repquota</i> when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).				
ATTRIBUTES	See <i>attributes</i>(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<i>edquota</i> (1M), <i>quota</i> (1M), <i>quotacheck</i> (1M), <i>quotaon</i> (1M), <i>attributes</i> (5), <i>largefile</i> (5), <i>quotactl</i> (7I)				

NAME	re-preinstall – installs the JumpStart software on a system				
SYNOPSIS	<code>cdrom-mnt-pt/Solaris_XX/Tools/Boot/usr/sbin/install.d/re-preinstall [-m Solaris_boot_dir] [-k platform_name] target-slice</code>				
DESCRIPTION	re-preinstall installs the JumpStart software (preinstall boot image) on a system, so you can power-on the system and have it automatically install the Solaris software (perform a JumpStart installation on the system). When you turn on a re-preinstalled system, the system looks for the JumpStart software on the system's default boot disk. All new SPARC systems have the JumpStart software already preinstalled. The XX in Solaris_XX is the version number of the Solaris release being used. You can use the re-preinstall command in several ways. The most common way is to run re-preinstall on a system to install the JumpStart software on its own default boot disk. This is useful if you want to restore a system to its original factory conditions. (See the first procedure described in EXAMPLES.) You can also run re-preinstall on a system to install JumpStart software on any attached disk (non-boot disk). After you install the JumpStart software on a disk, you can move the disk to a different system and perform a JumpStart installation on the different system. (See the second procedure described in EXAMPLES.) re-preinstall creates a standard file system on the specified <i>target-slice</i> (usually slice 0), and re-preinstall makes sure there is enough space on the <i>target-slice</i> for the JumpStart software. If sufficient space is not available, re-preinstall fails with the following message: <pre>re-preinstall: target-slice too small xx Megabytes required</pre> You can use the format(1M) command to create sufficient space on the <i>target-slice</i> for the JumpStart software.				
OPTIONS	The following options are supported: <table> <tr> <td><code>-k platform_name</code></td><td>Platform name of the system that will use the disk with the JumpStart software. The default is the platform name of the system running re-preinstall. (Use the uname(1) command (-i option) to determine a system's platform name.)</td></tr> <tr> <td><code>-m Solaris_boot_dir</code></td><td>Absolute path to the Solaris_XX/Tools/Boot subdirectory of a mounted Solaris CD or a Solaris CD copied to disk that re-preinstall uses to install the JumpStart software. The default is root (/), which is where the Solaris CD is mounted in single-user mode.</td></tr> </table>	<code>-k platform_name</code>	Platform name of the system that will use the disk with the JumpStart software. The default is the platform name of the system running re-preinstall. (Use the uname(1) command (-i option) to determine a system's platform name.)	<code>-m Solaris_boot_dir</code>	Absolute path to the Solaris_XX/Tools/Boot subdirectory of a mounted Solaris CD or a Solaris CD copied to disk that re-preinstall uses to install the JumpStart software. The default is root (/), which is where the Solaris CD is mounted in single-user mode.
<code>-k platform_name</code>	Platform name of the system that will use the disk with the JumpStart software. The default is the platform name of the system running re-preinstall. (Use the uname(1) command (-i option) to determine a system's platform name.)				
<code>-m Solaris_boot_dir</code>	Absolute path to the Solaris_XX/Tools/Boot subdirectory of a mounted Solaris CD or a Solaris CD copied to disk that re-preinstall uses to install the JumpStart software. The default is root (/), which is where the Solaris CD is mounted in single-user mode.				
OPERANDS	The following operands are supported: <table> <tr> <td><i>target-slice</i></td><td>Device name of the disk slice where the JumpStart software will be installed (usually slice 0), for example, c0t3d0s0.</td></tr> </table>	<i>target-slice</i>	Device name of the disk slice where the JumpStart software will be installed (usually slice 0), for example, c0t3d0s0.		
<i>target-slice</i>	Device name of the disk slice where the JumpStart software will be installed (usually slice 0), for example, c0t3d0s0.				

re-preinstall(1M)

EXAMPLES

EXAMPLE 1 Installing the JumpStart Software on a System's Own Default Boot Disk

The following procedure installs the JumpStart software on a system's own default boot disk:

1. From the `ok` prompt, boot the system from the Solaris media CD or DVD in single-user mode:
2. The following command installs the Jumpstart software on the System default boot disk, `c0t0d0s0` on a Solaris 9 system:

```
ok boot cdrom -s
```

```
example# /usr/sbin/install.d/re-preinstall c0t0d0s1
```

3. Reboot the slice:

```
example# reboot disk:b
```

EXAMPLE 2 Installing the JumpStart Software on a System's Attached (non-boot) Disk

The following procedure installs the JumpStart software on a system's attached (non-boot) disk:

1. Mount the Solaris CD or DVD if `vold(1M)` is not running or CD or DVD is not mounted.
2. Use the `format(1M)` command to determine the target-slice where JumpStart will be installed.
3. Use the `uname(1)` command (`-i` option) to determine the platform name of the system that will use the re-preinstalled disk
4. Run `re-preinstall` with the `-m Solaris_boot_dir` option if the Solaris CD or DVD is not mounted on `/cdrom`.

The following command installs the JumpStart software on the system's attached disk for a system with a Sun4u kernel architecture, and it uses the Solaris CD or DVD mounted with `vold(1M)` on a Solaris 9 system:

```
example# /cdrom/cdrom/s1/usr/bin/install.d/re-preinstall -m  
/cdrom/cdrom/s1 -k sun4u c0t2d0s0
```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	An error has occurred.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

re-preinstall(1M)

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcdrom (Solaris CD, SPARC Platform Edition)

SEE ALSO `uname(1)`, `eeeprom(1M)`, `format(1M)`, `mount(1M)`, `vold(1M)`, `attributes(5)`

Solaris 9 12/03 Installation Guide

rmmount(1M)

NAME	rmmount – removable media mounter for CD-ROM, floppy, Jaz drive, and others
SYNOPSIS	<code>/usr/sbin/rmmount [-D]</code>
DESCRIPTION	The <code>rmmount</code> utility is a removable media mounter that is executed by Volume Management whenever a removable medium, such as a CD-ROM or a floppy, is inserted. The Volume Management daemon, <code>vold(1M)</code>, manages removable media. <code>rmmount</code> can also be called by using <code>volrmmount(1)</code>. Upon insertion of a medium and following invocation of the <code>volcheck(1)</code> command, <code>rmmount</code> determines what type of file system (if any) is on that medium. If a file system is present, <code>rmmount</code> mounts the file system in one of the locations listed below. For a diskette (floppy): <code>/floppy/floppy0</code> symbolic link to mounted floppy in local floppy drive <code>/floppy/floppy_name</code> mounted named floppy <code>/floppy/unnamed_floppy</code> mounted unnamed floppy For a CD-ROM or a DVD-ROM: <code>/cdrom/cdrom0</code> symbolic link to mounted CD-ROM in local CD-ROM drive <code>/cdrom/CD-ROM_name</code> mounted named CD-ROM <code>/cdrom/CD-ROM_name/partition</code> mounted named CD-ROM with partitioned file system <code>/cdrom/unnamed_cdrom</code> mounted unnamed CD-ROM For a Zip drive: <code>/rmdisk/zip0</code> symbolic link to mounted Zip medium in local Zip drive <code>/rmdisk/Zip_name</code> mounted named Zip medium <code>/rmdisk/Zip_name/partition</code> mounted named Zip medium with partitioned file system <code>/rmdisk/unnamed_zip</code> mounted unnamed Zip medium For a Jaz drive:

```

/rmdisk/jaz0
    symbolic link to mounted Jaz medium in local Jaz drive
/rmdisk/Jaz_name
    mounted named Jaz medium
/rmdisk/Jaz_name/partition
    mounted named Jaz medium with partitioned file system
/rmdisk/unnamed_Jaz
    mounted unnamed Jaz medium

```

For a generic “rmdisk” drive:

```

/rmdisk/rmdisk0
    symbolic link to mounted removable medium in local removable medium drive
/rmdisk/rmdisk_name
    mounted named removable medium
/rmdisk/rmdisk_name/partition
    mounted named removable medium with partitioned file system
/rmdisk/unnamed_rmdisk
    mounted unnamed removable medium

```

If the media is read-only (for example, a CD-ROM or a floppy with write-protect tab set), the file system is mounted read-only.

If a file system is not identified, `rmmount` does not mount a file system. See the *System Administration Guide: Basic Administration* for more information on the location of CD-ROM, floppy, and other media without file systems. Also see `volfs(7FS)`.

If a file system type has been determined, it is then checked to see that it is “clean.” If the file system is “dirty,” `fsck -p` (see `fsck(1M)`) is run in an attempt to clean it. If `fsck` fails, the file system is mounted read-only.

After the mount is complete, “actions” associated with the media type are executed. These actions allow for the notification to other programs that new media are available. These actions are shared objects and are described in the configuration file, `/etc/rmmount.conf`. See `rmmount.conf(4)`.

Actions are executed in the order in which they appear in the configuration file. The action function can return either 1 or 0. If it returns 0, no further actions will be executed. This allows the function to control which applications are executed.

In order to execute an action, `rmmount` performs a `dlopen(3DL)` on the shared object and calls the action function defined within it. The definition of the interface to actions can be found in `/usr/include/rmmount.h`.

rmmount(1M)

File systems mounted by `rmmount` are always mounted with the `nosuid` flag set, thereby disabling `setuid` programs and access to block or character devices in that file system. Upon ejection, `rmmount` unmounts mounted file systems and executes actions associated with the media type. If a file system is “busy” (that is, it contains the current working directory of a live process), the ejection will fail.

OPTIONS `-D` Turn on the debugging output from the `rmmount` `dprintf` calls.

FILES `/etc/rmmount.conf` removable media mouter configuration file
 `/usr/lib/rmmount/*.so.1` shared objects used by `rmmount`.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWvolu

SEE ALSO `volcancel(1)`, `volcheck(1)`, `volmissing(1)`, `volrmmount(1)`, `fsck(1M)`,
 `vold(1M)`, `dlopen(3DL)`, `rmmount.conf(4)`, `vold.conf(4)`, `attributes(5)`,
 `volfs(7FS)`

System Administration Guide: Basic Administration

NAME	rmt – remote magtape protocol module												
SYNOPSIS	<code>/usr/sbin/rmt</code>												
DESCRIPTION	rmt is a program used by the remote dump and restore programs in manipulating a magnetic tape drive through an interprocess communication connection. rmt is normally started up with an <code>rexec(3SOCKET)</code> or <code>rcmd(3SOCKET)</code> call. The rmt program accepts requests that are specific to the manipulation of magnetic tapes, performs the commands, then responds with a status indication. All responses are in ASCII and in one of two forms. Successful commands have responses of: <i>A</i>number\n where <i>number</i> is an ASCII representation of a decimal number. Unsuccessful commands are responded to with: <i>E</i>error-number\n<i>e</i>rror-message\n where <i>error-number</i> is one of the possible error numbers described in <code>intro(3)</code>, and <i>error-message</i> is the corresponding error string as printed from a call to <code>perror(3C)</code>. The protocol consists of the following commands: <table> <tr> <td><i>S</i>\n</td><td>Return the status of the open device, as obtained with a <code>MTIOCGET ioctl</code> call. If the operation was successful, an “ack” is sent with the size of the status buffer, then the status buffer is sent (in binary).</td></tr> <tr> <td><i>C</i>device\n</td><td>Close the currently open device. The <i>device</i> specified is ignored.</td></tr> <tr> <td><i>I</i>operation\n<i>n</i>count\n</td><td>Perform a <code>MTIOCOP ioctl(2)</code> command using the specified parameters. The parameters are interpreted as the ASCII representations of the decimal values to place in the <i>mt_op</i> and <i>mt_count</i> fields of the structure used in the <code>ioctl</code> call. When the operation is successful the return value is the <i>count</i> parameter.</td></tr> <tr> <td><i>L</i>offset\n<i>n</i>whence\n</td><td>Perform an <code>lseek(2)</code> operation using the specified parameters. The response value is returned from the <code>lseek</code> call.</td></tr> <tr> <td><i>O</i>device\n<i>n</i>mode\n</td><td>Open the specified <i>device</i> using the indicated <i>mode</i>. <i>device</i> is a full pathname, and <i>mode</i> is an ASCII representation of a decimal number suitable for passing to <code>open(9E)</code>. If a device is already open, it is closed before a new open is performed.</td></tr> <tr> <td><i>R</i>count\n</td><td>Read <i>count</i> bytes of data from the open device. rmt performs the requested <code>read(9E)</code> and responds with <i>A</i>count-read\n if the read was successful; otherwise an</td></tr> </table>	<i>S</i> \n	Return the status of the open device, as obtained with a <code>MTIOCGET ioctl</code> call. If the operation was successful, an “ack” is sent with the size of the status buffer, then the status buffer is sent (in binary).	<i>C</i> device\n	Close the currently open device. The <i>device</i> specified is ignored.	<i>I</i> operation\n <i>n</i> count\n	Perform a <code>MTIOCOP ioctl(2)</code> command using the specified parameters. The parameters are interpreted as the ASCII representations of the decimal values to place in the <i>mt_op</i> and <i>mt_count</i> fields of the structure used in the <code>ioctl</code> call. When the operation is successful the return value is the <i>count</i> parameter.	<i>L</i> offset\n <i>n</i> whence\n	Perform an <code>lseek(2)</code> operation using the specified parameters. The response value is returned from the <code>lseek</code> call.	<i>O</i> device\n <i>n</i> mode\n	Open the specified <i>device</i> using the indicated <i>mode</i> . <i>device</i> is a full pathname, and <i>mode</i> is an ASCII representation of a decimal number suitable for passing to <code>open(9E)</code> . If a device is already open, it is closed before a new open is performed.	<i>R</i> count\n	Read <i>count</i> bytes of data from the open device. rmt performs the requested <code>read(9E)</code> and responds with <i>A</i> count-read\n if the read was successful; otherwise an
<i>S</i> \n	Return the status of the open device, as obtained with a <code>MTIOCGET ioctl</code> call. If the operation was successful, an “ack” is sent with the size of the status buffer, then the status buffer is sent (in binary).												
<i>C</i> device\n	Close the currently open device. The <i>device</i> specified is ignored.												
<i>I</i> operation\n <i>n</i> count\n	Perform a <code>MTIOCOP ioctl(2)</code> command using the specified parameters. The parameters are interpreted as the ASCII representations of the decimal values to place in the <i>mt_op</i> and <i>mt_count</i> fields of the structure used in the <code>ioctl</code> call. When the operation is successful the return value is the <i>count</i> parameter.												
<i>L</i> offset\n <i>n</i> whence\n	Perform an <code>lseek(2)</code> operation using the specified parameters. The response value is returned from the <code>lseek</code> call.												
<i>O</i> device\n <i>n</i> mode\n	Open the specified <i>device</i> using the indicated <i>mode</i> . <i>device</i> is a full pathname, and <i>mode</i> is an ASCII representation of a decimal number suitable for passing to <code>open(9E)</code> . If a device is already open, it is closed before a new open is performed.												
<i>R</i> count\n	Read <i>count</i> bytes of data from the open device. rmt performs the requested <code>read(9E)</code> and responds with <i>A</i> count-read\n if the read was successful; otherwise an												

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error in standard format is returned. If the read was successful, the data read is sent.

wcount \n

Write data onto the open device. *rmt* reads *count* bytes from the connection, aborting if a premature EOF is encountered. The response value is returned from the *write(9E)* call.

Any other command causes *rmt* to exit.

ATTRIBUTES See *attributes(5)* for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWrcmdc

SEE ALSO *ufsdump(1M)*, *ufsrestore(1M)*, *intro(3)*, *ioctl(2)*, *lseek(2)*, *perror(3C)*, *rcmd(3SOCKET)*, *rexec(3SOCKET)*, *attributes(5)*, *mtio(7I)*, *open(9E)*, *read(9E)*, *write(9E)*

DIAGNOSTICS All responses are of the form described above.

BUGS Do not use this for a remote file access protocol.

NAME	roleadd – administer a new role account on the system
SYNOPSIS	<pre> roleadd [-c <i>comment</i>] [-d <i>dir</i>] [-e <i>expire</i>] [-f <i>inactive</i>] [-g <i>group</i>] [-G <i>group</i> [, <i>group</i>...]] [-m [-k <i>skel_dir</i>]] [-u <i>uid</i> [-o]] [-s <i>shell</i>] [-A <i>authorization</i> [, <i>authorization</i>...]] <i>role</i> roleadd -D [-b <i>base_dir</i>] [-e <i>expire</i>] [-f <i>inactive</i>] [-g <i>group</i>] [-A <i>authorization</i> [, <i>authorization</i>...]] [-P <i>profile</i> [, <i>profile</i>...]] </pre>
DESCRIPTION	roleadd adds a role entry to the <code>/etc/passwd</code> and <code>/etc/shadow</code> and <code>/etc/user_attr</code> files. The <code>-A</code> and <code>-P</code> options respectively assign authorizations and profiles to the role. Roles cannot be assigned to other roles. roleadd also creates supplementary group memberships for the role (<code>-G</code> option) and creates the home directory (<code>-m</code> option) for the role if requested. The new role account remains locked until the <code>passwd(1)</code> command is executed. Specifying roleadd <code>-D</code> with the <code>-g</code>, <code>-b</code>, <code>-f</code>, or <code>-e</code> option (or any combination of these option) sets the default values for the respective fields. See the <code>-D</code> option. Subsequent roleadd commands without the <code>-D</code> option use these arguments. The system file entries created with this command have a limit of 512 characters per line. Specifying long arguments to several options can exceed this limit. The role (<i>role</i>) field accepts a string of no more than eight bytes consisting of characters from the set of alphabetic characters, numeric characters, period (<code>.</code>), underscore (<code>_</code>), and hyphen (<code>-</code>). The first character should be alphabetic and the field should contain at least one lower case alphabetic character. A warning message will be written if these restrictions are not met. A future Solaris release may refuse to accept role fields that do not meet these requirements. The <i>role</i> field must contain at least one character and must not contain a colon (<code>:</code>) or a newline (<code>\n</code>).
OPTIONS	The following options are supported: <code>-A <i>authorization</i></code> One or more comma separated authorizations defined in <code>auth_attr(4)</code>. Only a user or role who has grant rights to the authorization can assign it to an account <code>-b <i>base_dir</i></code> The default base directory for the system if <code>-d <i>dir</i></code> is not specified. <i>base_dir</i> is concatenated with the account name to define the home directory. If the <code>-m</code> option is not used, <i>base_dir</i> must exist. <code>-c <i>comment</i></code> Any text string. It is generally a short description of the role. This information is stored in the role's <code>/etc/passwd</code> entry. <code>-d <i>dir</i></code> The home directory of the new role. It defaults to <code>base_dir/account_name</code>, where <i>base_dir</i> is the base directory for new login home directories and <i>account_name</i> is the new role name.

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-D	Display the default values for <i>group</i>, <i>base_dir</i>, <i>skel_dir</i>, <i>shell</i>, <i>inactive</i>, and <i>expire</i>. When used with the -g, -b, or -f, options, the -D option sets the default values for the specified fields. The default values are: <table> <tr> <td>group</td><td>other (GID of 1)</td></tr> <tr> <td>base_dir</td><td>/home</td></tr> <tr> <td>skel_dir</td><td>/etc/skel</td></tr> <tr> <td>shell</td><td>/bin/sh</td></tr> <tr> <td>inactive</td><td>0</td></tr> <tr> <td>expire</td><td>Null</td></tr> <tr> <td>auths</td><td>Null</td></tr> <tr> <td>profiles</td><td>Null</td></tr> </table>	group	other (GID of 1)	base_dir	/home	skel_dir	/etc/skel	shell	/bin/sh	inactive	0	expire	Null	auths	Null	profiles	Null
group	other (GID of 1)																
base_dir	/home																
skel_dir	/etc/skel																
shell	/bin/sh																
inactive	0																
expire	Null																
auths	Null																
profiles	Null																
-e <i>expire</i>	Specify the expiration date for a role. After this date, no user will be able to access this role. The expire option argument is a date entered using one of the date formats included in the template file /etc/datemsk. See getdate(3C). If the date format that you choose includes spaces, it must be quoted. For example, you can enter 10/6/90 or "October 6, 1990". A null value (" ") defeats the status of the expired date. This option is useful for creating temporary roles.																
-f <i>inactive</i>	The maximum number of days allowed between uses of a role ID before that ID is declared invalid. Normal values are positive integers. A value of 0 defeats the status.																
-g <i>group</i>	An existing group's integer ID or character-string name. Without the -D option, it defines the new role's primary group membership and defaults to the default group. You can reset this default value by invoking roleadd -D -g <i>group</i>.																
-G <i>group</i>	An existing group's integer ID or character-string name. It defines the new role's supplementary group membership. Duplicates between <i>group</i> with the -g and -G options are ignored. No more than NGROUPS_MAX groups can be specified.																
-k <i>skel_dir</i>	A directory that contains skeleton information (such as .profile) that can be copied into a new role's home directory. This directory must already exist. The system provides the /etc/skel directory that can be used for this purpose.																
-m	Create the new role's home directory if it does not already exist. If the directory already exists, it must have read, write, and execute permissions by <i>group</i>, where <i>group</i> is the role's primary group.																

- o This option allows a UID to be duplicated (non-unique).
- P *profile* One or more comma-separated execution profiles defined in `prof_attr(4)`.
- s *shell* Full pathname of the program used as the user's shell on login. It defaults to an empty field causing the system to use `/bin/sh` as the default. The value of *shell* must be a valid executable file.
- u *uid* The UID of the new role. This UID must be a non-negative decimal integer below `MAXUID` as defined in `<sys/param.h>`. The UID defaults to the next available (unique) number above the highest number currently assigned. For example, if UIDs 100, 105, and 200 are assigned, the next default UID number will be 201. (UIDs from 0-99 are reserved for possible use in future applications.)

FILES

- `/etc/datemsk`
- `/etc/passwd`
- `/etc/shadow`
- `/etc/group`
- `/etc/skel`
- `/usr/include/limits.h`
- `/etc/user_attr`

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `passwd(1)`, `profiles(1)`, `roles(1)`, `users(1B)`, `groupadd(1M)`, `groupdel(1M)`, `groupmod(1M)`, `grpck(1M)`, `logins(1M)`, `pwck(1M)`, `userdel(1M)`, `usermod(1M)`, `getdate(3C)`, `auth_attr(4)`, `passwd(4)`, `prof_attr(4)`, `user_attr(4)`, `attributes(5)`

DIAGNOSTICS In case of an error, `roleadd` prints an error message and exits with a non-zero status.

The following indicates that login specified is already in use:

```
UX: roleadd: ERROR: login is already in use. Choose another.
```

The following indicates that the *uid* specified with the `-u` option is not unique:

```
UX: roleadd: ERROR: uid uid is already in use. Choose another.
```

roleadd(1M)

The following indicates that the *group* specified with the *-g* option is already in use:

```
UX: roleadd: ERROR: group group does not exist. Choose another.
```

The following indicates that the *uid* specified with the *-u* option is in the range of reserved UIDs (from 0-99):

```
UX: roleadd: WARNING: uid uid is reserved.
```

The following indicates that the *uid* specified with the *-u* option exceeds MAXUID as defined in *<sys/param.h>*:

```
UX: roleadd: ERROR: uid uid is too big. Choose another.
```

The following indicates that the */etc/passwd* or */etc/shadow* files do not exist:

```
UX: roleadd: ERROR: Cannot update system files - login cannot be created.
```

NOTES If a network nameservice such as NIS or NIS+ is being used to supplement the local */etc/passwd* file with additional entries, *roleadd* cannot change information supplied by the network nameservice.

NAME	roledel – delete a role’s login from the system				
SYNOPSIS	roledel [-r] <i>role</i>				
DESCRIPTION	The roledel utility deletes a role account from the system and makes the appropriate account-related changes to the system file and file system. roledel also removes the role from each user’s list of assumable roles.				
OPTIONS	The following options are supported: -r Remove the role’s home directory from the system. This directory must exist. The files and directories under the home directory will no longer be accessible following successful execution of the command.				
OPERANDS	The following operands are supported: <i>role</i> An existing role name to be deleted.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. 2 Invalid command syntax. A usage message for the roledel command is displayed. 6 The account to be removed does not exist. 8 The account to be removed is in use. 10 Cannot update the <i>/etc/group</i> or <i>/etc/user_attr</i> file but the login is removed from the <i>/etc/passwd</i> file. 12 Cannot remove or otherwise modify the home directory.				
FILES	<i>/etc/passwd</i> system password file <i>/etc/shadow</i> system file containing roles’ encrypted passwords and related information <i>/etc/group</i> system file containing group definitions <i>/etc/user_attr</i> system file containing additional role attributes				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				

roledel(1M)

SEE ALSO auths(1), passwd(1), profiles(1), roles(1), users(1B), groupadd(1M), groupdel(1M), groupmod(1M), logins(1M), roleadd(1M), rolemod(1M), useradd(1M), userdel(1M), usermod(1M), passwd(4), prof_attr(4), user_attr(4), attributes(5)

NOTES The roledel utility only deletes an account definition that is in the local /etc/group, /etc/passwd, /etc/shadow, and /etc/user_attr file. file. If a network name service such as NIS or NIS+ is being used to supplement the local /etc/passwd file with additional entries, roledel cannot change information supplied by the network name service.

NAME	rolemod – modify a role’s login information on the system
SYNOPSIS	rolemod [-u <i>uid</i> [-o]] [-g <i>group</i>] [-G <i>group</i> [, <i>group</i> ...]] [-d <i>dir</i> [-m]] [-s <i>shell</i>] [-c <i>comment</i>] [-l <i>new_name</i>] [-f <i>inactive</i>] [-e <i>expire</i>] [-A <i>authorization</i> [, <i>authorization</i>]] [-P <i>profile</i> [, <i>profile</i>]] <i>role</i>
DESCRIPTION	The rolemod utility modifies a role’s login information on the system. It changes the definition of the specified login and makes the appropriate login-related system file and file system changes. The system file entries created with this command have a limit of 512 characters per line. Specifying long arguments to several options may exceed this limit.
OPTIONS	The following options are supported: -A <i>authorization</i> One or more comma separated authorizations as defined in <code>auth_attr(4)</code>. Only role with grant rights to the <i>authorization</i> can assign it to an account. This replaces any existing authorization setting. -c <i>comment</i> Specify a comment string. <i>comment</i> can be any text string. It is generally a short description of the login, and is currently used as the field for the user’s full name. This information is stored in the user’s <code>/etc/passwd</code> entry. -d <i>dir</i> Specify the new home directory of the role. It defaults to <code>base_dir/login</code>, where <i>base_dir</i> is the base directory for new login home directories, and <i>login</i> is the new login. -e <i>expire</i> Specify the expiration date for a role. After this date, no role will be able to access this login. The expire option argument is a date entered using one of the date formats included in the template file <code>/etc/datemsk</code>. See <code>getdate(3C)</code>. - For example, you may enter <code>10/6/90</code> or <code>October 6, 1990</code>. A value of <code>''</code> defeats the status of the expired date. -f <i>inactive</i> Specify the maximum number of days allowed between uses of a login ID before that login ID is declared invalid. Normal values are positive integers. A value of 0 defeats the status. -g <i>group</i> Specify an existing group’s integer ID or character-string name. It redefines the role’s primary group membership. -G <i>group</i> Specify an existing group’s integer "ID" or character string name. It redefines the role’s supplementary

rolemod(1M)

	group membership. Duplicates between <i>group</i> with the -g and -G options are ignored. No more than NGROUPS_UMAX groups may be specified as defined in <param.h>.
-l <i>new_logname</i>	Specify the new login name for the role. The <i>new_logname</i> argument is a string no more than eight bytes consisting of characters from the set of alphabetic characters, numeric characters, period (.), underline (_), and hyphen (-). The first character should be alphabetic and the field should contain at least one lower case alphabetic character. A warning message will be written if these restrictions are not met. A future Solaris release may refuse to accept login fields that do not meet these requirements. The <i>new_logname</i> argument must contain at least one character and must not contain a colon (:) or NEWLINE (\n).
-m	Move the role's home directory to the new directory specified with the -d option. If the directory already exists, it must have permissions read/write/execute by <i>group</i> , where <i>group</i> is the role's primary group.
-o	This option allows the specified UID to be duplicated (non-unique).
-P <i>profile</i>	One or more comma-separated execution profiles defined in <i>auth_attr</i> (4). This replaces any existing profile setting.
-s <i>shell</i>	Specify the full pathname of the program that is used as the role's shell on login. The value of <i>shell</i> must be a valid executable file.
-u <i>uid</i>	Specify a new UID for the role. It must be a non-negative decimal integer less than MAXUID as defined in <param.h>. The UID associated with the role's home directory is not modified with this option; a role will not have access to their home directory until the UID is manually reassigned using <i>chown</i> (1M).
OPERANDS	The following operands are supported: login An existing login name to be modified.
EXIT STATUS	In case of an error, <i>rolemod</i> prints an error message and exits with one of the following values: 2 The command syntax was invalid. A usage message for the <i>rolemod</i> command is displayed. 3 An invalid argument was provided to an option.

- 4 The *uid* given with the *-u* option is already in use.
- 5 The password files contain an error. *pwconv*(1M) can be used to correct possible errors. See *passwd*(4).
- 6 The login to be modified does not exist, the *group* does not exist, or the login shell does not exist.
- 8 The login to be modified is in use.
- 9 The *new_logname* is already in use.
- 10 Cannot update the */etc/group* or */etc/user_attr* file. Other update requests will be implemented.
- 11 Insufficient space to move the home directory (*-m* option). Other update requests will be implemented.
- 12 Unable to complete the move of the home directory to the new home directory.

FILES	<i>/etc/group</i>	system file containing group definitions
	<i>/etc/datemsk</i>	system file of date formats
	<i>/etc/passwd</i>	system password file
	<i>/etc/shadow</i>	system file containing users' and roles' encrypted passwords and related information
	<i>/etc/usr_attr</i>	system file containing additional user and role attributes

ATTRIBUTES See *attributes*(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO *passwd*(1), *users*(1B), *chown*(1M), *groupadd*(1M), *groupdel*(1M), *groupmod*(1M), *logins*(1M), *pwconv*(1M), *roleadd*(1M), *roledel*(1M), *useradd*(1M), *userdel*(1M), *usermod*(1M), *getdate*(3C), *auth_attr*(4), *passwd*(4), *attributes*(5)

route(1M)

NAME	route – manually manipulate the routing tables												
SYNOPSIS	<pre> route [-fnvq] <i>sub-command</i> [[<i>modifiers</i>] <i>args</i>] route [-fnvq] add delete [<i>modifiers</i>] <i>destination gateway</i> [<i>args</i>] route [-fnvq] change get [<i>modifiers</i>] <i>destination</i> [<i>gateway</i> [<i>args</i>]] route [-fn] monitor [<i>modifiers</i>] route [-fnvq] flush [<i>modifiers</i>] </pre>												
DESCRIPTION	route manually manipulates the network routing tables. These tables are normally maintained by the system routing daemon, such as <code>in.routed(1M)</code> and <code>in.ripngd(1M)</code>. route supports a limited number of general options, but a rich command language. Users can specify an arbitrary request that can be delivered by means of the programmatic interface discussed in <code>route(7P)</code>. route uses a routing socket and the new message types RTM_ADD, RTM_DELETE, RTM_GET, and RTM_CHANGE. Only superusers can modify routing tables.												
OPTIONS	-f Flush the routing tables of all gateway entries. If you use the -f option in conjunction with any of the <code>route</code> sub-commands, <code>route</code> flushes the gateways before performing the sub-command. Specify the table to flush by placing the -inet or -inet6 modifier immediately after the -f option. If unspecified, flushing IPv4 (-inet) routes is the default. -n Prevent attempts to print host and network names symbolically when reporting actions. This option is useful when name servers are unavailable. -v Print additional details in verbose mode. -q Suppress all output.												
Sub-commands	The following sub—commands are supported: <table> <tr> <td><code>add</code></td><td>Add a route.</td></tr> <tr> <td><code>change</code></td><td>Change aspects of a route (such as its gateway).</td></tr> <tr> <td><code>delete</code></td><td>Delete a specific route.</td></tr> <tr> <td><code>flush</code></td><td>Remove all gateway entries from the routing table.</td></tr> <tr> <td><code>get</code></td><td>Look up and display the route for a destination.</td></tr> <tr> <td><code>monitor</code></td><td>Continuously report any changes to the routing information base, routing lookup misses, or suspected network partitionings.</td></tr> </table> The <code>add</code> and <code>delete</code> sub-commands have the following syntax: <pre> route [-fnvq] cmd <i>destination gateway</i> [metric/netmask] </pre>	<code>add</code>	Add a route.	<code>change</code>	Change aspects of a route (such as its gateway).	<code>delete</code>	Delete a specific route.	<code>flush</code>	Remove all gateway entries from the routing table.	<code>get</code>	Look up and display the route for a destination.	<code>monitor</code>	Continuously report any changes to the routing information base, routing lookup misses, or suspected network partitionings.
<code>add</code>	Add a route.												
<code>change</code>	Change aspects of a route (such as its gateway).												
<code>delete</code>	Delete a specific route.												
<code>flush</code>	Remove all gateway entries from the routing table.												
<code>get</code>	Look up and display the route for a destination.												
<code>monitor</code>	Continuously report any changes to the routing information base, routing lookup misses, or suspected network partitionings.												

where *cmd* is `add` or `delete`, *destination* is the destination host or network, and *gateway* is the next-hop intermediary through which packets should be routed. Modifiers described in OPERANDS can be placed anywhere on the command line.

The `get` and `change` sub-commands have the following syntax:

```
route [ -fnvq ] cmd destination [gateway [metric/netmask]]
```

where *cmd* is `get` or `change`, *destination* is the destination host or network, and *gateway* is the next-hop intermediary through which packets should be routed. Modifiers described in OPERANDS can be placed anywhere on the command line.

The `monitor` sub-command has the following syntax:

```
route monitor [ -inet | -inet6 ]
```

OPERANDS

Destinations and Gateways

`route` executes its sub-commands on routes to destinations by way of gateways.

By default, destination and gateway addresses are interpreted as IPv4 addresses. All symbolic names are tried first as a host name, using `getipnodebyname(3SOCKET)`. If this lookup fails in the `AF_INET` case, `getnetbyname(3SOCKET)` interprets the name as that of a network.

Including an optional modifier on the command line before the address changes how the `route` sub-command interprets it.

The following modifiers are supported:

<code>-inet</code>	Force the address to be interpreted as an IPv4 address, that is, under the <code>AF_INET</code> address family.
<code>-inet6</code>	Force the address to be interpreted as an IPv6 address, that is, under the <code>AF_INET6</code> address family.

For IPv4 addresses, routes to a particular host are by default distinguished from those to a network by interpreting the Internet address specified as the destination. If the destination has a *local address part* (that is, the portion not covered by the netmask) of 0, or if the destination is resolved as the symbolic name of a network, then the route is assumed to be to a network; otherwise, it is presumed to be a route to a host.

You can force this selection by using one of the following modifiers:

<code>-host</code>	Force the destination to be interpreted as a host.
<code>-net</code>	Force the destination to be interpreted as a network.

For example:

Destination	Destination Equivalent
128.32	<code>-host 128.0.0.32</code>

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Destination	Destination Equivalent
128.32.130	- host 128.32.0.130
-net 128.32	128.32.0.0
-net 128.32.130	128.32.130.0

Two modifiers avoid confusion between addresses and keywords (for example., *host* used as a symbolic host name). You can distinguish a *destination* by preceding it with the `-dst` modifier. You can distinguish a gateway address by using the `-gateway` modifier. If the destination is directly reachable by way of an interface requiring no intermediary IP router to act as a gateway, this can be indicated by using the `-interface` or `-iface` modifier.

In the following example, the route does not refer to an external gateway (router), but rather to one of the machine's interfaces. Packets with IP destination addresses matching the destination and mask on such a route are sent out on the interface identified by the gateway address. For interfaces using the ARP protocol, this type of route is used to specify that all matching destinations are local to the physical link. That is, a host could be configured to ARP for all addresses, without regard to the configured interface netmask, by adding a default route using this command. For example:

```
example# route add default hostname -interface
```

where gateway address *hostname* is the name or IP address associated with the network interface over which all matching packets should be sent. On a host with a single network interface, *hostname* is usually the same as the *nodename* returned by the `uname -n` command. See `uname(1)`.

For backward compatibility with older systems, directly reachable routes can also be specified by placing a 0 after the gateway address:

```
example# route add default hostname 0
```

This value was once a route metric, but this metric is no longer used. If the value is specified as 0, then the destination is directly reachable (equivalent to specifying `-interface`). If it is non-zero but cannot be interpreted as a subnet mask, then a gateway is used (default).

With the `AF_INET` address family or an IPv4 address, a separate subnet mask can be specified. This can be specified in one of the following ways:

- IP address following the gateway address . This is typically specified in *decimal dot* notation as for `inet_addr(3SOCKET)` rather than in symbolic form.
- IP address following the `-netmask` qualifier.
- Slash character and a decimal length appended to the destination address.

If a subnet mask is not specified, the mask used is the subnet mask of the output interface selected by the gateway address, if the classful network of the destination is the same as the classful network of the interface. Otherwise, the classful network mask for the destination address is used.

Each of the following examples creates an IPv4 route to the destination 192.0.2.32 subnet with a subnet mask of 255.255.255.224:

```
example# route add 192.0.2.32/27 somegateway
example# route add 192.0.2.32 -netmask 255.255.255.224 somegateway
example# route add 192.0.2.32 somegateway 255.255.255.224
```

For IPv6, only the slash format is accepted. The following example creates an IPv6 route to the destination 33fe:: with a netmask of 16 one-bits followed by 112 zero-bits.

```
example# route add -inet6 3ffe::/16 somegateway
```

In cases where the gateway does not uniquely identify the output interface (for example, when several interfaces have the same address), you can use the `-ifp ifname` modifier to specify the interface by name. For example, `-ifp lo0` associates the route with the `lo0` interface.

Routing Flags

Routes have associated flags that influence operation of the protocols when sending to destinations matched by the routes. These flags can be set (and in some cases cleared, indicated by ~) by including the following modifiers on the command line:

Modifier	Flag	Description
-interface	~RTF_GATEWAY	Destination is directly reachable
-iface	~RTF_GATEWAY	Alias for interface modifier
-static	RTF_STATIC	Manually added route
-nostatic	~RTF_STATIC	Pretend route was added by kernel or routing daemon
-reject	RTF_REJECT	Emit an ICMP unreachable when matched
-blackhole	RTF_BLACKHOLE	Silently discard packets during updates
-proto1	RTF_PROTO1	Set protocol specific routing flag #1
-proto2	RTF_PROTO2	Set protocol specific routing flag #2
-private	RTF_PRIVATE	Do not advertise this route
-multirt	RTF_MULTIRT	Creates the specified redundant route
-setsrc	RTF_SETSRC	Assigns the default source address

route(1M)

The optional modifiers `-rtt`, `-rttvar`, `-sendpipe`, `-recvpipe`, `-mtu`, `-hopcount`, `-expire`, and `-sssthresh` provide initial values to quantities maintained in the routing entry by transport level protocols, such as TCP. These can be individually locked either by preceding each modifier to be locked by the `-lock` meta-modifier, or by specifying that all ensuing metrics can be locked by the `-lockrest` meta-modifier.

Some transport layer protocols can support only some of these metrics. The following optional modifiers are supported:

<code>-expire</code>	Lifetime for the entry. This optional modifier is not currently supported.
<code>-hopcount</code>	Maximum hop count. This optional modifier is not currently supported.
<code>-mtu</code>	Maximum MTU in bytes.
<code>-recvpipe</code>	Receive pipe size in bytes.
<code>-rtt</code>	Round trip time in microseconds.
<code>-rttvar</code>	Round trip time variance in microseconds.
<code>-sendpipe</code>	Send pipe size in bytes.
<code>-sssthresh</code>	Send pipe size threshold in bytes.

Compatibility

The modifiers `host` and `net` are taken to be equivalent to `-host` and `-net`. To specify a symbolic address that matches one of these names, use the `dst` or `gateway` keyword to distinguish it. For example: `-dst host`

The following two flags are also accepted for compatibility with older systems, but have no effect.

Modifier	Flag
<code>-cloning</code>	RTF_CLONING
<code>-xresolve</code>	RTF_XRESOLVE

The `-ifa` hostname modifier is also accepted, but has no effect.

FILES

<code>/etc/defaultrouter</code>	List of default routers
<code>/etc/hosts</code>	List of host names and net addresses
<code>/etc/networks</code>	List of network names and addresses

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO uname(1), in.ripngd(1M), in.routed(1M), netstat(1M), routed(1M), ioctl(2), getipnodebyname(3SOCKET), getnetbyname(3SOCKET), inet_addr(3SOCKET), defaultrouter(4), hosts(4), networks(4), attributes(5), ARP(7P), ip(7P), route(7P), routing(7P)

DIAGNOSTICS `add [ host | network ] destination:gateway flags`
 The specified route is being added to the tables. The values printed are from the routing table entry supplied in the `ioctl(2)` call. If the gateway address used was not the primary address of the gateway (the first one returned by `getipnodebyname(3SOCKET)`) the gateway address is printed numerically as well as symbolically.

`delete [ host | network ] destination:gateway flags`

`change [ host | network ] destination:gateway flags`

As add, but when deleting or changing an entry.

destination done

When the `-f` flag is specified, or the `flush` sub-command is used, each routing table entry deleted is indicated with a message of this form.

Network is unreachable

An attempt to add a route failed because the gateway listed was not on a directly-connected network. Give the next-hop gateway instead.

not in table

A delete operation was attempted for an entry that is not in the table.

entry exists

An add operation was attempted for a route that already exists in the kernel.

routing table overflow

An operation was attempted, but the system was unable to allocate memory to create the new entry.

NOTES Specifying that destinations are local (with the `-interface` modifier) assumes that the routers implement proxy ARP, meaning that they respond to ARP queries for all reachable destinations. Normally, using either router discovery or RIP is more reliable and scalable than using proxy ARP. See `in.routed(1M)` for information related to RIP.

Combining the all destinations are local route with subnet or network routes can lead to unpredictable results. The search order as it relates to the all destinations are local route are undefined and can vary from release to release.

rpcbind(1M)

NAME	rpcbind – universal addresses to RPC program number mapper				
SYNOPSIS	rpcbind [-d] [-w]				
DESCRIPTION	rpcbind is a server that converts RPC program numbers into universal addresses. It must be running on the host to be able to make RPC calls on a server on that machine. When an RPC service is started, it tells rpcbind the address at which it is listening, and the RPC program numbers it is prepared to serve. When a client wishes to make an RPC call to a given program number, it first contacts rpcbind on the server machine to determine the address where RPC requests should be sent. rpcbind should be started before any other RPC service. Normally, standard RPC servers are started by port monitors, so rpcbind must be started before port monitors are invoked. When rpcbind is started, it checks that certain name-to-address translation-calls function correctly. If they fail, the network configuration databases may be corrupt. Since RPC services cannot function correctly in this situation, rpcbind reports the condition and terminates. rpcbind can only be started by the super-user.				
OPTIONS	The following options are supported: -d Run in debug mode. In this mode, rpcbind will not fork when it starts, will print additional information during operation, and will abort on certain errors. With this option, the name-to-address translation consistency checks are shown in detail. -w Do a warm start. If rpcbind aborts or terminates on SIGINT or SIGTERM, it will write the current list of registered services to /tmp/portmap.file and /tmp/rpcbind.file. Starting rpcbind with the -w option instructs it to look for these files and start operation with the registrations found in them. This allows rpcbind to resume operation without requiring all RPC services to be restarted.				
FILES	/tmp/portmap.file /tmp/rpcbind.file				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	rpcinfo(1M), rpcbind(3NSL), attributes(5)				

NOTES	Terminating <code>rpcbind</code> with <code>SIGKILL</code> will prevent the warm-start files from being written. All RPC servers must be restarted if the following occurs: <code>rpcbind</code> crashes (or is killed with <code>SIGKILL</code>) and is unable to write the warm-start files; <code>rpcbind</code> is started without the <code>-w</code> option after a graceful termination; or, the warm-start files are not found by <code>rpcbind</code>.

rpc.bootparamd(1M)

NAME	rpc.bootparamd, bootparamd – boot parameter server				
SYNOPSIS	<code>/usr/sbin/rpc.bootparamd [-d]</code>				
DESCRIPTION	rpc.bootparamd is a server process that provides information from a bootparams database to diskless clients at boot time. See bootparams(4) The source for the bootparams database is determined by the nsswitch.conf(4) file (on the machine running the rpc.bootparamd process). The rpc.bootparamd program can be invoked either by inetd(1M) or directly from the command line.				
OPTIONS	<code>-d</code> Display debugging information.				
FILES	<code>/etc/bootparams</code> boot parameter data base <code>/etc/nsswitch.conf</code> configuration file for the name-service switch				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWbsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWbsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWbsu				
SEE ALSO	inetd(1M), bootparams(4), nsswitch.conf(4), attributes(5)				
NOTES	A diskless client requires service from at least one rpc.bootparamd process running on a server that is on the same IP subnetwork as the diskless client. Some routines that compare hostnames use case-sensitive string comparisons; some do not. If an incoming request fails, verify that the case of the hostname in the file to be parsed matches the case of the hostname called for, and attempt the request again.				

NAME	rpcinfo – report RPC information	
SYNOPSIS	<pre> rpcinfo [-m -s] [<i>host</i>] rpcinfo -p [<i>host</i>] rpcinfo -T <i>transport</i> <i>host</i> <i>prognum</i> [<i>versnum</i>] rpcinfo -l [-T <i>transport</i>] <i>host</i> <i>prognum</i> <i>versnum</i> rpcinfo [-n <i>portnum</i>] -u <i>host</i> <i>prognum</i> [<i>versnum</i>] rpcinfo [-n <i>portnum</i>] -t <i>host</i> <i>prognum</i> [<i>versnum</i>] rpcinfo -a <i>serv_address</i> -T <i>transport</i> <i>prognum</i> [<i>versnum</i>] rpcinfo -b [-T <i>transport</i>] <i>prognum</i> <i>versnum</i> rpcinfo -d [-T <i>transport</i>] <i>prognum</i> <i>versnum</i> </pre>	
DESCRIPTION	rpcinfo makes an RPC call to an RPC server and reports what it finds. In the first synopsis, <i>rpcinfo</i> lists all the registered RPC services with <i>rpcbind</i> on <i>host</i>. If <i>host</i> is not specified, the local host is the default. If <i>-s</i> is used, the information is displayed in a concise format. In the second synopsis, <i>rpcinfo</i> lists all the RPC services registered with <i>rpcbind</i>, version 2. Note that the format of the information is different in the first and the second synopsis. This is because the second synopsis is an older protocol used to collect the information displayed (version 2 of the <i>rpcbind</i> protocol). The third synopsis makes an RPC call to procedure 0 of <i>prognum</i> and <i>versnum</i> on the specified <i>host</i> and reports whether a response was received. <i>transport</i> is the transport which has to be used for contacting the given service. The remote address of the service is obtained by making a call to the remote <i>rpcbind</i>. The <i>prognum</i> argument is a number that represents an RPC program number (see <i>rpc(4)</i>). If a <i>versnum</i> is specified, <i>rpcinfo</i> attempts to call that version of the specified <i>prognum</i>. Otherwise, <i>rpcinfo</i> attempts to find all the registered version numbers for the specified <i>prognum</i> by calling version 0, which is presumed not to exist; if it does exist, <i>rpcinfo</i> attempts to obtain this information by calling an extremely high version number instead, and attempts to call each registered version. Note that the version number is required for <i>-b</i> and <i>-d</i> options. The EXAMPLES section describe other ways of using <i>rpcinfo</i>.	
OPTIONS	<i>-T transport</i>	Specify the transport on which the service is required. If this option is not specified, <i>rpcinfo</i> uses the transport specified in the <i>NETPATH</i> environment variable, or if that is unset or <i>NULL</i>, the transport in the <i>netconfig(4)</i> database is used. This is a generic

rpcinfo(1M)

	option, and can be used in conjunction with other options as shown in the SYNOPSIS.
-a <i>serv_address</i>	Use <i>serv_address</i> as the (universal) address for the service on <i>transport</i> to ping procedure 0 of the specified <i>prognum</i> and report whether a response was received. The -T option is required with the -a option. If <i>versnum</i> is not specified, <i>rpcinfo</i> tries to ping all available version numbers for that program number. This option avoids calls to remote <i>rpcbind</i> to find the address of the service. The <i>serv_address</i> is specified in universal address format of the given transport.
-b	Make an RPC broadcast to procedure 0 of the specified <i>prognum</i> and <i>versnum</i> and report all hosts that respond. If <i>transport</i> is specified, it broadcasts its request only on the specified transport. If broadcasting is not supported by any transport, an error message is printed. Use of broadcasting should be limited because of the potential for adverse effect on other systems.
-d	Delete registration for the RPC service of the specified <i>prognum</i> and <i>versnum</i> . If <i>transport</i> is specified, unregister the service on only that transport, otherwise unregister the service on all the transports on which it was registered. Only the owner of a service can delete a registration, except the superuser, who can delete any service.
-l	Display a list of entries with a given <i>prognum</i> and <i>versnum</i> on the specified <i>host</i> . Entries are returned for all transports in the same protocol family as that used to contact the remote <i>rpcbind</i> .
-m	Display a table of statistics of <i>rpcbind</i> operations on the given <i>host</i> . The table shows statistics for each version of <i>rpcbind</i> (versions 2, 3 and 4), giving the number of times each procedure was requested and successfully serviced, the number and type of remote call requests that were made, and information about RPC address lookups that were handled. This is useful for monitoring RPC activities on <i>host</i> .
-n <i>portnum</i>	Use <i>portnum</i> as the port number for the -t and -u options instead of the port number given by <i>rpcbind</i> . Use of this option avoids a call to the remote <i>rpcbind</i> to find out the address of the service. This option is made obsolete by the -a option.

-p	Probe <code>rpcbind</code> on <i>host</i> using version 2 of the <code>rpcbind</code> protocol, and display a list of all registered RPC programs. If <i>host</i> is not specified, it defaults to the local host. This option is not useful for IPv6; use <code>-s</code> (see below) instead. Note that version 2 of the <code>rpcbind</code> protocol was previously known as the portmapper protocol.
-s	Display a concise list of all registered RPC programs on <i>host</i> . If <i>host</i> is not specified, it defaults to the local host.
-t	Make an RPC call to procedure 0 of <i>prognum</i> on the specified <i>host</i> using TCP, and report whether a response was received. This option is made obsolete by the <code>-T</code> option as shown in the third synopsis.
-u	Make an RPC call to procedure 0 of <i>prognum</i> on the specified <i>host</i> using UDP, and report whether a response was received. This option is made obsolete by the <code>-T</code> option as shown in the third synopsis.

EXAMPLES**EXAMPLE 1** RPC services.

To show all of the RPC services registered on the local machine use:

```
example% rpcinfo
```

To show all of the RPC services registered with `rpcbind` on the machine named *klaxon* use:

```
example% rpcinfo klaxon
```

The information displayed by the above commands can be quite lengthy. Use the `-s` option to display a more concise list:

```
example% rpcinfo -s klaxon
```

program	vrsn	netid(s)	service	owner
100000	2,3,4	tcp,udp,ticltls,ticots,ticotsord	rpcbind	superuser
100008	1	ticotsord,ticots,ticltls,udp,tcp	walld	superuser
100002	2,1	ticotsord,ticots,ticltls,udp,tcp	rusersd	superuser
100001	2,3,4	ticotsord,ticots,tcp,ticltls,udp	rstatd	superuser
100012	1	ticotsord,ticots,ticltls,udp,tcp	sprayd	superuser
100007	3	ticotsord,ticots,ticltls,udp,tcp	ypbind	superuser
100029	1	ticotsord,ticots,ticltls	keyserv	superuser

rpcinfo(1M)

EXAMPLE 1 RPC services. (Continued)

100078	4	ticotsord,ticots,ticlts	-	superuser
100024	1	ticotsord,ticots,ticlts,udp,tcp	status	superuser
100021	2,1	ticotsord,ticots,ticlts,udp,tcp	nlockmgr	superuser
100020	1	ticotsord,ticots,ticlts,udp,tcp	llockmgr	superuser

To show whether the RPC service with program number *prognum* and version *versnum* is registered on the machine named *klaxon* for the transport TCP use:

```
example% rpcinfo -T tcp klaxon prognum versnum
```

To show all RPC services registered with version 2 of the rpcbind protocol on the local machine use:

```
example% rpcinfo -p
```

To delete the registration for version 1 of the walld (program number 100008) service for all transports use:

```
example# rpcinfo -d 100008 1
```

or

```
example# rpcinfo -d walld 1
```

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

rpcbind(1M), rpc(3NSL), netconfig(4), rpc(4), attributes(5)

NAME	rpc.metad – remote metaset services
SYNOPSIS	/usr/sbin/rpc.metad
DESCRIPTION	rpc.metad is an rpc(4) daemon (functioning as a server process) that is used to manage local copies of metadevice diskset information. The rpc.metad daemon is invoked by inetd(1M).
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdu

SEE ALSO inetd(1M), metaset(1M), rpc.metamhd(1M), rpc(3NSL), services(4), attributes(5)

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rpc.metamedd(1M)

NAME rpc.metamedd – remote mediator services

SYNOPSIS `/usr/sbin/rpc.metamedd`

DESCRIPTION `rpc.metamedd` is an `rpc(4)` server which is used to manage mediator information for use in 2-string HA configurations. The `rpc.metamedd` daemon is invoked by `inetd(1M)`.

EXIT STATUS The following exit values are returned:

0	Successful completion.
>0	An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdu
Interface Stability	Evolving

SEE ALSO `inetd(1M)`, `rpc(4)`, `services(4)`,
Sun Cluster documentation, *Solaris Volume Manager Administration Guide*

NAME	rpc.metamhd – remote multihost disk services
SYNOPSIS	/usr/sbin/rpc.metamhd
DESCRIPTION	rpc.metamhd is an rpc(4) daemon (functioning as a server process) that is used to manage multi-hosted disks. The rpc.metamhd daemon is invoked by inetd(1M).
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmdu

SEE ALSO inetd(1M), metaset(1M), rpc.metad(1M), rpc(3NSL), services(4), attributes(5)

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rpc.nisd(1M)

NAME	rpc.nisd, nisd – NIS+ service daemon
SYNOPSIS	/usr/sbin/rpc.nisd [-ACDFhlv] [-Y [-B [-t <i>netid</i>]]] [-d <i>dictionary</i>] [-L <i>load</i>] [-S <i>level</i>] [-m <i>mappingfile</i>] [-x <i>attribute=value</i>]... [-z <i>number</i>]
DESCRIPTION	The <code>rpc.nisd</code> daemon is an RPC service that implements the NIS+ service. This daemon must be running on all machines that serve a portion of the NIS+ namespace. <code>rpc.nisd</code> is usually started from a system startup script. The <code>-B</code> option causes <code>rpc.nisd</code> to start an auxiliary process, <code>rpc.nisd_resolv</code>, which provides yperv compatible DNS forwarding for NIS host requests. <code>rpc.nisd_resolv</code> can also be started independently. See <code>rpc.nisd_resolv(1M)</code> for more information on using <code>rpc.nisd_resolv</code> independently. The <code>/etc/default/rpc.nisd</code> file contains the following default parameter settings. See FILES. ENABLE_NIS_YP_EMULATION Specifies whether the server is put into NIS (YP) compatibility mode. <code>ENABLE_NIS_YP_EMULATION=YES</code> is equivalent to the <code>-Y</code> command-line option. The default value for <code>ENABLE_NIS_YP_EMULATION</code> is NO.
OPTIONS	-A Authentication verbose mode. The daemon logs all the authentication related activities to <code>syslogd(1M)</code> with <code>LOG_INFO</code> priority. -B Provide yperv compatible DNS forwarding for NIS host requests. The DNS resolving process, <code>rpc.nisd_resolv</code>, is started and controlled by <code>rpc.nisd</code>. This option requires that the <code>/etc/resolv.conf</code> file be setup for communication with a DNS nameserver. The <code>nslookup</code> utility can be used to verify communication with a DNS nameserver. See <code>resolv.conf(4)</code> and <code>nslookup(1M)</code>. -C Open diagnostic channel on <code>/dev/console</code>. -D Debug mode. Do not fork. -d <i>dictionary</i> Specify an alternate dictionary for the NIS+ database. The primary use of this option is for testing. Note that the string is not interpreted, rather it is simply passed to the <code>db_initialize</code> function.> -F Force the server to do a checkpoint of the database when it starts up. Forced checkpoints may be required when the server is low on disk space. This option removes updates from the transaction log that have propagated to all of the replicas.

-h	Print list of options.				
-L <i>number</i>	Specify the “load” the NIS+ service is allowed to place on the server. The load is specified in terms of the <i>number</i> of child processes that the server may spawn. The value of <i>number</i> must be at least 1 for the callback functions to work correctly. The default is 128.				
-m <i>mappingfile</i>	Specify the name of a configuration file that maps NIS+ objects (especially tables and columns) to LDAP (entries and attributes). See NIS+LDAPmapping(4). The default path is <code>/var/nis</code>. The default mapping file is <code>NIS+LDAPmapping</code>. If this file exists, the <code>rpc.nisd</code> daemon will map data to and from LDAP. A template mapping file that covers the normal NIS+ directories and tables is installed as <code>/var/nis/NIS+LDAPmapping.template</code>. A NIS+ object must have a valid mapping entry in the mapping file in order to have data for that table read from or written to the LDAP repository. The <code>rpc.nisd(4)</code> file contains specifications for LDAP server addresses, LDAP authentication method, and the like. See NIS+LDAPmapping(4) for an overview of the setup you need to map NIS+ data to or from LDAP.				
-S <i>level</i>	Set the authorization security level of the service. The argument is a number between 0 and 2. By default, the daemon runs at security level 2. <table> <tr> <td>0</td><td>Security level 0 is designed to be used for testing and initial setup of the NIS+ namespace. When running at level 0, the daemon does not enforce any access controls. Any client is allowed to perform any operation, including updates and deletions.</td></tr> <tr> <td>1</td><td>At security level 1, the daemon accepts both <code>AUTH_SYS</code> and <code>AUTH_DES</code> credentials for authenticating clients and authorizing them to perform NIS+ operations. This is not a secure mode of operation since <code>AUTH_SYS</code> credentials are easily forged. It should not be used on networks in which any untrusted users may potentially have access.</td></tr> </table>	0	Security level 0 is designed to be used for testing and initial setup of the NIS+ namespace. When running at level 0, the daemon does not enforce any access controls. Any client is allowed to perform any operation, including updates and deletions.	1	At security level 1, the daemon accepts both <code>AUTH_SYS</code> and <code>AUTH_DES</code> credentials for authenticating clients and authorizing them to perform NIS+ operations. This is not a secure mode of operation since <code>AUTH_SYS</code> credentials are easily forged. It should not be used on networks in which any untrusted users may potentially have access.
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rpc.nisd(1M)

	2	At security level 2, the daemon only accepts authentication using the security mechanisms configured by <code>nisauthconf(1M)</code> . The default security mechanism is <code>AUTH_DES</code> . Security level 2 is the default if the <code>-S</code> option is not used.
<code>-t netid</code>		Use <i>netid</i> as the transport for communication between <code>rpc.nisd</code> and <code>rpc.nisd_resolv</code> . The default transport is <code>ticots(7D)</code> (<code>tcp</code> on SunOS 4.x systems).
<code>-v</code>		Verbose. With this option, the daemon sends a running narration of what it is doing to the syslog daemon (see <code>syslogd(1M)</code>) at <code>LOG_INFO</code> priority. This option is most useful for debugging problems with the service. See also <code>-A</code> option.
<code>-x attribute=value</code>		Specify the value of the named <i>attribute</i> . Attributes that control the NIS+ to LDAP mapping operation are derived as follows: 1. Retrieve from LDAP. 2. Override with values from the <i>mappingfile</i>, if any. See the <code>-m</code> option. 3. Override with values from the command line <code>-x</code> options. See <code>NIS+LDAPmapping(4)</code> and <code>rpc.nisd(4)</code> for the recognized attributes and their syntax. As a special case, you can use the <code>nisplusLdapConfig*</code> attributes to derive additional information from LDAP. You can only specify the <code>nisplusLdapConfig*</code> attributes in <code>rpc.nisd(4)</code> or by means of the command line.
<code>-Y</code>		Put the server into NIS (YP) compatibility mode. When operating in this mode, the NIS+ server will respond to NIS Version 2 requests using the version 2 protocol. Because the YP protocol is not authenticated, only those items that have read access to nobody (the unauthenticated request) will be visible through the V2 protocol. It supports only the standard Version 2 maps in this mode (see <code>-B</code> option and <code>NOTES</code> in <code>ypfiles(4)</code>). See <code>FILES</code> .
<code>-z number</code>		Specify the maximum RPC record size that can be used over connection oriented transports. The default is 9000 bytes. If you specify a size less than the default value, the default value will be used instead.

EXAMPLES	EXAMPLE 1 Setting up the NIS+ Service	
	The following example sets up the NIS+ service.	
	example% rpc.nisd	
	EXAMPLE 2 Setting Up NIS+ Service Emulating YP With DNS Forwarding	
	The following example sets up the NIS+ service, emulating YP with DNS forwarding.	
	example% rpc.nisd -YB	
	EXAMPLE 3 Specifying NIS+ and LDAP Mapping Information	
	The following example shows how to specify that all additional NIS+ and LDAP mapping information should be retrieved from DN “dc=x,dc=y,dc=z”, from the LDAP server at IP address 1.2.3.4, port 389. The examples uses the simple authentication method and the cn=nisplusAdmin,ou=People, proxy user. The -m option is omitted for clarity in this example..	
	<pre>-x nisplusLDAPconfigDN=dc=x,dc=y,dc=z \ -x nisplusLDAPconfigPreferredServerList=127.0.0.1:389 \ -x nisplusLDAPconfigAuthenticationMethod=simple \ -x nisplusLDAPconfigProxyUser=cn=nisplusAdmin,ou=People, \ -x nisplusLDAPconfigProxyPassword=xyzzzy</pre>	
ENVIRONMENT VARIABLES	NETPATH	The transports that the NIS+ service will use can be limited by setting this environment variable. See netconfig(4).
	FILES	
	/var/nis/data/parent.object	This file describes the namespace that is logically above the NIS+ namespace. The most common type of parent object is a DNS object. This object contains contact information for a server of that domain.
	/var/nis/data/root.object	This file describes the root object of the NIS+ namespace. It is a standard XDR-encoded NIS+ directory object that can be modified by authorized clients using the nis_modify(3NSL) interface.
	/etc/init.d/rpc	Initialization script for NIS+.
	/etc/default/rpc.nisd	LDAP connection and general rpc.nisd configuration. You can override some of the settings by command-line options.
	/var/nis/nis+LDAPmapping	Default path for LDAP mapping file. See the discussion of the -m option.

rpc.nisd(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO nis_cachemgr(1M), nisauthconf(1M), nisinit(1M), nissetup(1M), nisldapmaptest(1M), nslookup(1M), rpc.nisd_resolv(1M), rpc.nispasswd(1M), syslogd(1M), nis_modify(3NSL), NIS+LDAPmapping(4), netconfig(4), nisfiles(4), resolv.conf(4), rpc.nisd(4), ypfiles(4), attributes(5), ticots(7D)

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

NAME	rpc.nisd_resolv, nisd_resolv – NIS+ service daemon				
SYNOPSIS	rpc.nisd_resolv [-v -V] [-F [-C <i>fd</i>]] [-t <i>xx</i>] [-p <i>yy</i>]				
DESCRIPTION	rpc.nisd_resolv is an auxiliary process which provides DNS forwarding service for NIS hosts requests to both ypserve and rpc.nisd that are running in the NIS compatibility mode. It is generally started by invoking rpc.nisd(1M) with the -B option or ypserve(1M) with the -d option. Although it is not recommended, rpc.nisd_resolv can also be started independently with the following options. This command requires that the /etc/resolv.conf file be setup for communication with a DNS nameserver. The nslookup utility can be used to verify communication with a DNS nameserver. See resolv.conf(4) and nslookup(1M).				
OPTIONS	-F Run in foreground. -C <i>fd</i> Use <i>fd</i> for service xprt (from nisd). -v Verbose. Send output to the syslog daemon. -V Verbose. Send output to stdout. -t <i>xx</i> Use transport <i>xx</i>. -p <i>yy</i> Use transient program# <i>yy</i>.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWnisu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnisu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWnisu				
SEE ALSO	nslookup(1M), rpc.nisd(1M), resolv.conf(4), attributes(5)				
NOTES	NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit http://www.sun.com/directory/nisplus/transition.html.				

rpc.nispasswd(1M)

NAME	rpc.nispasswd, nispasswd – NIS+ password update daemon	
SYNOPSIS	/usr/sbin/rpc.nispasswd [-a <i>attempts</i>] [-c <i>minutes</i>] [-D] [-g] [-v]	
DESCRIPTION	rpc.nispasswd daemon is an ONC+ RPC service that services password update requests from nispasswd(1) and yppasswd(1). It updates password entries in the NIS+ passwd table. rpc.nispasswd is normally started from a system startup script after the NIS+ server (rpc.nisd(1M)) has been started. rpc.nispasswd will determine whether it is running on a machine that is a master server for one or more NIS+ directories. If it discovers that the host is not a master server, then it will promptly exit. It will also determine if rpc.nisd(1M) is running in NIS (YP) compatibility mode (the -Yoption) and will register as yppasswd for NIS (YP) clients as well. rpc.nispasswd will syslog all failed password update attempts, which will allow an administrator to determine whether someone was trying to "crack" the passwords. rpc.nispasswd has to be run by a superuser.	
OPTIONS	-a <i>attempts</i>	Set the maximum number of attempts allowed to authenticate the caller within a password update request session. Failed attempts are syslogd(1M) and the request is cached by the daemon. After the maximum number of allowed attempts the daemon severs the connection to the client. The default value is set to 3.
	-c <i>minutes</i>	Set the number of minutes a failed password update request should be cached by the daemon. This is the time during which if the daemon receives further password update requests for the same user and authentication of the caller fails, then the daemon will simply not respond. The default value is set to 30minutes.
	-D	Debug. Run in debugging mode.
	-g	Generate DES credential. By default the DES credential is not generated for the user if they do not have one. By specifying this option, if the user does not have a credential, then one will be generated for them and stored in the NIS+ cred table.
	-v	Verbose. With this option, the daemon sends a running narration of what it is doing to the syslog daemon. This option is useful for debugging problems.
EXIT STATUS	0	success
	1	an error has occurred.
FILES	/etc/init.d/rpc	initialization script for NIS+

rpc.nispasswd(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO nispasswd(1), passwd(1), yppasswd(1), rpc.nisd(1M), syslogd(1M), nsswitch.conf(4), attributes(5)

NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

rpc.rexd(1M)

NAME	rpc.rexd, rexd – RPC-based remote execution server						
SYNOPSIS	<code>/usr/sbin/rpc.rexd [-s]</code>						
DESCRIPTION	<code>rpc.rexd</code> is the Sun RPC server for remote program execution. This daemon is started by <code>inetd(1M)</code> whenever a remote execution request is made. For non-interactive programs, the standard file descriptors are connected directly to TCP connections. Interactive programs involve pseudo-terminals, in a fashion that is similar to the login sessions provided by <code>rlogin(1)</code>. This daemon may use NFS to mount file systems specified in the remote execution request.						
OPTIONS	The following options are supported: <code>-s</code> Secure. When specified, requests must have valid DES credentials. If the request does not have a DES credential it is rejected. The default publickey credential is rejected. Only newer <code>on(1)</code> commands send DES credentials. If access is denied with an authentication error, you may have to set your publickey with the <code>chkey(1)</code> command. Specifying the <code>-s</code> option without presenting secure credentials will result in an error message: <code>Unix too weak auth (DesOnly)!</code>						
SECURITY	<code>rpc.rexd</code> uses <code>pam(3PAM)</code> for account and session management. The PAM configuration policy, listed through <code>/etc/pam.conf</code>, specifies the modules to be used for <code>rpc.rexd</code>. Here is a partial <code>pam.conf</code> file with <code>rpc.rexd</code> entries for account and session management using the UNIX module. <pre>rpc.rexd account requisite pam_roles.so.1 rpc.rexd account required pam_projects.so.1 rpc.rexd account required pam_unix_account.so.1 rpc.rexd session required pam_unix_session.so.1</pre> If there are no entries for the <code>rpc.rexd</code> service, then the entries for the "other" service will be used. <code>rpc.rexd</code> uses the <code>getpwnuid()</code> call to determine whether the given user is a legal user.						
FILES	<table> <tr> <td><code>/dev/pts/n</code></td><td>Pseudo-terminals used for interactive mode</td></tr> <tr> <td><code>/etc/passwd</code></td><td>Authorized users</td></tr> <tr> <td><code>/tmp_rex/rexd??????</code></td><td>Temporary mount points for remote file systems</td></tr> </table>	<code>/dev/pts/n</code>	Pseudo-terminals used for interactive mode	<code>/etc/passwd</code>	Authorized users	<code>/tmp_rex/rexd??????</code>	Temporary mount points for remote file systems
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ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWnisu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnisu		
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWnisu						

rpc.rexd(1M)

SEE ALSO chkey(1), on(1), rlogin(1), inetd(1M), pam(3PAM), inetd.conf(4), pam.conf(4), publickey(4), attributes(5), pam_authtok_check(5), pam_authtok_get(5), pam_authtok_store(5), pam_dhkeys(5), pam_passwd_auth(5), pam_unix(5), pam_unix_account(5), pam_unix_auth(5), pam_unix_session(5)

DIAGNOSTICS Diagnostic messages are normally printed on the console, and returned to the requestor.

NOTES Root cannot execute commands using rexd client programs such as on(1).

The pam_unix(5) module might not be supported in a future release. Similar functionality is provided by pam_authtok_check(5), pam_authtok_get(5), pam_authtok_store(5), pam_dhkeys(5), pam_passwd_auth(5), pam_unix_account(5), pam_unix_auth(5), and pam_unix_session(5).

rpc.rstatd(1M)

NAME rpc.rstatd, rstatd – kernel statistics server

SYNOPSIS `/usr/lib/netsvc/rstat/rpc.rstatd`

DESCRIPTION `rpc.rstatd` is a server which returns performance statistics obtained from the kernel. `rup(1)` uses `rpc.rstatd` to collect the uptime information that it displays.

`rpc.rstatd` is an RPC service.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWrcmds

SEE ALSO `rup(1)`, `inetd(1M)`, `services(4)`, `attributes(5)`

rpc.rusersd(1M)

NAME rpc.rusersd, rusersd – network username server

SYNOPSIS `/usr/lib/netsvc/rusers/rpc.rusersd`

DESCRIPTION `rpc.rusersd` is a server that returns a list of users on the host. The `rpc.rusersd` daemon may be started by `inetd(1M)` or `listen(1M)`.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWrcmds

SEE ALSO `inetd(1M)`, `listen(1M)`, `pmadm(1M)`, `sacadm(1M)`, `attributes(5)`

rpc.rwalld(1M)

NAME rpc.rwalld, rwalld – network rwall server

SYNOPSIS `/usr/lib/netsvc/rwall/rpc.rwalld`

DESCRIPTION `rpc.rwalld` is a server that handles `rwall(1M)` requests. It is implemented by calling `wall(1M)` on all the appropriate network machines. The `rpc.rwalld` daemon may be started by `inetd(1M)` or `listen(1M)`.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWrcmds

SEE ALSO `inetd(1M)`, `listen(1M)`, `rwall(1M)`, `wall(1M)`, `attributes(5)`

NAME	rpc.smserverd – removable media device server				
SYNOPSIS	<code>/usr/lib/smedia/rpc.smserverd</code>				
DESCRIPTION	<code>rpc.smserverd</code> is a server that handles requests from client applications, including the Volume Management daemon (<code>vold(1M)</code>), for access to removable media devices. In addition to <code>vold</code>, <code>rmformat(1)</code> and the CDE Filemanager (when performing removable media operations) are <code>rpc.smserverd</code> clients. The <code>rpc.smserverd</code> daemon is started by <code>inetd(1M)</code> when a client makes a call to a Solaris-internal library to access a SCSI, IDE, or USB device. The daemon is not started if a client attempts to access a floppy or PCMCIA device. Once started, the daemon remains active until such time as it is idle for three minutes or more. The <code>rpc.smserverd</code> daemon is provided for the exclusive use of the client applications mentioned above. It has no external, customer-accessible interfaces, including no configuration file.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWvolu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWvolu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWvolu				
SEE ALSO	<code>inetd(1M)</code> , <code>vold(1M)</code> , <code>vold.conf(4)</code> , <code>attributes(5)</code>				

rpc.sprayd(1M)

NAME	rpc.sprayd, sprayd – spray server				
SYNOPSIS	/usr/lib/netsvc/spray/rpc.sprayd				
DESCRIPTION	rpc.sprayd is a server that records the packets sent by spray(1M). The rpc.sprayd daemon may be started by inetd(1M) or listen(1M). The service provided by rpc.sprayd is not useful as a networking benchmark as it uses unreliable connectionless transports, (udp for example). It can report a large number of packets dropped when the drops were caused by the program sending packets faster than they can be buffered locally (before the packets get to the network medium).				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWrcmds</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWrcmds
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWrcmds				
SEE ALSO	inetd(1M) listen(1M), pmadm(1M), sacadm(1M), spray(1M), attributes(5)				

NAME	rpc.yppasswdd, yppasswdd – server for modifying NIS password file
SYNOPSIS	<pre> /usr/lib/netsvc/yp/rpc.yppasswdd [-D <i>directory</i>] [-nogecos] [-noshell] [-nopw] [-m <i>argument1 argument2...</i>] /usr/lib/netsvc/yp/rpc.yppasswdd [<i>passwordfile adjunctfile</i>] [-nogecos] [-noshell] [-nopw] [-m <i>argument1 argument2...</i>] </pre>
DESCRIPTION	rpc.yppasswdd is a server that handles password change requests from yppasswd(1). It changes a password entry in the passwd, shadow, and security/passwd.adjunct files. The passwd and shadow files provide the basis for the passwd.byname and passwd.byuid maps. The passwd.adjunct file provides the basis for the passwd.adjunct.byname and passwd.adjunct.byuid maps. Entries in the passwd, shadow or passwd.adjunct files are changed only if the password presented by yppasswd(1) matches the encrypted password of the entry. All password files are located in the PWDIR directory. If the -D option is given, the passwd, shadow, or passwd.adjunct files are placed under the directory path that is the argument to -D. If the -noshell, -nogecos or -nopw options are given, these fields cannot be changed remotely using chfn, chsh, or passwd(1). If the -m option is given, a make(1) is performed in /var/yp after any of the passwd, shadow, or passwd.adjunct files are modified. All arguments following the flag are passed to make. The second of the listed syntaxes is provided only for backward compatibility. If the second syntax is used, the passwordfile is the full pathname of the password file and adjunctfile is the full pathname of the optional passwd.adjunct file. If a shadow file is found in the same directory as passwordfile, the shadowfile is used as described above. Use of this syntax and the discovery of a shadowfile file generates diagnostic output. The daemon, however, starts normally. The first and second syntaxes are mutually exclusive. You cannot specify the full pathname of the passwd, passwd.adjunct files and use the -D option at the same time. The daemon is started automatically on the master server of the passwd map by ypstart(1M), which is invoked at boot time by the /etc/init.d/rpc script. The server does not insist on the presence of a shadow file unless there is no -D option present or the directory named with the -D option is /etc. In addition, a passwd.adjunct file is not necessary. If the -D option is given, the server attempts to find a passwd.adjunct file in the security subdirectory of the named directory. For example, in the presence of -D /var/yp the server checks for a /var/yp/security/passwd.adjunct file.

rpc.yppasswdd(1M)

If only a `passwd` file exists, then the encrypted password is expected in the second field. If both a `passwd` and a `passwd.adjunct` file exist, the encrypted password is expected in the second field of the adjunct file with `##username` in the second field of the `passwd` file. If all three files are in use, the encrypted password is expected in the shadow file. Any deviation causes a password update to fail.

If you remove or add a shadow or `passwd.adjunct` file after `rpc.yppasswdd` has started, you must stop and restart the daemon to enable it to recognize the change. See `ypstart(1m)` for information on restarting the daemon.

The `rpc.yppasswdd` daemon considers a shell that has a name that begins with 'r' to be a restricted shell. By default, the daemon does not check whether a shell begins with an 'r'. However, you can tell it to do so by uncommenting the `check_restricted_shell_name=1` line in `/etc/default/yppasswdd`. The result will be to restrict a user's ability to change from his default shell. See `yppasswdd(4)`.

On start up, `yppasswdd` checks for the existence of a NIS to LDAP (N2L) configuration file, `/var/yp/NISLDAPmapping`. If the configuration file is present, the daemon runs in N2L mode. If the file is not present, `yppasswdd` runs in traditional, non-N2L mode.

In N2L mode, changes are written directly to the Directory Information Tree (DIT). If the changes are written successfully, the NIS map is updated. The NIS source files, `passwd`, `shadow`, and `passwd.adjunct`, for example, are not updated. Thus, in N2L mode, the `-D` option is meaningless. In N2L mode, `yppasswdd` propagates changes by calling `yppush(1M)` instead of `ypmake(1M)`. The `-m` option is thus unused.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWypu

SEE ALSO

`make(1)`, `passwd(1)`, `yppasswd(1)`, `inetd(1M)`, `ypmake(1M)`, `yppush(1M)`, `NISLDAPmapping(4)`, `passwd(4)`, `shadow(4)`, `ypfiles(4)`, `yppasswdd(4)`, `ypserv(4)`, `attributes(5)`

NOTES

If `make` has not been installed and the `-m` option is given, the daemon outputs a warning and proceeds, effectively ignoring the `-m` flag.

When using the `-D` option, you should make sure that the `PWDIR` of the `/var/yp/Makefile` is set accordingly.

The second listed syntax is supplied only for backward compatibility and might be removed in a future release of this daemon.

rpc.yppasswdd(1M)

The Network Information Service (NIS) was formerly known as Sun Yellow Pages (YP). The functionality of the two remains the same; only the name has changed. The name Yellow Pages is a registered trademark in the United Kingdom of British Telecommunications PLC, and cannot be used without permission.

rpc.yppupdated(1M)

NAME	rpc.yppupdated, yppupdated – server for changing NIS information						
SYNOPSIS	/usr/lib/netsvc/yp/rpc.yppupdated [-is]						
DESCRIPTION	yppupdated is a daemon that updates information in the Network Information Service (NIS). yppupdated consults the updaters(4) file in the /var/yp directory to determine which NIS maps should be updated and how to change them. By default, the daemon requires the most secure method of authentication available to it, either DES (secure) or UNIX (insecure). On start up, yppupdated checks for the existence of a NIS to LDAP (N2L) configuration file, /var/yp/NISLDAPmapping. If the file is present, yppupdated generates an informational message and exits. yppupdated is not supported in N2L mode.						
OPTIONS	-i Accept RPC calls with the insecure AUTH_UNIX credentials. This allows programmatic updating of the NIS maps in all networks. -s Accept only calls authenticated using the secure RPC mechanism (AUTH_DES authentication). This disables programmatic updating of the NIS maps unless the network supports these calls.						
FILES	/var/yp/updaters Configuration file for rpc.updated command. /var/yp/NISLDAPmapping Configuration file for N2L						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWypu</td></tr><tr><td>Interface Stability</td><td>Evolving</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWypu	Interface Stability	Evolving
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWypu						
Interface Stability	Evolving						
SEE ALSO	keyserv(1M), updaters(4), NISLDAPmapping(4), attributes(5) <i>System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)</i>						
NOTES	The Network Information Service (NIS) was formerly known as Sun Yellow Pages (YP). The functionality of the two services remains the same. Only the name has changed. The name Yellow Pages is a registered trademark in the United Kingdom of British Telecommunications PLC, and it must not be used without permission.						

NAME	rpld – x86 Network Booting RPL (Remote Program Load) Server
SYNOPSIS	<pre>/usr/sbin/rpld [-fdMblgz] interface /usr/sbin/rpld -a [-fdMblgz]</pre>
DESCRIPTION	The RPL server provides network booting functionality to x86 clients by listening to boot requests from them according to the RPL protocol specifications. Boot requests can be generated by clients using the boot floppy supplied in the x86 distribution. Once the request has been received, the server validates the client and adds it to its internal service list. Subsequent requests from the client to download bootfiles will result in the sending of data frames from the server to the client specifying where to load the boot program in memory. When all the bootfiles have been downloaded, the server specifies where to start execution to initiate the boot process. In the first synopsis, the interface parameter names the network interface upon which rpld is to listen for requests. For example: <pre>/usr/sbin/rpld /dev/le0 /usr/sbin/rpld /dev/smc0</pre> In the second synopsis, rpld locates all of the network interfaces present on the system and starts a daemon process for each one. The server starts by reading the default configuration file, or an alternate configuration file if one is specified. If no configuration file can be found, internal default values will be used. Alternatively, command line options are available to override any of the values in the configuration file. After the configuration options are set, it then opens the network interface as specified in the command line and starts listening to RPL boot requests. Network boot x86 clients have to have information pre-configured on a server for the RPL server to validate and serve them. This involves putting configuration information in both the ethers(4) and the bootparams(4) databases. The ethers database contains a translation from the physical node address to the IP address of the clients and is normally used by the RARP server. The bootparams database stores all other information needed for booting off this client, such as the number of bootfiles and the file names of the various boot components. Both databases can be looked up by the RPL server through NIS. See the sub-section Client Configuration for information on how to set up these databases. To assist in the administration and maintenance of the network boot activity, there are two run-time signals that the server will accept to change some run-time parameters and print out useful status information. See the sub-section Signals for details. The RPL server is not limited to the ability to boot only x86 clients. If properly configured, the server should be able to download any bootfiles to the clients. Client Configuration The following configuration information is specific to booting x86 clients.

rpld(1M)

In order to allow clients to boot x86 from across the network, the client's information has to be pre-configured in two databases: `ethers(4)` and `bootparams(4)`. Both databases can be accessed through NIS. Refer to *Solaris 9 12/03 Installation Guide* for information on how to configure a diskless x86 client. The discussion contained in the rest of this section is provided for your information only and should not be performed manually.

The `ethers` database contains a translation table to convert the physical node address to the IP address of the client. Therefore, an IP address must be assigned to the client (if this has not been done already), the node address of the client must be obtained, and then this information needs to be entered in the `ethers` database.

The bulk of the configuration is done in the `bootparams` database. This is a free-format database that essentially contains a number of keyword-value string pairs. A number of keywords have been defined for specific purposes, like the `bootparams` RPC in `bootparamd(1M)`. Three more keywords have been defined for the RPL server. They are `numbootfiles`, `bootfile`, and `bootaddr`. All three keywords must be in lowercase letters with no spaces before or after the equals symbol following the keyword.

`numbootfiles` Specifies the number of files to be downloaded to the network boot client. The format of this option is:

```
numbootfiles=n
```

Always use `numbootfiles=3` to boot x86 across the network.

`bootfile` Specifies the path name of the bootfile to be downloaded and where in memory to start loading the bootfile. A complete path name should be used. For example, assuming the client's IP address is 129.181.32.15:

```
bootfile=/rplboot/129.181.32.15.hw.com:45000
bootfile=/rplboot/129.181.32.15.glue.com:35000
bootfile=/rplboot/129.181.32.15.inetboot=8000
```

The path name following the equals symbol specifies the bootfile to be downloaded, and the hex address following the colon (:) is the absolute address of the memory location to start loading that bootfile. These addresses should be in the range of 7c00 to a0000 (i.e., the base 640K range excluding the interrupt vector and BIOS data areas). Address 45000 for this `hw.com` bootfile is also a suggested value and if possible should not be changed. The address of 35000 for `glue.com` is a suggested value that, if possible, should not be changed. The address of 8000 for `inetboot` is an absolute requirement and should never be changed.

These files, when created following the procedures in the *Solaris 9 12/03 Installation Guide* are actually symbolic links to the real file to be downloaded to the client. `hw.com` is linked to a special driver that corresponds to the network interface card of the client. `glue.com` and `inetboot` are generic to all network boot clients.

The order of these bootfile lines is not significant, but because problems have been found with certain boot PROMs, it is highly recommended that the bootfile lines be ordered in descending order of the load addresses.

`bootaddr` The absolute address in memory to start executing after all the bootfiles have been downloaded. This address should always correspond to the address where `glue.com` is being loaded. If possible, always use:

`bootaddr=35000`

OPTIONS The following options are supported:

- `-b background_mode` Specify 1 to run the server in the background and relinquish the controlling terminal, or 0 to run in the foreground without relinquishing the controlling terminal. This option corresponds to the *BackGround* setting in the configuration file. If you have specified that the error or warning messages be sent to standard output in the configuration file or by using the `-D` option above, the server cannot be run in background mode. Doing so will cause the server to exit after announcing the error.
- `-d debug_level` Specify a level of 0 if you do not want any error or warning messages to be generated, or a level from 1 to 9 for increasing amounts of messages. This option corresponds to the *DebugLevel* setting in the configuration file. The default value is 0. Note that it is best to limit the level to 8 or below; use of level 9 may generate so many debug messages that the performance of the RPL server may be impacted.
- `-D debug_destination` Specify 0 to send error or warning messages to standard output, 1 to `syslogd`, and 2 to the log file. This option corresponds to the *DebugDest* setting in the configuration file. The default value is 2.
- `-f config_filename` Use this to specify a configuration file name other than the system default `/etc/rpld.conf` file.
- `-g delay_granularity` This corresponds to the *DelayGran* setting in the configuration file. If retransmission requests from clients do occur, the delay granularity factor will be used to adjust the delay count for this client upwards

rpld(1M)

	or downwards. If the retransmission request is caused by data overrun, the delay count will be incremented by delay granularity units to increase the delay between data frames. If the retransmission request is caused by sending data too slowly, this will be used to adjust the delay count downwards to shorten the delay. Eventually the server will settle at the delay count value that works best with the speed of the client and no retransmission request will be needed. The default value is 2.
<code>-l log_filename</code>	Specify an alternate log file name to hold the error or warning messages in connection with the <code>-D 2</code> option or the configuration file <code>DebugDest = 2</code> setting. This option corresponds to the <code>LogFile</code> setting in the configuration file. The default is <code>/var/spool/rpld.log</code>.
<code>-M maximum_clients</code>	Specify the maximum number of simultaneous network boot clients to be served. This option corresponds to the <code>MaxClients</code> setting in the configuration file. A value of <code>-1</code> means unlimited, and the actual number will depend on available system resources. The default value is <code>-1</code>.
<code>-s start_delay_count</code>	This option corresponds to the <code>StartDelay</code> setting in the configuration file. Specify the number of delay units between outgoing data frames sent to clients to avoid retransmission requests from them. Using the LLC type 1 protocol, data transfer is a one-way, best-effort delivery mechanism. The server, without any type of delay mechanism, can overrun the client by sending data frames too quickly. Therefore, a variable delay is built into the server to limit the speed of sending data to the clients, thus avoiding the clients sending back retransmission requests. This value should be machine environment specific. If you have a fast server machine but slow client machines, you may want to set a large start delay count. If you have comparable server and client machines, the delay count may be set to 1. The delay is only approximate and should not be taken as an accurate measure of time. There is no specific correlation between the delay unit and the actual time of delay. The default value is 20.
<code>-z frame_size</code>	This option corresponds to the <code>FrameSize</code> setting in the configuration file. This specifies the size of the data frames used to send data to the clients. This is limited by the underlying physical medium. For

ethernet/802.3, the maximum physical frame size is 1500 octets. The default value is 1500. Note that the protocol overhead of LLC1 and RPL is 32 octets, resulting in a maximum data length of 1468 octets.

Signals The RPL server accepts two signals to change run-time parameters and display status information, respectively:

- HANGUP** This will cause the RPL server to reread the default configuration file `/etc/rpld.conf` or an alternate configuration file if one is specified when the server is started. New values of certain parameters can be used immediately, such as *DebugLevel*, *DebugDest*, *LogFile*, *DelayGran*, and *FrameSize*. For *MaxClients*, if the server is already serving more than the new value, the server will not accept additional boot requests until the number has fallen below the *MaxClients* parameter. For *StartDelay*, this will only affect new boot requests. All the existing delay counts for the various clients in service will not be affected. Finally, the *BackGround* parameter will have no effect once the server has been running. You cannot change the mode of service without first killing the server and then restarting it.
- USR1** This signal will cause the server to dump all the parameter values and the status of each individual boot client to the destination specified by *DebugDest*.

FILES `/usr/sbin/rpld`
`/etc/rpld.conf`
`/var/spool/rpld.log`
`/etc/ethers`
`/etc/bootparams`
`/rplboot`

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	x86
Availability	SUNWbsu

SEE ALSO `bootparamd(1M)`, `in.rarpd(1M)`, `bootparams(4)`, `ethers(4)`, `nsswitch.conf(4)`, `rpld.conf(4)`, `attributes(5)`

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rquotad(1M)

NAME	rquotad – remote quota server
SYNOPSIS	/usr/lib/nfs/rquotad
DESCRIPTION	rquotad is an rpc(4) server which returns quotas for a user of a local file system which is mounted by a remote machine over the NFS. The results are used by quota(1M) to display user quotas for remote file systems. The rquotad daemon is normally invoked by inetd(1M).
USAGE	See largefile(5) for the description of the behavior of rquotad when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).
FILES	quotas quota file at the file system root
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnfssu

SEE ALSO inetd(1M), quota(1M), rpc(4), services(4), attributes(5), largefile(5)
Solaris 9 12/03 Installation Guide

NAME	rsh, restricted_shell – restricted shell command interpreter
SYNOPSIS	/usr/lib/rsh [-acefhiknprstuvx] [<i>argument...</i>]
DESCRIPTION	rsh is a limiting version of the standard command interpreter sh, used to restrict logins to execution environments whose capabilities are more controlled than those of sh (see sh(1) for complete description and usage). When the shell is invoked, it scans the environment for the value of the environmental variable, SHELL. If it is found and rsh is the file name part of its value, the shell becomes a restricted shell. The actions of rsh are identical to those of sh, except that the following are disallowed: ■ changing directory (see cd(1)), ■ setting the value of \$PATH, ■ specifying path or command names containing /, ■ redirecting output (> and >>). The restrictions above are enforced after <i>.profile</i> is interpreted. A restricted shell can be invoked in one of the following ways: 1. rsh is the file name part of the last entry in the /etc/passwd file (see passwd(4)); 2. the environment variable SHELL exists and rsh is the file name part of its value; the environment variable SHELL needs to be set in the <i>.login</i> file; 3. the shell is invoked and rsh is the file name part of argument 0; 4. the shell is invoked with the -r option. When a command to be executed is found to be a shell procedure, rsh invokes sh to execute it. Thus, it is possible to provide to the end-user shell procedures that have access to the full power of the standard shell, while imposing a limited menu of commands; this scheme assumes that the end-user does not have write and execute permissions in the same directory. The net effect of these rules is that the writer of the <i>.profile</i> (see profile(4)) has complete control over user actions by performing guaranteed setup actions and leaving the user in an appropriate directory (probably <i>not</i> the login directory). The system administrator often sets up a directory of commands (that is, /usr/rbin) that can be safely invoked by a restricted shell. Some systems also provide a restricted editor, red.
EXIT STATUS	Errors detected by the shell, such as syntax errors, cause the shell to return a non-zero exit status. If the shell is being used non-interactively execution of the shell file is abandoned. Otherwise, the shell returns the exit status of the last command executed.

rsh(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO intro(1), cd(1), login(1), rsh(1), sh(1), exec(2), passwd(4), profile(4), attributes(5)

NOTES The restricted shell, /usr/lib/rsh, should not be confused with the remote shell, /usr/bin/rsh, which is documented in rsh(1).

NAME	rtc – provide all real-time clock and GMT-lag management							
SYNOPSIS	/usr/sbin/rtc [-c] [-z zone-name]							
DESCRIPTION	The <code>rtc</code> command reconciles the difference in the way that time is established between UNIX and MS-DOS systems. UNIX systems utilize Greenwich Mean Time (GMT), while MS-DOS systems utilize local time. Without arguments, <code>rtc</code> displays the currently configured time zone string. The currently configured time zone string is based on what was last recorded by <code>rtc-z zone-name</code>. The <code>rtc</code> command is not normally run from a shell prompt; it is generally invoked by the system. Commands such as <code>date(1)</code> and <code>rdate(1M)</code>, which are used to set the time on a system, invoke <code>/usr/sbin/rtc -c</code> to ensure that daylight savings time (DST) is corrected for properly.							
	OPTIONS	<table><tr><td>-c</td><td>This option checks for DST and makes corrections if necessary. It is normally run once a day by a cron job.</td></tr><tr><td></td><td>If there is no RTC time zone or <code>/etc/rtc_config</code> file, this option will do nothing.</td></tr><tr><td>-z zone-name</td><td>This option, which is normally run by the system at software installation time, is used to specify the time zone in which the RTC is to be maintained. It updates the configuration file <code>/etc/rtc_config</code> with the name of the specified zone and the current GMT lag for that zone. If there is an existing <code>rtc_config</code> file, this command will update it. If not, this command will create it.</td></tr></table>	-c	This option checks for DST and makes corrections if necessary. It is normally run once a day by a cron job.		If there is no RTC time zone or <code>/etc/rtc_config</code> file, this option will do nothing.	-z zone-name	This option, which is normally run by the system at software installation time, is used to specify the time zone in which the RTC is to be maintained. It updates the configuration file <code>/etc/rtc_config</code> with the name of the specified zone and the current GMT lag for that zone. If there is an existing <code>rtc_config</code> file, this command will update it. If not, this command will create it.
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FILES	/etc/rtc_config	The data file used to record the time zone and GMT lag. This file is completely managed by <code>/usr/sbin/rtc</code> , and it is read by the kernel.						
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:							
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Architecture</td><td>x86</td></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Architecture	x86	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE							
Architecture	x86							
Availability	SUNWcsu							
SEE ALSO	<code>date(1)</code> , <code>rdate(1M)</code> , <code>attributes(5)</code>							

rtquery(1M)

NAME	rtquery – query routing daemons for their routing tables
SYNOPSIS	rtquery [-np1] [-w <i>timeout</i>] [-r <i>addr</i>] [-a <i>secret</i>] <i>host</i> ... rtquery [-t <i>operation</i>] <i>host</i> ...
DESCRIPTION	The rtquery command is used to query a RIP network routing daemon, in.routed(1M) or GateD, for its routing table by sending a request or poll command. The routing information in any routing response packets returned is displayed numerically and symbolically. By default, rtquery uses the request command. When the -p option is specified, rtquery uses the poll command, an undocumented extension to the RIP protocol supported by GateD. When querying GateD, the poll command is preferred over the request command because the response is not subject to Split Horizon and/or Poisoned Reverse, and because some versions of GateD do not answer the request command. in.routed does not answer the poll command, but recognizes requests coming from rtquery and so answers completely. The rtquery command is also used to turn tracing on or off in in.routed.
OPTIONS	The following options are supported: -a <i>passwd=XXX</i> -a <i>md5_passwd=XXX KeyID</i> Causes the query to be sent with the indicated cleartext or MD5 password. -n Displays only the numeric network and host addresses instead of both numeric and symbolic names. -p Uses the poll command to request full routing information from GateD. This is an undocumented extension RIP protocol supported only by GateD. -r <i>addr</i> Asks about the route to destination <i>addr</i>. -t <i>operation</i> Changes tracing, where <i>operation</i> is one of the actions listed below. Requests from processes not running with UID 0 or on distant networks are generally ignored by the daemon except for a message in the system log. GateD is likely to ignore these debugging requests. on=<i>tracefile</i> Turns tracing on, directing tracing into the specified file. That file must have been specified when the daemon was started or have the name, <i>/var/log/in.routed.trace</i>. more Increases the debugging level. off Turns off tracing.

rtquery(1M)

dump

Dumps the daemon's routing table to the current trace file.

-w *timeout*

Changes the delay for an answer from each host. By default, each host is given 15 seconds to respond.

-1

Queries using RIP version 1 instead of RIP version 2.

EXIT STATUS The following exit values are returned:

0 Successful completion.

>0 An error occurred.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWroute

SEE ALSO *in.routed(1M), route(1M), gateways(4), attributes(5), icmp(7P), inet(7P), udp(7P)*

Routing Information Protocol, RIPv1, RFC 1058

Routing Information Protocol, RIPv2, RFC 2453, STD 0056

runacct(1M)

NAME	runacct – run daily accounting																						
SYNOPSIS	<code>/usr/lib/acct/runacct</code> [<i>mmdd</i> [<i>state</i>]]																						
DESCRIPTION	runacct is the main daily accounting shell procedure. It is normally initiated using cron. runacct processes connect, fee, disk, and process accounting files. It also prepares summary files for prdaily or billing purposes. runacct is distributed only to source code licensees. runacct takes care not to damage active accounting files or summary files in the event of errors. It records its progress by writing descriptive diagnostic messages into active. When an error is detected, a message is written to /dev/console, mail (see mail(1)) is sent to root and adm, and runacct terminates. runacct uses a series of lock files to protect against re-invocation. The files lock and lock1 are used to prevent simultaneous invocation, and lastdate is used to prevent more than one invocation per day. runacct breaks its processing into separate, restartable <i>states</i> using statefile to remember the last <i>state</i> completed. It accomplishes this by writing the <i>state</i> name into statefile. runacct then looks in statefile to see what it has done and to determine what to process next. <i>states</i> are executed in the following order: <table> <tr> <td>SETUP</td><td>Move active accounting files into working files.</td></tr> <tr> <td>WTMPFIX</td><td>Verify integrity of wtmpx file, correcting date changes if necessary.</td></tr> <tr> <td>CONNECT</td><td>Produce connect session records in tacct.h format.</td></tr> <tr> <td>PROCESS</td><td>Convert process accounting records into tacct.h format.</td></tr> <tr> <td>MERGE</td><td>Merge the connect and process accounting records.</td></tr> <tr> <td>FEES</td><td>Convert output of chargefee into tacct.h format, merge with connect, and process accounting records.</td></tr> <tr> <td>DISK</td><td>Merge disk accounting records with connect, process, and fee accounting records.</td></tr> <tr> <td>MERGETACCT</td><td>Merge the daily total accounting records in daytacct with the summary total accounting records in /var/adm/acct/sum/tacct.</td></tr> <tr> <td>CMS</td><td>Produce command summaries.</td></tr> <tr> <td>USEREXIT</td><td>Any installation dependent accounting programs can be included here.</td></tr> <tr> <td>CLEANUP</td><td>Clean up temporary files and exit. To restart runacct after a failure, first check the active file for diagnostics, then fix any corrupted data files, such as pacct or wtmpx. The lock, lock1, and lastdate files must be removed before runacct can be restarted. The argument <i>mmdd</i> is necessary if runacct is being restarted. <i>mmdd</i> specifies the month and day for which runacct will rerun the accounting. The entry point for processing is based</td></tr> </table>	SETUP	Move active accounting files into working files.	WTMPFIX	Verify integrity of wtmpx file, correcting date changes if necessary.	CONNECT	Produce connect session records in tacct.h format.	PROCESS	Convert process accounting records into tacct.h format.	MERGE	Merge the connect and process accounting records.	FEES	Convert output of chargefee into tacct.h format, merge with connect, and process accounting records.	DISK	Merge disk accounting records with connect, process, and fee accounting records.	MERGETACCT	Merge the daily total accounting records in daytacct with the summary total accounting records in /var/adm/acct/sum/tacct.	CMS	Produce command summaries.	USEREXIT	Any installation dependent accounting programs can be included here.	CLEANUP	Clean up temporary files and exit. To restart runacct after a failure, first check the active file for diagnostics, then fix any corrupted data files, such as pacct or wtmpx. The lock, lock1, and lastdate files must be removed before runacct can be restarted. The argument <i>mmdd</i> is necessary if runacct is being restarted. <i>mmdd</i> specifies the month and day for which runacct will rerun the accounting. The entry point for processing is based
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runacct(1M)

on the contents of *statefile*; to override this, include the desired *state* on the command line to designate where processing should begin.

EXAMPLES

EXAMPLE 1 Starting runacct

The following example starts runacct:

```
example% nohup runacct 2> /var/adm/acct/nite/fd2log &
```

EXAMPLE 2 Restarting runacct

The following example restarts runacct:

```
example% nohup runacct 0601 2>> /var/adm/acct/nite/fd2log &
```

EXAMPLE 3 Restarting runacct at a Specific State

The following example restarts runacct at a specific state:

```
example% nohup runacct 0601 MERGE 2>> /var/adm/acct/nite/fd2log &
```

FILES

/var/adm/wtmpx
History of user access and administration information

/var/adm/pacctincr

/var/adm/acct/nite/active

/var/adm/acct/nite/daytacct

/var/adm/acct/nite/lock

/var/adm/acct/nite/lock1

/var/adm/acct/nite/lastdate

/var/adm/acct/nite/statefile

ATTRIBUTES

See *attributes(5)* for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWaccu

SEE ALSO

acctcom(1), *mail(1)*, *acct(1M)*, *acctcms(1M)*, *acctcon(1M)*, *acctmerg(1M)*, *acctprc(1M)*, *acctsh(1M)*, *cron(1M)*, *fwtmp(1M)*, *acct(2)*, *acct(3HEAD)*, *utmpx(4)*, *attributes(5)*

NOTES

It is not recommended to restart runacct in the *SETUP state*. Run *SETUP* manually and restart using:

runacct(1M)

`runacct mmd` WTMPFIX

If `runacct` failed in the *PROCESS state*, remove the last `ptacct` file because it will not be complete.

The `runacct` command can process a maximum of

- 6000 distinct sessions
- 1000 distinct terminal lines
- 2000 distinct login names

during a single invocation of the command. If at some point the actual number of any one of these items exceeds the maximum, the command will not succeed.

Do not invoke `runacct` at the same time as `ckpacct`, as there may be a conflict if both scripts attempt to execute `turnacct switch` simultaneously.

NAME	rwall – write to all users over a network				
SYNOPSIS	<pre>/usr/sbin/rwall hostname... /usr/sbin/rwall -n netgroup... /usr/sbin/rwall -h hostname -n netgroup</pre>				
DESCRIPTION	rwall reads a message from standard input until EOF. It then sends this message, preceded by the line: <pre>Broadcast Message . . .</pre> to all users logged in on the specified host machines. With the <code>-n</code> option, it sends to the specified network groups.				
OPTIONS	<code>-n netgroup</code> Send the broadcast message to the specified network groups. <code>-h hostname</code> Specify the hostname, the name of the host machine.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWrcmdc</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWrcmdc
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWrcmdc				
SEE ALSO	<code>inetd(1M)</code> , <code>listen(1M)</code> , <code>pmadm(1M)</code> , <code>sacadm(1M)</code> , <code>wall(1M)</code> , <code>attributes(5)</code>				
NOTES	The timeout is fairly short to allow transmission to a large group of machines (some of which may be down) in a reasonable amount of time. Thus the message may not get through to a heavily loaded machine.				

sac(1M)

NAME	sac – service access controller										
SYNOPSIS	sac -t <i>sanity_interval</i> /usr/lib/saf/sac										
DESCRIPTION	The Service Access Controller (SAC) is the overseer of the server machine. It is started when the server machine enters multiuser mode. The SAC performs several important functions as explained below.										
Customizing the SAC Environment	When sac is invoked, it first looks for the per-system configuration script /etc/saf/_sysconfig . sac interprets _sysconfig to customize its own environment. The modifications made to the SAC environment by _sysconfig are inherited by all the children of the SAC. This inherited environment may be modified by the children.										
Starting Port Monitors	After it has interpreted the _sysconfig file, the sac reads its administrative file /etc/saf/_sactab . _sactab specifies which port monitors are to be started. For each port monitor to be started, sac forks a child (see fork(2)) and creates a utmpx entry with the type field set to LOGIN_PROCESS . Each child then interprets its per-port monitor configuration script /etc/saf/pmtag/_config , if the file exists. These modifications to the environment affect the port monitor and will be inherited by all its children. Finally, the child process execs the port monitor, using the command found in the _sactab entry. (See sacadm ; this is the command given with the -c option when the port monitor is added to the system.)										
Polling Port Monitors to Detect Failure	The -t option sets the frequency with which sac polls the port monitors on the system. This time may also be thought of as half of the maximum latency required to detect that a port monitor has failed and that recovery action is necessary.										
Administrative functions	The Service Access Controller represents the administrative point of control for port monitors. Its administrative tasks are explained below. When queried (sacadm with either -l or -L), the Service Access Controller returns the status of the port monitors specified, which sacadm prints on the standard output. A port monitor may be in one of six states: <table><tr><td>ENABLED</td><td>The port monitor is currently running and is accepting connections. See sacadm(1M) with the -e option.</td></tr><tr><td>DISABLED</td><td>The port monitor is currently running and is not accepting connections. See sacadm with the -d option, and see NOTRUNNING, below.</td></tr><tr><td>STARTING</td><td>The port monitor is in the process of starting up. STARTING is an intermediate state on the way to ENABLED or DISABLED.</td></tr><tr><td>FAILED</td><td>The port monitor was unable to start and remain running.</td></tr><tr><td>STOPPING</td><td>The port monitor has been manually terminated but has not completed its shutdown procedure. STOPPING is an intermediate state on the way to NOTRUNNING.</td></tr></table>	ENABLED	The port monitor is currently running and is accepting connections. See sacadm(1M) with the -e option.	DISABLED	The port monitor is currently running and is not accepting connections. See sacadm with the -d option, and see NOTRUNNING , below.	STARTING	The port monitor is in the process of starting up. STARTING is an intermediate state on the way to ENABLED or DISABLED .	FAILED	The port monitor was unable to start and remain running.	STOPPING	The port monitor has been manually terminated but has not completed its shutdown procedure. STOPPING is an intermediate state on the way to NOTRUNNING .
ENABLED	The port monitor is currently running and is accepting connections. See sacadm(1M) with the -e option.										
DISABLED	The port monitor is currently running and is not accepting connections. See sacadm with the -d option, and see NOTRUNNING , below.										
STARTING	The port monitor is in the process of starting up. STARTING is an intermediate state on the way to ENABLED or DISABLED .										
FAILED	The port monitor was unable to start and remain running.										
STOPPING	The port monitor has been manually terminated but has not completed its shutdown procedure. STOPPING is an intermediate state on the way to NOTRUNNING .										

NOTRUNNING The port monitor is not currently running. (See `sacadm` with `-k`.) This is the normal “not running” state. When a port monitor is killed, all ports it was monitoring are inaccessible. It is not possible for an external user to tell whether a port is not being monitored or the system is down. If the port monitor is not killed but is in the `DISABLED` state, it may be possible (depending on the port monitor being used) to write a message on the inaccessible port telling the user who is trying to access the port that it is disabled. This is the advantage of having a `DISABLED` state as well as the `NOTRUNNING` state.

When a port monitor terminates, the SAC removes the `utmpx` entry for that port monitor.

The SAC receives all requests to enable, disable, start, or stop port monitors and takes the appropriate action.

The SAC is responsible for restarting port monitors that terminate. Whether or not the SAC will restart a given port monitor depends on two things:

- The restart count specified for the port monitor when the port monitor was added by `sacadm`; this information is included in `/etc/saf/pmtag/_sactab`.
- The number of times the port monitor has already been restarted.

SECURITY `sac` uses `pam(3PAM)` for session management. The PAM configuration policy, listed through `/etc/pam.conf`, specifies the session management module to be used for `sac`. Here is a partial `pam.conf` file with entries for `sac` using the UNIX session management module.

```
sac session required pam_unix_session.so.1
```

If there are no entries for the `sac` service, then the entries for the “other” service will be used.

OPTIONS `-t sanity_interval` Sets the frequency (*sanity_interval*) with which `sac` polls the port monitors on the system.

FILES `/etc/saf/_sactab`
`/etc/saf/_sysconfig`
`/var/adm/utmpx`
`/var/saf/_log`

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

sac(1M)

SEE ALSO pmadm(1M), sacadm(1M), fork(2) pam(3PAM), pam.conf(4), attributes(5), pam_authtok_check(5), pam_authtok_get(5), pam_authtok_store(5), pam_dhkeys(5), pam_passwd_auth(5), pam_unix(5), pam_unix_account(5), pam_unix_auth(5), pam_unix_session(5)

NOTES The pam_unix(5) module might not be supported in a future release. Similar functionality is provided by pam_authtok_check(5), pam_authtok_get(5), pam_authtok_store(5), pam_dhkeys(5), pam_passwd_auth(5), pam_unix_account(5), pam_unix_auth(5), and pam_unix_session(5).

NAME	sacadm – service access controller administration
SYNOPSIS	<pre> sacadm -a -p <i>pmtag</i> -t <i>type</i> -c <i>cmd</i> -v <i>ver</i> [-f <i>dx</i>] [-n <i>count</i>] [-y <i>comment</i>] [-z <i>script</i>] sacadm -r -p <i>pmtag</i> sacadm -s -p <i>pmtag</i> sacadm -k -p <i>pmtag</i> sacadm -e -p <i>pmtag</i> sacadm -d -p <i>pmtag</i> sacadm -l [-p <i>pmtag</i> -t <i>type</i>] sacadm -L [-p <i>pmtag</i> -t <i>type</i>] sacadm -g -p <i>pmtag</i> [-z <i>script</i>] sacadm -G [-z <i>script</i>] sacadm -x [-p <i>pmtag</i>] </pre>
DESCRIPTION	sacadm is the administrative command for the upper level of the Service Access Facility hierarchy (port monitor administration). sacadm performs the following functions: ■ adds or removes a port monitor ■ starts or stops a port monitor ■ enables or disables a port monitor ■ installs or replaces a per-system configuration script ■ installs or replaces a per-port monitor configuration script ■ prints requested port monitor information Requests about the status of port monitors (-l and -L) and requests to print per-port monitor and per-system configuration scripts (-g and -G without the -z option) may be executed by any user on the system. Other sacadm commands may be executed only by the super-user.
OPTIONS	-a Add a port monitor. When adding a port monitor, sacadm creates the supporting directory structure in /etc/saf and /var/saf and adds an entry for the new port monitor to /etc/saf/_sactab. The file _sactab already exists on the delivered system. Initially, it is empty except for a single line, which contains the version number of the Service Access Controller. Unless the command line that adds the new port monitor includes the -f option with the -x argument, the new port monitor will be started. Because of the complexity of the options and arguments that follow the -a option, it may be convenient to use a command script or the menu system to add port monitors.

sacadm(1M)

-c <i>cmd</i>	Execute the command string <i>cmd</i> to start a port monitor. The -c option may be used only with a -a. A -a option requires a -c.
-d	Disable the port monitor <i>pmtag</i> .
-e	Enable the port monitor <i>pmtag</i> .
-f <i>dx</i>	The -f option specifies one or both of the following two flags which are then included in the flags field of the <code>_sactab</code> entry for the new port monitor. If the -f option is not included on the command line, no flags are set and the default conditions prevail. By default, a port monitor is started. A -f option with no following argument is illegal. d Do not enable the new port monitor. x Do not start the new port monitor.
-g	The -g option is used to request output or to install or replace the per-port monitor configuration script <code>/etc/saf/<i>pmtag</i>/_config</code> . -g requires a -p option. The -g option with only a -p option prints the per-port monitor configuration script for port monitor <i>pmtag</i> . The -g option with a -p option and a -z option installs the file <code>script</code> as the per-port monitor configuration script for port monitor <i>pmtag</i> . Other combinations of options with -g are invalid.
-G	The -G option is used to request output or to install or replace the per-system configuration script <code>/etc/saf/_sysconfig</code> . The -G option by itself prints the per-system configuration script. The -G option in combination with a -z option installs the file <code>script</code> as the per-system configuration script. Other combinations of options with a -G option are invalid.
-k	Stop port monitor <i>pmtag</i> .
-l	The -l option is used to request port monitor information. The -l by itself lists all port monitors on the system. The -l option in combination with the -p option lists only the port monitor specified by <i>pmtag</i> . A -l in combination with the -t option lists all port monitors of type <i>type</i> . Any other combination of options with the -l option is invalid.
-L	The -L option is identical to the -l option except that the output appears in a condensed format.
-n <i>count</i>	Set the restart count to <i>count</i> . If a restart count is not specified, count is set to 0. A count of 0 indicates that the port monitor is not to be restarted if it fails.
-p <i>pmtag</i>	Specifies the tag associated with a port monitor.
-r	Remove port monitor <i>pmtag</i> . <code>sacadm</code> removes the port monitor entry from <code>/etc/saf/_sactab</code> . If the removed port monitor is

not running, then no further action is taken. If the removed port monitor is running, the Service Access Controller (SAC) sends it SIGTERM to indicate that it should shut down. Note that the port monitor's directory structure remains intact.

- s Start a port monitor. The SAC starts the port monitor *pmtag*.
- t *type* Specifies the port monitor type.
- v *ver* Specifies the version number of the port monitor. This version number may be given as
 -v '*pmspec* -V'
 where *pmspec* is the special administrative command for port monitor *pmtag*. This special command is *tttadm* for *tttmon* and *nlsadmin* for *listen*. The version stamp of the port monitor is known by the command and is returned when *pmspec* is invoked with a -V option.
- x The -x option by itself tells the SAC to read its database file (*_sactab*). The -x option with the -p option tells port monitor *pmtag* to read its administrative file.
- y *comment* Include *comment* in the *_sactab* entry for port monitor *pmtag*.
- z *script* Used with the -g and -G options to specify the name of a file that contains a configuration script. With the -g option, *script* is a per-port monitor configuration script; with -G it is a per-system configuration script. Modifying a configuration script is a three-step procedure. First a copy of the existing script is made (-g or -G). Then the copy is edited. Finally, the copy is put in place over the existing script (-g or -G with -z).

OUTPUT If successful, *sacadm* will exit with a status of 0. If *sacadm* fails for any reason, it will exit with a nonzero status. Options that request information will write the information on the standard output. In the condensed format (-L), port monitor information is printed as a sequence of colon-separated fields; empty fields are indicated by two successive colons. The standard format (-l) prints a header identifying the columns, and port monitor information is aligned under the appropriate headings. In this format, an empty field is indicated by a hyphen. The comment character is #.

EXAMPLES **EXAMPLE 1** A sample output of the *sacadm* command.

The following command line adds a port monitor. The port monitor tag is *npack*; its type is *listen*; if necessary, it will restart three times before failing; its administrative command is *nlsadmin*; and the configuration script to be read is in the file *script*:

```
sacadm -a -p npack -t listen -c /usr/lib/saf/listen npack
-v 'nlsadmin -V' -n 3 -z script
```

Remove a port monitor whose tag is *pmtag*:

```
sacadm -r -p pmtag
```

sacadm(1M)

EXAMPLE 1 A sample output of the `sacadm` command. (Continued)

Start the port monitor whose tag is `pmtag`:

```
sacadm -s -p pmtag
```

Stop the port monitor whose tag is `pmtag`:

```
sacadm -k -p pmtag
```

Enable the port monitor whose tag is `pmtag`:

```
sacadm -e -p pmtag
```

Disable the port monitor whose tag is `pmtag`:

```
sacadm -d -p pmtag
```

List status information for all port monitors:

```
sacadm -l
```

List status information for the port monitor whose tag is `pmtag`:

```
sacadm -l -p pmtag
```

List the same information in condensed format:

```
sacadm -L -p pmtag
```

List status information for all port monitors whose type is `listen`:

```
sacadm -l -t listen
```

Replace the per-port monitor configuration script associated with the port monitor whose tag is `pmtag` with the contents of the file `file.config`:

```
sacadm -g -p pmtag -z file.config
```

FILES

- `/etc/saf/_sactab`
- `/etc/saf/_sysconfig`
- `/etc/saf/pmtag/_config`

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `pmadm(1M)`, `sac(1M)`, `doconfig(3NSL)`, `attributes(5)`

NAME	sadmind – distributed system administration daemon								
SYNOPSIS	sadmind [-c <i>keywords</i>] [-i <i>secs</i>] [-l [<i>logfile</i>]] [-O <i>OW_path_name</i>] [-S <i>security_level</i>] [-v]								
DESCRIPTION	sadmind is the daemon used by Solstice AdminSuite applications to perform distributed system administration operations. The <i>sadmind</i> daemon is started automatically by the <i>inetd</i> daemon whenever a request to invoke an operation is received. The <i>sadmind</i> daemon process continues to run for 15 minutes after the last request is completed, unless a different idle-time is specified with the -i command line option. The <i>sadmind</i> daemon may be started independently from the command line, for example, at system boot time. In this case, the -i option has no effect; <i>sadmind</i> continues to run, even if there are no active requests. The <i>sadmind</i> daemon process can be configured to write tracing information into a log file by specifying the -c and -l command line options. The -c option specifies a comma-separated list of keywords indicating the types of information to be logged. The following keywords may be useful to administrators: <table> <tr> <td>Errors</td><td>Includes messages about errors that occurred during the daemon execution.</td></tr> <tr> <td>Requests</td><td>Includes messages about which operations <i>sadmind</i> invoked and when.</td></tr> <tr> <td>System-Info</td><td>Includes messages about when the <i>sadmind</i> daemon was started and stopped.</td></tr> <tr> <td>*</td><td>Includes all possible log messages.</td></tr> </table> The -l option enables logging and optionally specifies the path and file name of the log file. If no log file is specified, the default log file <i>/var/adm/admin.log</i> is used.	Errors	Includes messages about errors that occurred during the daemon execution.	Requests	Includes messages about which operations <i>sadmind</i> invoked and when.	System-Info	Includes messages about when the <i>sadmind</i> daemon was started and stopped.	*	Includes all possible log messages.
Errors	Includes messages about errors that occurred during the daemon execution.								
Requests	Includes messages about which operations <i>sadmind</i> invoked and when.								
System-Info	Includes messages about when the <i>sadmind</i> daemon was started and stopped.								
*	Includes all possible log messages.								
OPTIONS	The following options are supported: <table> <tr> <td>-c <i>keywords</i></td><td>Specify the types of information to be logged as a comma-separated list of keywords. The default is to log all types of messages.</td></tr> <tr> <td>-i <i>secs</i></td><td>Specify the number of seconds for <i>sadmind</i> to stay up after the last request is completed. The default is 15 minutes (900 seconds). If <i>secs</i> is 0 or over 10,000,000, <i>sadmind</i> stays up forever. -i only applies when <i>sadmind</i> is started by the <i>inetd</i> daemon. You may want <i>sadmind</i> to run permanently (or for extended durations) on systems that are frequently administered by applications using <i>sadmind</i> (for example, a server managed through Host Manager) to improve application performance.</td></tr> </table>	-c <i>keywords</i>	Specify the types of information to be logged as a comma-separated list of keywords. The default is to log all types of messages.	-i <i>secs</i>	Specify the number of seconds for <i>sadmind</i> to stay up after the last request is completed. The default is 15 minutes (900 seconds). If <i>secs</i> is 0 or over 10,000,000, <i>sadmind</i> stays up forever. -i only applies when <i>sadmind</i> is started by the <i>inetd</i> daemon. You may want <i>sadmind</i> to run permanently (or for extended durations) on systems that are frequently administered by applications using <i>sadmind</i> (for example, a server managed through Host Manager) to improve application performance.				
-c <i>keywords</i>	Specify the types of information to be logged as a comma-separated list of keywords. The default is to log all types of messages.								
-i <i>secs</i>	Specify the number of seconds for <i>sadmind</i> to stay up after the last request is completed. The default is 15 minutes (900 seconds). If <i>secs</i> is 0 or over 10,000,000, <i>sadmind</i> stays up forever. -i only applies when <i>sadmind</i> is started by the <i>inetd</i> daemon. You may want <i>sadmind</i> to run permanently (or for extended durations) on systems that are frequently administered by applications using <i>sadmind</i> (for example, a server managed through Host Manager) to improve application performance.								

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-l [<i>logfile</i>]	Enable logging and optionally define the path name to the distributed system administration log file. The default log file is: <code>/var/adm/admin.log</code>				
-O <i>OW_path_name</i>	Define the path name to the OpenWindows home directory. If this option is not specified, the <code>sadmind</code> daemon will use the OpenWindows home directory defined in the <code>OPENWINHOME</code> environment variable, if defined; the home directory specified in the <code>/etc/OPENWINHOME</code> file, if it exists; or the default directory <code>/usr/openwin</code> . When the <code>sadmind</code> daemon is started by the <code>inetd</code> daemon, the environment variable <code>OPENWINHOME</code> is typically not defined. If the OpenWindows home directory is not one of the path names specified (<code>/usr/openwin</code> or in the file <code>/etc/OPENWINHOME</code>), the <code>-O</code> option must be added to the <code>sadmind</code> entry in the <code>inetd.conf(4)</code> configuration file.				
-S <i>security_level</i>	Define the level of security to be used by the <code>sadmind</code> daemon when checking a client's right to perform an operation on the server system. Security level specifies the authentication mechanism used to provide and check the client's identity. The client's identity must be authenticated by the specified mechanism for <code>sadmind</code> to accept his or her request. The system-wide authentication requirements set by the security level may take precedence over any operation-specific requirements. Consequently, the security level can be used system-wide to ensure that all operations meet minimum authentication requirements, regardless of the requirements assigned specifically to an operation. In addition, the security level determines whether <code>sadmind</code> will perform authorization access control checking. Security level may be one of the following: <table><tr><td>0</td><td>Set authentication type to NONE. All clients' user and group identities are set to the <code>nobody</code> identity by <code>sadmind</code> (see <i>Solstice AdminSuite 2.1 User's Guide</i>). If access is granted to <code>nobody</code>, <code>sadmind</code> executes the operation. Use this level only for testing.</td></tr><tr><td>1</td><td>Set authentication type to WEAK. Clients' user and group identities are set by <code>sadmind</code> from their authentication credentials. Client identities are accepted by</td></tr></table>	0	Set authentication type to NONE. All clients' user and group identities are set to the <code>nobody</code> identity by <code>sadmind</code> (see <i>Solstice AdminSuite 2.1 User's Guide</i>). If access is granted to <code>nobody</code> , <code>sadmind</code> executes the operation. Use this level only for testing.	1	Set authentication type to WEAK. Clients' user and group identities are set by <code>sadmind</code> from their authentication credentials. Client identities are accepted by
0	Set authentication type to NONE. All clients' user and group identities are set to the <code>nobody</code> identity by <code>sadmind</code> (see <i>Solstice AdminSuite 2.1 User's Guide</i>). If access is granted to <code>nobody</code> , <code>sadmind</code> executes the operation. Use this level only for testing.				
1	Set authentication type to WEAK. Clients' user and group identities are set by <code>sadmind</code> from their authentication credentials. Client identities are accepted by				

sadmind when they have satisfied either AUTH_SYS or AUTH_DES authentication mechanisms. The authenticated client identity is checked by `sadmind` for authorization to execute the operation. If an operation calls for a stronger security level, `sadmind` demotes the user identity to nobody, and then checks whether nobody is authorized to execute the operation. Since AUTH_SYS client credentials are easily forged, this level should be used only in relatively secure environments. No check is done that the user ID of the client represents the same user on the server system as on the client system. It is assumed that user and group identities are set up consistently on the network. This security level is the default.

- 2 Set authentication type to STRONG. Clients' user and group identities are set by `sadmind` from their authentication credential mappings (effectively, user and group IDs from `netid.byname` for NIS, or `cred` table for NIS+). Client identities are accepted by `sadmind` only when they have satisfied the AUTH_DES authentication mechanism. The `sadmind` daemon checks whether the client identity is authorized to execute the operation. This level provides the most secure environment for executing distributed administration operations. It overrides any weaker level specific to an operation. A DES credential must exist for the host running the `sadmind` daemon and all administration client user identities.

`-v` Enable the writing of log messages to the system logger, `syslogd`. Messages logged include fatal errors encountered while attempting to start the `sadmind` daemon process and those specified by the `-c` trace message keywords.

EXAMPLES

EXAMPLE 1 Using the `sadmind` command

By default, the line in `/etc/inetd.conf` that starts `sadmind` appears as follows:

```
100232/10      tli      rpc/udp      wait root
/usr/sbin/sadmind sadmind
```

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EXAMPLE 1 Using the `sadmind` command (Continued)

To make a network as secure as possible, change the line to:

```
100232/10      tli      rpc/udp      wait root
/usr/sbin/sadmind sadmind -S 2
```

To minimize delays due to starting up `sadmind`, change the line to include the `-i` option:

```
100232/10      tli      rpc/udp      wait root
/usr/sbin/sadmind sadmind -i 86400
```

In this example, the duration that `sadmind` remains up after the last operation request was completed is extended to 24 hours (86,400 seconds). Extending the timeout period may enhance performance on servers and workstations that frequently run or are administered by applications that use the `sadmind` daemon (for example, Solstice AdminSuite applications such as Host Manager).

FILES	<code>/var/adm/admin.log</code>	Distributed system administration default log file
	<code>/etc/inetd.conf</code>	Internet servers database file

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWadmfw

SEE ALSO `inetd(1M)`, `rpcbind(1M)`, `inetd.conf(4)`, `attributes(5)`

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NOTES Whenever `inetd` fails to start `sadmind`, re-register the RPC number for `sadmind`, 100232, with `rpcbind` by sending the `inetd` process a `SIGHUP` signal:

```
example% kill -HUP pid
```

or

```
example% kill -1
```

Sometimes `inetd` does not start `sadmind` in response to system administration requests, even though the `inetd.conf` file has the correct entry for the `sadmind` daemon. This can happen when `sadmind` is started manually from the command line and takes over the previous registration of the `sadmind` RPC number, 100232, by `inetd`. When the manually-started `sadmind` daemon is terminated, the `sadmind` RPC number, 100232, is de-registered with `rpcbind`. Consequently, system administration requests are ignored by `inetd`.

NAME	saf – Service Access Facility
DESCRIPTION	The SAF generalizes the procedures for service access so that login access on the local system and network access to local services are managed in similar ways. Under the SAF, systems may access services using a variety of port monitors, including ttymon, the listener, and port monitors written expressly for a user's application. The manner in which a port monitor observes and manages access ports is specific to the port monitor and not to any component of the SAF. Users may therefore extend their systems by developing and installing their own port monitors. One of the important features of the SAF is that it can be extended in this way by users. Relative to the SAF, a service is a process that is started. There are no restrictions on the functions a service may provide. The SAF consists of a controlling process, the service access controller (SAC), and two administrative levels corresponding to two levels in the supporting directory structure. The top administrative level is concerned with port monitor administration, the lower level with service administration. The SAC is documented in the <code>sac(1M)</code> man page. The administrative levels and associated utilities are documented in the <i>System Administration Guide - Volume II</i>. The requirements for writing port monitors and the functions a port monitor must perform to run under the SAF and the SAC are documented here.
Port Monitors	A port monitor is a process that is responsible for monitoring a set of homogeneous, incoming ports on a machine. A port monitor's major purpose is to detect incoming service requests and to dispatch them appropriately. A port is an externally seen access point on a system. A port may be an address on a network (TSAP or PSAP), a hardwired terminal line, an incoming phone line, etc. The definition of what constitutes a port is strictly a function of the port monitor itself. A port monitor performs certain basic functions. Some of these are required to conform to the SAF; others may be specified by the requirements and design of the port monitor itself. Port monitors have two main functions: managing ports and monitoring ports for indications of activity. Port Management The first function of a port monitor is to manage a port. The actual details of how a port is managed are defined by the person who defines the port monitor. A port monitor is not restricted to handling a single port; it may handle multiple ports simultaneously. Some examples of port management are setting the line speed on incoming phone connections, binding an appropriate network address, reinitializing the port when the service terminates, outputting a prompt, etc. Activity Monitoring The second function of a port monitor is to monitor the port or ports for which it is responsible for indications of activity. Two types of activity may be detected.

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Other Port Monitor Functions

The first is an indication to the port monitor to take some port monitor-specific action. Pressing the break key to indicate that the line speed should be cycled is an example of a port monitor activity. Not all port monitors need to recognize and respond to the same indications. The indication used to attract the attention of the port monitor is defined by the person who defines the port monitor.

The second is an incoming service request. When a service request is received, a port monitor must be able to determine which service is being requested from the port on which the request is received. The same service may be available on more than one port.

This section briefly describes other port monitor functions.

Restricting Access to the System

A port monitor must be able to restrict access to the system without disturbing services that are still running. In order to do this, a port monitor must maintain two internal states: enabled and disabled. The port monitor starts in the state indicated by the ISTATE environment variable provided by the sac. See sac(1M) for details. Enabling or disabling a port monitor affects all ports for which the port monitor is responsible. If a port monitor is responsible for a single port, only that port will be affected. If a port monitor is responsible for multiple ports, the entire collection of ports will be affected. Enabling or disabling a port monitor is a dynamic operation: it causes the port monitor to change its internal state. The effect does not persist across new invocations of the port monitor. Enabling or disabling an individual port, however, is a static operation: it causes a change to an administrative file. The effect of this change will persist across new invocations of the port monitor.

Creating utmpx Entries

Port monitors are responsible for creating utmpx entries with the type field set to USER_PROCESS for services they start. If this action has been specified, by using the -fu option in the pmadm command line that added the service, these utmpx entries may in turn be modified by the service. When the service terminates, the utmpx entry must be set to DEAD_PROCESS.

Port Monitor Process IDs and Lock Files

When a port monitor starts, it writes its process id into a file named _pid in the current directory and places an advisory lock on the file.

Changing the Service Environment: Running

doconfig(3NSL) Before invoking the service designated in the port monitor administrative file, _pmtab, a port monitor must arrange for the per-service configuration script to be run, if one exists, by calling the library function doconfig(3NSL). Because the per-service configuration script may specify the execution of restricted commands, as well as for other security reasons, port monitors are invoked with root permissions. The details of how services are invoked are specified by the person who defines the port monitor.

Terminating a Port Monitor

A port monitor must terminate itself gracefully on receipt of the signal SIGTERM. The termination sequence is the following:

	1. The port monitor enters the stopping state; no further service requests are accepted. 2. Any attempt to re-enable the port monitor will be ignored. 3. The port monitor yields control of all ports for which it is responsible. It must be possible for a new instantiation of the port monitor to start correctly while a previous instantiation is stopping. 4. The advisory lock on the process id file is released. Once this lock is released, the contents of the process id file are undefined and a new invocation of the port monitor may be started.
SAF Files	This section briefly covers the files used by the SAF. The Port Monitor Administrative File A port monitor's current directory contains an administrative file named <code>_pmtab</code>; <code>_pmtab</code> is maintained by the <code>pmadm</code> command in conjunction with a port monitor-specific administrative command. The port monitor administrative command for a listen port monitor is <code>nlsadmin(1M)</code>; the port monitor administrative command for <code>ttymon</code> is <code>ttyadm(1M)</code>. Any port monitor written by a user must be provided with an administrative command specific to that port monitor to perform similar functions. Per-Service Configuration Files A port monitor's current directory also contains the per-service configuration scripts, if they exist. The names of the per-service configuration scripts correspond to the service tags in the <code>_pmtab</code> file. Private Port Monitor Files A port monitor may create private files in the directory <code>/var/saf/tag</code>, where <i>tag</i> is the name of the port monitor. Examples of private files are log files or temporary files.
The SAC/Port Monitor Interface	The SAC creates two environment variables for each port monitor it starts: <code>PMTAG</code> and <code>ISTATE</code>. This variable is set to a unique port monitor tag by the SAC. The port monitor uses this tag to identify itself in response to <code>sac</code> messages. <code>ISTATE</code> is used to indicate to the port monitor what its initial internal state should be. <code>ISTATE</code> is set to "enabled" or "disabled" to indicate that the port monitor is to start in the enabled or disabled state respectively. The SAC performs a periodic sanity poll of the port monitors. The SAC communicates with port monitors through FIFOs. A port monitor should open <code>_pmpipe</code>, in the current directory, to receive messages from the SAC and <code>./_sacpipe</code> to send return messages to the SAC.
Message Formats	This section describes the messages that may be sent from the SAC to a port monitor (<code>sac</code> messages), and from a port monitor to the SAC (port monitor messages). These messages are sent through FIFOs and are in the form of C structures.

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Port Monitor Messages

sac Messages

The format of messages from the SAC is defined by the structure `sacmsg`:

```
struct sacmsg
{
    int sc_size; /* size of optional data portion */
    char sc_type; /* type of message */
};
```

The SAC may send four types of messages to port monitors. The type of message is indicated by setting the `sc_type` field of the `sacmsg` structure to one of the following:

SC_STATUS	status request
SC_ENABLE	enable message
SC_DISABLE	disable message
SC_READDB	message indicating that the port monitor's <code>_pmtab</code> file should be read

The `sc_size` field indicates the size of the optional data part of the message. See "Message Classes." For Solaris, `sc_size` should always be set to 0. A port monitor must respond to every message sent by the sac.

The format of messages from a port monitor to the SAC is defined by the structure `pmmsg`:

```
struct pmmsg {
    char pm_type; /* type of message */
    uchar_t pm_state; /* current state of port monitor */
    char pm_maxclass; /* maximum message class this port
                      monitor understands */
    char pm_tag[PMTAGSIZE + 1]; /* port monitor's tag */
    int pm_size; /* size of optional data portion */
};
```

Port monitors may send two types of messages to the SAC. The type of message is indicated by setting the `pm_type` field of the `pmmsg` structure to one of the following:

PM_STATUS	state information
PM_UNKNOWN	negative acknowledgment

For both types of messages, the `pm_tag` field is set to the port monitor's tag and the `pm_state` field is set to the port monitor's current state. Valid states are:

PM_STARTING	starting
PM_ENABLED	enabled
PM_DISABLED	disabled

	PM_STOPPING stopping The current state reflects any changes caused by the last message from the SAC. The status message is the normal return message. The negative acknowledgment should be sent only when the message received is not understood. <code>pm_size</code> indicates the size of the optional data part of the message. <code>pm_maxclass</code> is used to specify a message class. Both are discussed under "Message Classes." In Solaris, always set <code>pm_maxclass</code> to 1 and <code>sc_size</code> to 0. Port monitors may never initiate messages; they may only respond to messages that they receive.
Message Classes	The concept of message class has been included to accommodate possible SAF extensions. The messages described above are all class 1 messages. None of these messages contains a variable data portion; all pertinent information is contained in the message header. If new messages are added to the protocol, they will be defined as new message classes (for example, class 2). The first message the SAC sends to a port monitor will always be a class 1 message. Since all port monitors, by definition, understand class 1 messages, the first message the SAC sends is guaranteed to be understood. In its response to the SAC, the port monitor sets the <code>pm_maxclass</code> field to the maximum message class number for that port monitor. The SAC will not send messages to a port monitor from a class with a larger number than the value of <code>pm_maxclass</code>. Requests that require messages of a higher class than the port monitor can understand will fail. For Solaris, always set <code>pm_maxclass</code> to 1. For any given port monitor, messages of class <code>pm_maxclass</code> and messages of all classes with values lower than <code>pm_maxclass</code> are valid. Thus, if the <code>pm_maxclass</code> field is set to 3, the port monitor understands messages of classes 1, 2, and 3. Port monitors may not generate messages; they may only respond to messages. A port monitor's response must be of the same class as the originating message. Since only the SAC can generate messages, this protocol will function even if the port monitor is capable of dealing with messages of a higher class than the SAC can generate. <code>pm_size</code> (an element of the <code>pmmsg</code> structure) and <code>sc_size</code> (an element of the <code>sacmsg</code> structure) indicate the size of the optional data part of the message. The format of this part of the message is undefined. Its definition is inherent in the type of message. For Solaris, always set both <code>sc_size</code> and <code>pm_size</code> to 0.
Administrative Interface The SAC Administrative File <code>_sactab</code>	This section discusses the port monitor administrative files available under the SAC. The service access controller's administrative file contains information about all the port monitors for which the SAC is responsible. This file exists on the delivered system. Initially, it is empty except for a single comment line that contains the version number of the SAC. Port monitors are added to the system by making entries in the SAC's administrative file. These entries should be made using the administrative command <code>sacadm(1M)</code> with a <code>-a</code> option. <code>sacadm(1M)</code> is also used to remove entries from the SAC's administrative file. Each entry in the SAC's administrative file contains the following information.

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**The Port Monitor
Administrative
File _pmtab**

PMTAG

A unique tag that identifies a particular port monitor. The system administrator is responsible for naming a port monitor. This tag is then used by the SAC to identify the port monitor for all administrative purposes. PMTAG may consist of up to 14 alphanumeric characters.

PMTYPE

The type of the port monitor. In addition to its unique tag, each port monitor has a type designator. The type designator identifies a group of port monitors that are different invocations of the same entity. `ttymon` and `listen` are examples of valid port monitor types. The type designator is used to facilitate the administration of groups of related port monitors. Without a type designator, the system administrator has no way of knowing which port monitor tags correspond to port monitors of the same type. PMTYPE may consist of up to 14 alphanumeric characters.

FLGS

The flags that are currently defined are:

- `d` When started, do not enable the port monitor.
- `x` Do not start the port monitor.

If no flag is specified, the default action is taken. By default a port monitor is started and enabled.

RCNT

The number of times a port monitor may fail before being placed in a failed state. Once a port monitor enters the failed state, the SAC will not try to restart it. If a count is not specified when the entry is created, this field is set to 0. A restart count of 0 indicates that the port monitor is not to be restarted when it fails.

COMMAND

A string representing the command that will start the port monitor. The first component of the string, the command itself, must be a full path name.

Each port monitor will have two directories for its exclusive use. The current directory will contain files defined by the SAF (`_pmtab`, `_pid`) and the per-service configuration scripts, if they exist. The directory `/var/saf/pmtag`, where *pmtag* is the tag of the port monitor, is available for the port monitor's private files. Each port monitor has its own administrative file. The `pmadm(1M)` command should be used to add, remove, or modify service entries in this file. Each time a change is made using `pmadm(1M)`, the corresponding port monitor rereads its administrative file. Each entry in a port monitor's administrative file defines how the port monitor treats a specific port and what service is to be invoked on that port. Some fields must be present for all types of port monitors. Each entry must include a service tag to identify the service uniquely and an identity to be assigned to the service when it is started (for example, `root`).

The combination of a service tag and a port monitor tag uniquely define an instance of a service. The same service tag may be used to identify a service under a different port monitor. The record must also contain port monitor specific data (for example, for a

ttymon port monitor, this will include the prompt string which is meaningful to ttymon). Each type of port monitor must provide a command that takes the necessary port monitor-specific data as arguments and outputs these data in a form suitable for storage in the file. The `ttynam(1M)` command does this for ttymon and `nlsadmin(1M)` does it for listen. For a user-defined port monitor, a similar administrative command must also be supplied. Each service entry in the port monitor administrative file must have the following format and contain the information listed below:

```
svctag:flgs:id:reserved:reserved:reserved:pmspecific# comment
```

SVCTAG is a unique tag that identifies a service. This tag is unique only for the port monitor through which the service is available. Other port monitors may offer the same or other services with the same tag. A service requires both a port monitor tag and a service tag to identify it uniquely. SVCTAG may consist of up to 14 alphanumeric characters. The service entries are defined as:

FLGS

Flags with the following meanings may currently be included in this field:

- `x` Do not enable this port. By default the port is enabled.
- `u` Create a utmpx entry for this service. By default no utmpx entry is created for the service.

ID

The identity under which the service is to be started. The identity has the form of a login name as it appears in `/etc/passwd`.

PMSPECIFIC

Examples of port monitor information are addresses, the name of a process to execute, or the name of a STREAMS pipe to pass a connection through. This information will vary to meet the needs of each different type of port monitor.

COMMENT

A comment associated with the service entry. Port monitors may ignore the `u` flag if creating a utmpx entry for the service is not appropriate to the manner in which the service is to be invoked. Some services may not start properly unless utmpx entries have been created for them (for example, login). Each port monitor administrative file must contain one special comment of the form:

```
# VERSION=value
```

where *value* is an integer that represents the port monitor's version number. The version number defines the format of the port monitor administrative file. This comment line is created automatically when a port monitor is added to the system. It appears on a line by itself, before the service entries.

Monitor-Specific Administrative Command

Previously, two pieces of information included in the `_pmtab` file were described: the port monitor's version number and the port monitor part of the service entries in the port monitor's `_pmtab` file. When a new port monitor is added, the version number

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The Port Monitor/Service Interface

must be known so that the `_pmtab` file can be correctly initialized. When a new service is added, the port monitor part of the `_pmtab` entry must be formatted correctly. Each port monitor must have an administrative command to perform these two tasks. The person who defines the port monitor must also define such an administrative command and its input options. When the command is invoked with these options, the information required for the port monitor part of the service entry must be correctly formatted for inclusion in the port monitor's `_pmtab` file and must be written to the standard output. To request the version number the command must be invoked with a `-V` option; when it is invoked in this way, the port monitor's current version number must be written to the standard output. If the command fails for any reason during the execution of either of these tasks, no data should be written to standard output.

The interface between a port monitor and a service is determined solely by the service. Two mechanisms for invoking a service are presented here as examples.

New Service Invocations

The first interface is for services that are started anew with each request. This interface requires the port monitor to first `fork(2)` a child process. The child will eventually become the designated service by performing an `exec(1)`. Before the `exec(1)` happens, the port monitor may take some port monitor-specific action; however, one action that must occur is the interpretation of the per-service configuration script, if one is present. This is done by calling the library routine `doconfig(3NSL)`.

Standing Service Invocations

The second interface is for invocations of services that are actively running. To use this interface, a service must have one end of a stream pipe open and be prepared to receive connections through it.

Port Monitor Requirements

To implement a port monitor, several generic requirements must be met. This section summarizes these requirements. In addition to the port monitor itself, an administrative command must be supplied.

Initial Environment

When a port monitor is started, it expects an initial execution environment in which:

- It has no file descriptors open
- It cannot be a process group leader
- It has an entry in `/etc/utmpx` of type `LOGIN_PROCESS`
- An environment variable, `ISTATE`, is set to "enabled" or "disabled" to indicate the port monitor's correct initial state
- An environment variable, `PMTAG`, is set to the port monitor's assigned tag
- The directory that contains the port monitor's administrative files is its current directory
- The port monitor is able to create private files in the directory `/var/saf/tag`, where `tag` is the port monitor's tag
- The port monitor is running with user id 0 (root)

Important Files

Relative to its current directory, the following key files exist for a port monitor.

_config

The port monitor's configuration script. The port monitor configuration script is run by the SAC. The SAC is started by `init(1M)` as a result of an entry in `/etc/inittab` that calls `sac(1M)`.

_pid

The file into which the port monitor writes its process id.

_pmtab

The port monitor's administrative file. This file contains information about the ports and services for which the port monitor is responsible.

_pmpipe

The FIFO through which the port monitor will receive messages from the SAC.

svctag

The per-service configuration script for the service with the tag *svctag*.

../_sacpipe

The FIFO through which the port monitor will send messages to `sac(1M)`.

Port Monitor Responsibilities

A port monitor is responsible for performing the following tasks in addition to its port monitor function:

- Write its process id into the file `_pid` and place an advisory lock on the file
- Terminate gracefully on receipt of the signal `SIGTERM`
- Follow the protocol for message exchange with the SAC

A port monitor must perform the following tasks during service invocation:

- Create a `utmpx` entry if the requested service has the `u` flag set in `_pmtab`
- Port monitors may ignore this flag if creating a `utmpx` entry for the service does not make sense because of the manner in which the service is to be invoked. On the other hand, some services may not start properly unless `utmpx` entries have been created for them.
- Interpret the per-service configuration script for the requested service, if it exists, by calling the `doconfig(3NSL)` library routine

Configuration Files and Scripts

The library routine `doconfig(3NSL)`, defined in `libnsl.so`, interprets the configuration scripts contained in the files `/etc/saf/_sysconfig` (the per-system configuration file), and `/etc/saf/pmtag/_config` (per-port monitor configuration files); and in `/etc/saf/pmtag/svctag` (per-service configuration files). Its syntax is:

```
#include <sac.h>
```

```
int doconfig (int fd, char *script, long rflag);
```

script is the name of the configuration script; *fd* is a file descriptor that designates the stream to which stream manipulation operations are to be applied; *rflag* is a bitmask that indicates the mode in which *script* is to be interpreted. *rflag* may take two values, `NORUN` and `NOASSIGN`, which may be or'd. If *rflag* is zero, all commands in

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the configuration script are eligible to be interpreted. If *rflag* has the NOASSIGN bit set, the assign command is considered illegal and will generate an error return. If *rflag* has the NORUN bit set, the run and runwait commands are considered illegal and will generate error returns. If a command in the script fails, the interpretation of the script ceases at that point and a positive integer is returned; this number indicates which line in the script failed. If a system error occurs, a value of -1 is returned. If a script fails, the process whose environment was being established should not be started. In the example, doconfig(3NSL) is used to interpret a per-service configuration script.

```
. . .
    if ((i = doconfig (fd, svctag, 0)) != 0){
        error ("doconfig failed on line %d of script %s",i,svctag);
    }
```

The Per-System Configuration File

The per-system configuration file, */etc/saf/_sysconfig*, is delivered empty. It may be used to customize the environment for all services on the system by writing a command script in the interpreted language described in this chapter and on the doconfig(3NSL) manpage. When the SAC is started, it calls the doconfig(3NSL) function to interpret the per-system configuration script. The SAC is started when the system enters multiuser mode.

Per-Port Monitor Configuration Files

Per-port monitor configuration scripts (*/etc/saf/pmtag/_config*) are optional. They allow the user to customize the environment for any given port monitor and for the services that are available through the ports for which that port monitor is responsible. Per-port monitor configuration scripts are written in the same language used for per-system configuration scripts. The per-port monitor configuration script is interpreted when the port monitor is started. The port monitor is started by the SAC after the SAC has itself been started and after it has run its own configuration script, */etc/saf/_sysconfig*. The per-port monitor configuration script may override defaults provided by the per-system configuration script.

Per-Service Configuration Files

Per-service configuration files allow the user to customize the environment for a specific service. For example, a service may require special privileges that are not available to the general user. Using the language described in the doconfig(3NSL) manpage, you can write a script that will grant or limit such special privileges to a particular service offered through a particular port monitor. The per-service configuration may override defaults provided by higher-level configuration scripts. For example, the per-service configuration script may specify a set of STREAMS modules other than the default set.

The Configuration Language

The language in which configuration scripts are written consists of a sequence of commands, each of which is interpreted separately. The following reserved keywords are defined: assign, push, pop, runwait, and run. The comment character is #. Blank lines are not significant. No line in a command script may exceed 1024 characters.

`assign variable=value`

Used to define environment variables; *variable* is the name of the environment variable and *value* is the value to be assigned to it. The value assigned must be a string constant; no form of parameter substitution is available. *value* may be quoted. The quoting rules are those used by the shell for defining environment variables. `assign` will fail if space cannot be allocated for the new variable or if any part of the specification is invalid.

`push module1 [, module2, module3, ...]`

Used to push STREAMS modules onto the stream designated by `fd`; *module1* is the name of the first module to be pushed, *module2* is the name of the second module to be pushed, and so on. The command will fail if any of the named modules cannot be pushed. If a module cannot be pushed, the subsequent modules on the same command line will be ignored and modules that have already been pushed will be popped.

`pop [module]`

Used to pop STREAMS modules off the designated stream. If `pop` is invoked with no arguments, the top module on the stream is popped. If an argument is given, modules will be popped one at a time until the named module is at the top of the stream. If the named module is not on the designated stream, the stream is left as it was and the command fails. If *module* is the special keyword `ALL`, then all modules on the stream will be popped. Only modules above the topmost driver are affected.

`runwait command`

The `runwait` command runs a command and waits for it to complete; *command* is the path name of the command to be run. The command is run with `/bin/sh -c` prepended to it; shell scripts may thus be executed from configuration scripts. The `runwait` command will fail if *command* cannot be found or cannot be executed, or if *command* exits with a nonzero status.

`run command`

The `run` command is identical to `runwait` except that it does not wait for *command* to complete; *command* is the path name of the command to be run. `run` will not fail unless it is unable to create a child process to execute the command. Although they are syntactically indistinguishable, some of the commands available to `run` and `runwait` are interpreter built-in commands. Interpreter built-ins are used when it is necessary to alter the state of a process within the context of that process. The `doconfig` interpreter built-in commands are similar to the shell special commands and, like these, they do not spawn another process for execution. See the `sh(1)` man page. The initial set of built-in commands is: `cd`, `ulimit`, `umask`.

Sample Port Monitor Code

This example shows an example of a "null" port monitor that simply responds to messages from the SAC.

```
# include <stdlib.h>
# include <stdio.h>
# include <unistd.h>
# include <fcntl.h>
# include <signal.h>
```

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```
# include <sac.h>

char Scratch[BUFSIZ]; /* scratch buffer */
char Tag[PMTAGSIZE + 1]; /* port monitor's tag */
FILE *Fp; /* file pointer for log file */
FILE *Tfp; /* file pointer for pid file */
char State; /* portmonitor's current state*/

main(argc, argv)
    int argc;
    char *argv[];
{
    char *istate;
    strcpy(Tag, getenv("PMTAG"));
/*
 * open up a log file in port monitor's private directory
 */
    sprintf(Scratch, "/var/saf/%s/log", Tag);
    Fp = fopen(Scratch, "a+");
    if (Fp == (FILE *)NULL)
        exit(1);
    log(Fp, "starting");
/*
 * retrieve initial state (either "enabled" or "disabled") and set
 * State accordingly
 */
    istate = getenv("ISTATE");
    sprintf(Scratch, "ISTATE is %s", istate);
    log(Fp, Scratch);
    if (!strcmp(istate, "enabled"))
        State = PM_ENABLED;
    else if (!strcmp(istate, "disabled"))
        State = PM_DISABLED;
    else {
        log(Fp, "invalid initial state");
        exit(1);
    }
    sprintf(Scratch, "PMTAG is %s", Tag);
    log(Fp, Scratch);
/*
 * set up pid file and lock it to indicate that we are active
 */
    Tfp = fopen("_pid", "w");
    if (Tfp == (FILE *)NULL) {
        log(Fp, "couldn't open pid file");
        exit(1);
    }
    if (lockf(fileno(Tfp), F_TEST, 0) < 0) {
        log(Fp, "pid file already locked");
        exit(1);
    }

    log(Fp, "locking file");
    if (lockf(fileno(Tfp), F_LOCK, 0) < 0) {
        log(Fp, "lock failed");
        exit(1);
    }
    fprintf(Tfp, "%d", getpid());
}
```

```

        fflush(Tfp);

/*
 * handle poll messages from the sac ... this function never returns
 */
    handlepoll();
    pause();
    fclose(Tfp);
    fclose(Fp);
}

handlepoll()
{
    int pfd; /* file descriptor for incoming pipe */
    int sfd; /* file descriptor for outgoing pipe */
    struct sacmsg sacmsg; /* incoming message */
    struct pmmsg pmmsg; /* outgoing message */

/*
 * open pipe for incoming messages from the sac
 */
    pfd = open("_pmpipe", O_RDONLY|O_NONBLOCK);
    if (pfd < 0) {
        log(Fp, "_pmpipe open failed");
        exit(1);
    }

/*
 * open pipe for outgoing messages to the sac
 */
    sfd = open("../_sacpipe", O_WRONLY);
    if (sfd < 0) {
        log(Fp, "_sacpipe open failed");
        exit(1);
    }

/*
 * start to build a return message; we only support class 1 messages
 */
    strcpy(pmmsg.pm_tag, Tag);
    pmmsg.pm_size = 0;
    pmmsg.pm_maxclass = 1;

/*
 * keep responding to messages from the sac
 */
    for (;;) {
        if (read(pfd, &sacmsg, sizeof(sacmsg)) != sizeof(sacmsg)) {
            log(Fp, "_pmpipe read failed");
            exit(1);
        }
    }

/*
 * determine the message type and respond appropriately
 */
    switch (sacmsg.sc_type) {
        case SC_STATUS:
            log(Fp, "Got SC_STATUS message");
            pmmsg.pm_type = PM_STATUS;
            pmmsg.pm_state = State;
            break;
        case SC_ENABLE:
            /*note internal state change below*/

```

saf(1M)

```
        log(Fp, "Got SC_ENABLE message");
        pmmsg.pm_type = PM_STATUS;
        State = PM_ENABLED;
        pmmsg.pm_state = State;
        break;
    case SC_DISABLE:
        /*note internal state change below*/
        log(Fp, "Got SC_DISABLE message");
        pmmsg.pm_type = PM_STATUS;
        State = PM_DISABLED;
        pmmsg.pm_state = State;
        break;
    case SC_READDB:
        /*
         * if this were a fully functional port
         * monitor it would read _pmtab here
         * and take appropriate action
         */
        log(Fp, "Got SC_READDB message");
        pmmsg.pm_type = PM_STATUS;
        pmmsg.pm_state = State;
        break;
    default:
        sprintf(Scratch, "Got unknown message <%d>",
            sacmsg.sc_type);
        log(Fp, Scratch);
        pmmsg.pm_type = PM_UNKNOWN;
        pmmsg.pm_state = State;
        break;
    }

    /*
     * send back a response to the poll
     * indicating current state
     */
    if (write(sfd, &pmmsg, sizeof(pmmsg)) != sizeof(pmmsg))
        log(Fp, "sanity response failed");
}

/*
 * general logging function
 */
log(fp, msg)
    FILE *fp;
    char *msg;
{
    fprintf(fp, "%d: %s\n", getpid(), msg);
    fflush(fp);
}
```

The sac.h Header File

The following example shows the sac.h header file.

```
/* length in bytes of a utmpx id */
# define IDLEN 4
/* wild character for utmpx ids */
# define SC_WILDC 0xff
/* max len in bytes for port monitor tag */
# define PMTAGSIZE 14
/*
```

```

* values for rflag in doconfig()
*/
/* don't allow assign operations */
# define NOASSIGN 0x1
/* don't allow run or runwait operations */
# define NORUN 0x2
/*
* message to SAC (header only). This header is forever fixed. The
* size field (pm_size) defines the size of the data portion of the
* message, which follows the header. The form of this optional data
* portion is defined strictly by the message type (pm_type).
*/
struct pmmsg {
    char pm_type;           /* type of message */
    uchar_t pm_state;       /* current state of pm */
    char pm_maxclass;       /* max message class this port monitor
                           understands */
    char pm_tag[PMTAGSIZE + 1]; /* pm's tag */
    int pm_size;           /* size of opt data portion */
};
/*
* pm_type values
*/
# define PM_STATUS 1 /* status response */
# define PM_UNKNOWN 2 /* unknown message was received */
/*
* pm_state values
*/
/*
* Class 1 responses
*/
# define PM_STARTING 1 /* monitor in starting state */
# define PM_ENABLED 2 /* monitor in enabled state */
# define PM_DISABLED 3 /* monitor in disabled state */
# define PM_STOPPING 4 /* monitor in stopping state */
/*
* message to port monitor
*/
struct sacmsg {
    int sc_size;           /* size of optional data portion */
    char sc_type;         /* type of message */
};
/*
* sc_type values
* These represent commands that the SAC sends to a port monitor.
* These commands are divided into "classes" for extensibility. Each
* subsequent "class" is a superset of the previous "classes" plus
* the new commands defined within that "class". The header for all
* commands is identical; however, a command may be defined such that
* an optional data portion may be sent in addition to the header.
* The format of this optional data piece is self-defining based on
* the command. The first message sent by the SAC
* will always be a class 1 message. The port monitor response
* indicates the maximum class that it is able to understand. Another
* note is that port monitors should only respond to a message with
* an equivalent class response (i.e. a class 1 command causes a
* class 1 response).
*/

```

saf(1M)

```
/*
 * Class 1 commands (currently, there are only class 1 commands)
 */
# define SC_STATUS 1      /* status request */
# define SC_ENABLE 2      /* enable request */
# define SC_DISABLE 3     /* disable request */
# define SC_READDB 4      /* read pmtab request */
/*
 * 'errno' values for Saferno, note that Saferno is used by both
 * pmadm and sacadm and these values are shared between them
 */
# define E_BADARGS 1      /* bad args/ill-formed cmd line */
# define E_NOPRIV 2       /* user not priv for operation */
# define E_SAFERR 3       /* generic SAF error */
# define E_SYSERR 4       /* system error */
# define E_NOEXIST 5      /* invalid specification */
# define E_DUP 6          /* entry already exists */
# define E_PMRUN 7        /* port monitor is running */
# define E_PMNOTRUN 8     /* port monitor is not running */
# define E_RECOVER 9      /* in recovery */
```

Directory Structure

This section gives a description of the SAF files and directories.

<code>/etc/saf/_sysconfig</code>	The per-system configuration script.
<code>/etc/saf/_sactab</code>	The SAC's administrative file. Contains information about the port monitors for which the SAC is responsible.
<code>/etc/saf/pmtag</code>	The home directory for port monitor <i>pmtag</i> .
<code>/etc/saf/pmtag/_config</code>	The per-port monitor configuration script for port monitor <i>pmtag</i> .
<code>/etc/saf/pmtag/_pmtab</code>	Port monitor <i>pmtag</i> 's administrative file. Contains information about the services for which <i>pmtag</i> is responsible.
<code>/etc/saf/pmtag/svctag</code>	The file in which the per-service configuration script for service <i>svctag</i> (available through port monitor <i>pmtag</i>) is placed.
<code>/etc/saf/pmtag/_pid</code>	The file in which a port monitor writes its process id in the current directory and places an advisory lock on the file.
<code>/etc/saf/pmtag/_pmpipe</code>	The file in which the port monitor receives messages from the SAC and <code>../_sacpipe</code> and sends return messages to the SAC.
<code>/var/saf/_log</code>	The SAC's log file.
<code>/var/saf/pmtag</code>	The directory for files created by port monitor <i>pmtag</i> , for example its log file.

saf(1M)

**LIST OF
COMMANDS**

The following administrative commands relate to SAF.

sacadm(1M) port monitor administrative command

pmadm(1M) service administration command

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsr

SEE ALSO

exec(1), sh(1), init(1M), nlsadmin(1M), pmadm(1M), sac(1M), sacadm(1M),
ttyadm(1M), fork(2), doconfig(3NSL), attributes(5)

sar(1M)

NAME	sar, sa1, sa2, sadc – system activity report package
SYNOPSIS	<pre> /usr/lib/sa/sadc [t n] [ofile] /usr/lib/sa/sa1 [t n] /usr/lib/sa/sa2 [-aAbcdgkmpgruvwy] [-e time] [-f filename] [-i sec] [-s time] </pre>
DESCRIPTION	System activity data can be accessed at the special request of a user (see sar(1)) and automatically, on a routine basis, as described here. The operating system contains several counters that are incremented as various system actions occur. These include counters for CPU utilization, buffer usage, disk and tape I/O activity, TTY device activity, switching and system-call activity, file-access, queue activity, inter-process communications, and paging. For more general system statistics, use iostat (1M), sar(1), or vmstat(1M). sadc and two shell procedures, sa1 and sa2, are used to sample, save, and process this data. sadc, the data collector, samples system data <i>n</i> times, with an interval of <i>t</i> seconds between samples, and writes in binary format to <i>ofile</i> or to standard output. The sampling interval <i>t</i> should be greater than 5 seconds; otherwise, the activity of sadc itself may affect the sample. If <i>t</i> and <i>n</i> are omitted, a special record is written. This facility can be used at system boot time, when booting to a multi-user state, to mark the time at which the counters restart from zero. For example, when accounting is enabled, the /etc/init.d/perf file writes the restart mark to the daily data file using the command entry: <pre> su sys -c "/usr/lib/sa/sadc /var/adm/sa/sa`date +%d`" </pre> The shell script sa1, a variant of sadc, is used to collect and store data in the binary file /var/adm/sa/sadd, where dd is the current day. The arguments <i>t</i> and <i>n</i> cause records to be written <i>n</i> times at an interval of <i>t</i> seconds, or once if omitted. The following entries in /var/spool/cron/crontabs/sys will produce records every 20 minutes during working hours and hourly otherwise: <pre> 0 * * * 0-6 /usr/lib/sa/sa1 20,40 8-17 * * 1-5 /usr/lib/sa/sa1 </pre> See crontab(1) for details. The shell script sa2, a variant of sar, writes a daily report in the file /var/adm/sa/sardd. See the OPTIONS section in sar(1) for an explanation of the various options. The following entry in /var/spool/cron/crontabs/sys will report important activities hourly during the working day: <pre> 5 18 * * 1-5 /usr/lib/sa/sa2 -s 8:00 -e 18:01 -i 1200 -A </pre>

sar(1M)

FILES /etc/init.d/perf
/tmp/sa.adrfl address file
/var/adm/sa/sadd daily data file
/var/adm/sa/sardd daily report file
/var/spool/cron/crontabs/sys

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWaccu

SEE ALSO crontab(1), sag(1), sar(1), timex(1), iostat(1M), vmstat(1M), attributes(5)
System Administration Guide: Basic Administration

savecore(1M)

NAME	savecore – save a crash dump of the operating system
SYNOPSIS	/usr/bin/savecore [-Lvd] [-f <i>dumpfile</i>] [<i>directory</i>]
DESCRIPTION	The savecore utility saves a crash dump of the kernel (assuming that one was made) and writes a reboot message in the shutdown log. It is invoked by the <code>/etc/init.d/savecore</code> file after the system boots, if savecore is enabled by way of <code>dumpadm(1M)</code>. savecore is enabled on reboot by default. The savecore utility checks the crash dump to be certain it corresponds with the version of the operating system currently running. If it does, savecore saves the crash dump data in the file <i>directory/vmcore.n</i> and the kernel's namelist in <i>directory/unix.n</i>. The trailing <i>.n</i> in the pathnames is replaced by a number which grows every time savecore is run in that directory. Before writing out a crash dump, savecore reads a number from the file <i>directory/minfree</i>. This is the minimum number of kilobytes that must remain free on the file system containing <i>directory</i>. If after saving the crash dump the file system containing <i>directory</i> would have less free space the number of kilobytes specified in <i>minfree</i>, the crash dump is not saved. If the <i>minfree</i> file does not exist, savecore assumes a <i>minfree</i> value of 1 megabyte. The savecore utility also logs a reboot message using facility LOG_AUTH (see <code>syslog(3C)</code>). If the system crashed as a result of a panic, savecore logs the panic string too.
OPTIONS	The following options are supported: -d Disregard dump header valid flag. Force savecore to attempt to save a crash dump even if the header information stored on the dump device indicates the dump has already been saved. -f <i>dumpfile</i> Attempt to save a crash dump from the specified file instead of from the system's current dump device. This option may be useful if the information stored on the dump device has been copied to an on-disk file by means of the <code>dd(1M)</code> command. -L Save a crash dump of the live running Solaris system, without actually rebooting or altering the system in any way. This option forces savecore to save a live snapshot of the system to the dump device, and then immediately to retrieve the data and to write it out to a new set of crash dump files in the specified directory. Live system crash dumps can only be performed if you have configured your system to have a dedicated dump device using <code>dumpadm(1M)</code>. - savecore -L does not suspend the system, so the contents of memory continue to change while the dump is saved. This means that live crash dumps are not fully self-consistent. -v Verbose. Enables verbose error messages from savecore.

OPERANDS The following operands are supported:

directory Save the crash dump files to the specified directory. If *directory* is not specified, *savecore* saves the crash dump files to the default *savecore directory*, configured by *dumpadm(1M)*.

FILES *directory/vmcore.n*

directory/unix.n

directory/bounds

directory/minfree

/dev/ksyms the kernel namelist

/etc/init.d/savecore

/var/crash/'uname -n' default crash dump directory

ATTRIBUTES See *attributes(5)* for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu (32-bit) SUNWcsxu (64-bit)

SEE ALSO *adb(1)*, *mdb(1)*, *dd(1M)*, *dumpadm(1M)*, *syslog(3C)*, *attributes(5)*

BUGS If the dump device is also being used as a swap device, you must run *savecore* very soon after booting, before the swap space containing the crash dump is overwritten by programs currently running.

scadm(1M)

NAME	scadm – administer System Controller (SC)																												
SYNOPSIS	<code>/usr/platform/platform-name/sbin/scadm subcommand [option] [argument...]</code>																												
DESCRIPTION	The <code>scadm</code> utility administers the System Controller (SC). This utility allows the host server to interact with the SC. The <code>scadm</code> utility <i>must</i> be run as root. The interface, output, and location in the directory hierarchy for <code>scadm</code> are uncommitted and might change. <i>platform-name</i> is the name of the platform implementation. Use the <code>uname -i</code> command to identify the platform implementation. See <code>uname(1)</code>. The <code>scadm</code> utility has fifteen subcommands. Some subcommands have specific options and arguments associated with them. See SUBCOMMANDS, OPTIONS, OPERANDS, and USAGE.																												
SUBCOMMANDS	Subcommands immediately follow the <code>scadm</code> command on the command line, and are separated from the command by a SPACE. The following subcommands are supported <table><tr><td>date</td><td>Display the SC's time and date</td></tr><tr><td></td><td>The format for the date subcommand is:</td></tr><tr><td></td><td><code>scadm date</code></td></tr><tr><td>download</td><td>Program the SC's firmware.</td></tr><tr><td></td><td>There are two parts to the firmware, the boot monitor and the main image.</td></tr><tr><td></td><td>By default, The <code>scadm</code> command's download programs the main firmware image. The <code>boot</code> argument selects programming of the boot monitor.</td></tr><tr><td></td><td>The format for the download subcommand is:</td></tr><tr><td></td><td><code>scadm download [boot] file</code></td></tr><tr><td>help</td><td>Display a list of commands.</td></tr><tr><td></td><td>The format for the help subcommand is:</td></tr><tr><td></td><td><code>scadm help</code></td></tr><tr><td>loghistory</td><td>Display the most recent entries in the SC event log.</td></tr><tr><td></td><td>The format for the loghistory subcommand is:</td></tr><tr><td></td><td><code>scadm loghistory</code></td></tr></table>	date	Display the SC's time and date		The format for the date subcommand is:		<code>scadm date</code>	download	Program the SC's firmware.		There are two parts to the firmware, the boot monitor and the main image.		By default, The <code>scadm</code> command's download programs the main firmware image. The <code>boot</code> argument selects programming of the boot monitor.		The format for the download subcommand is:		<code>scadm download [boot] file</code>	help	Display a list of commands.		The format for the help subcommand is:		<code>scadm help</code>	loghistory	Display the most recent entries in the SC event log.		The format for the loghistory subcommand is:		<code>scadm loghistory</code>
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	The format for the loghistory subcommand is:																												
	<code>scadm loghistory</code>																												

resetrsc	Reset the SC. There are two types of resets allowed, a <code>hard reset</code> and a <code>soft reset</code>. The <code>hard reset</code> is done by default. The <code>soft reset</code> can be selected by using the <code>-s</code> option. The format for the <code>resetrsc</code> subcommand is: <pre>scadm resetrsc [-s]</pre>
send_event	Manually send a text based event. The SC can forward the event to the SC event log. You can configure the <code>-c</code> option to send a critical warning to email, alert to logged in SC users, and <code>syslog</code>. Critical events are logged to <code>syslog(3C)</code>. There is an 80 character limit to the length of the associated text message. The format for the <code>send_event</code> subcommand is: <pre>scadm send_event [-c] "message"</pre>
set	Set SC configuration variables to a value. Examples of SC configuration variables include: SC IP address <code>netsc_ipaddr</code> and SC Customer Information <code>sc_customerinfo</code>. See the output from the <code>scadm help</code> command for a complete list of SC configuration variables. The format for the <code>set</code> subcommand is: <pre>scadm set variable value</pre>
show	Display the current SC configuration variable settings. If no variable is specified, <code>scadm</code> shows all variable settings. The format for the <code>show</code> subcommand is: <pre>scadm show [variable]</pre>
shownetwork	Display the current network configuration parameters for SC. The format for the <code>shownetwork</code> subcommand is: <pre>scadm shownetwork</pre>
useradd	Add user accounts to the SC. The SC supports up to sixteen separate users. The format for the <code>useradd</code> subcommand is: <pre>scadm useradd username</pre>

userdel	Delete a user account from SC. The format for the <code>userdel</code> subcommand is: <pre>scadm userdel <i>username</i></pre>
userpassword	Set a password for the user account specified. This password overrides any existing password currently set. There is no verification of the old password before setting the new password. The format for the <code>userpassword</code> subcommand is: <pre>scadm userpassword <i>username</i></pre>
userperm	Set the permission level for the user. The format for the <code>userperm</code> subcommand is: <pre>scadm userperm <i>username</i> [<i>aucr</i>]</pre>
usershow	Display details on the specified user account. If a username is not specified, all user accounts are displayed. The format for the <code>usershow</code> subcommand is: <pre>scadm usershow <i>username</i></pre>
version	Display the version numbers of the SC and its components. The format for the <code>version</code> subcommand is: <pre>scadm version [-v]</pre>
OPTIONS	The <code>resetrsc</code>, <code>send_event</code>, and <code>version</code> subcommands have associated options. Options follow subcommands on the command line and are separated from the subcommand by a SPACE.
	The <code>resetrsc</code> subcommand supports the following options:
	<code>-s</code> Perform a soft reset instead of a hard reset. A hard reset physically resets the SC hardware. The SC software jumps to the boot firmware, simulating a reset, for a soft reset.
	The <code>send_event</code> subcommand supports the following options:
	<code>-c</code> Send a critical event. Without the <code>-c</code>, <code>-send_event</code> sends a warning.
	The <code>version</code> subcommand supports the following options:
	<code>-v</code> Display a verbose output of version numbers and associated information.

OPERANDS

The `download`, `send_event`, `set`, `show`, `useradd`, `userdel`, `userperm`, `usershow`, `userpassword`, and `userperm` subcommands have associated arguments (operands).

If the subcommand has an option, the arguments follow the option on the command line and is separated from the option by a SPACE. If the subcommand does not have an option, the arguments follow the subcommand on the command line and are separated from the subcommand by a SPACE. If there are more than one arguments, they are separated from each other by a SPACE.

The `download` subcommand supports the following arguments:

`boot` Program the boot monitor portion of the flash. The main portion of the flash is programmed without any arguments

`file` Specify *file* as the path to where the boot or main firmware image resides for download.

Examples of *file* are:

`/usr/platform/platform_type/lib/image/alommainfw`

or

`/usr/platform/platform_type/lib/image/alombootfw`

The `send_event` subcommand supports the following arguments:

`"message"` Describe event using the text contained in *message*. Enclose *message* in quotation marks.

The `set` subcommand supports the following arguments:

`variable` Set SC configuration *variable*.

`value` Set SC configuration variable to *value*.

The `show` subcommand supports the following arguments:

`variable` Display the value of that particular variable.

The `useradd` subcommand supports the following arguments:

`username` Add new SC account *username*.

The `userdel` subcommand supports the following arguments:

`username` Remove SC account *username*.

The `userperm` subcommand supports the following arguments:

`-aucr` Set permissions for SC user accounts. If no permissions are specified, all four permissions are disabled and read only access is assigned.

The following are the definitions for permissions:

a	Allow user to administer or change the SC configuration variables
u	Allow user to use the user commands to modify SC accounts
c	Allow user to connect to console.
r	Allow user to reset SC and to power on and off the host.

username Change permissions on SC account *username*.

The `-usershow` subcommand supports the following arguments:

username Display information on SC account *username*. If *username* is not specified, all accounts are displayed.

The `userpassword` subcommand supports the following arguments:

username Set SC password for *username*.

The `userperm` subcommand supports the following arguments:

username Change SC permissions for *username*.

EXAMPLES

EXAMPLE 1 Displaying the SC's Date and Time

The following command displays the SC's date and time.

```
scadm date
```

EXAMPLE 2 Setting the SC's Configuration Variables

The following command sets the SC's configuration variable `netsc_ipaddr` to `192.168.1.2`:

```
scadm set netsc_ipaddr 192.168.1.2
```

EXAMPLE 3 Displaying the Current SC's Configuration Settings:

The following command displays the current SC configuration settings:

```
scadm show
```

EXAMPLE 4 Displaying the Current Settings for a Variable

The following command displays the current settings for the `sys_hostname` variable:

```
scadm show sys_hostname
```

EXAMPLE 4 Displaying the Current Settings for a Variable (Continued)**EXAMPLE 5** Sending a Text-Based Critical Event

The following command sends a critical event to the SC logs, alerts the current SC users, and sends an event to syslog(3C):

```
scadm send_event -c "The UPS signaled a loss in power"
```

EXAMPLE 6 Sending an Informational Text-Based Event

The following command sends a non-critical informational text based event to the SC event log:

```
scadm send_event "The disk is close to full capacity"
```

EXAMPLE 7 Adding a User To the SC

The following command adds user `rscroot` to the SC:

```
scadm useradd rscroot
```

EXAMPLE 8 Deleting a User From the SC

The following command deletes user `olduser` from the SC:

```
scadm userdel olduser
```

EXAMPLE 9 Displaying User Details

The following command displays details of all user accounts:

```
scadm usershow
```

EXAMPLE 10 Displaying Details for a Specific User

The following command displays details of user account `rscroot`:

```
scadm usershow rscroot
```

EXAMPLE 11 Setting the User Permission Level

The following command sets the full permission level for user `rscroot` to `aucr`:

```
scadm userperm rscroot aucr
```

scadm(1M)

EXAMPLE 12 Setting the User Permission Level

The following command sets only console access for user `newuser` to `c`:

```
scadm userperm newuser c
```

EXAMPLE 13 Setting the User Permission Level

The following command sets the permission level for user `newuser` to read only access:

```
scadm userperm newuser
```

EXAMPLE 14 Displaying the Current Network Parameters

The following command displays the current network configuration parameters for the SC:

```
scadm shownetwork
```

EXAMPLE 15 Viewing the Loghistory

The following command displays the most recent entries in the SC event log:

```
scadm loghistory
```

EXAMPLE 16 Displaying Verbose Information

The following command displays verbose version information on the SC and its components:

```
scadm version -v
```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
non-zero	An error occurred.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkvm

SEE ALSO

`uname(1)`, `syslog(3C)`, `attributes(5)`

NAME	sckmd – Sun Fire 15K key management daemon						
SYNOPSIS	<code>/usr/platform/SUNW,Sun-Fire-15000/lib/sckmd</code>						
DESCRIPTION	sckmd is a server process that resides on a Sun Fire 15K domain. sckmd maintains the Internet Protocol Security (IPsec) Security Associations (SAs) needed to secure the communication between the Sun Fire 15K System Controller (SC) and the cvcd(1M) and dcs(1M) daemons running on a Sun Fire 15K domain. See ipsec(7P) for a description of Security Associations. sckmd receives SAs from the SC and provides these SAs to the Security Association Databases (SADB) using pf_key(7P). sckmd normally starts up at system boot time. Each domain supports only one running sckmd process at a time.						
FILES	<table> <tr> <td><code>/etc/inet/ipsecinit.conf</code></td><td>Configuration file for default system-wide IPsec policies</td></tr> </table>	<code>/etc/inet/ipsecinit.conf</code>	Configuration file for default system-wide IPsec policies				
<code>/etc/inet/ipsecinit.conf</code>	Configuration file for default system-wide IPsec policies						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Architecture</td><td>Sun Fire 15K systems</td></tr> <tr> <td>Availability</td><td>SUNWsckmx.u, SUNWsckmu.u, SUNWsckmr</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Architecture	Sun Fire 15K systems	Availability	SUNWsckmx.u, SUNWsckmu.u, SUNWsckmr
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Architecture	Sun Fire 15K systems						
Availability	SUNWsckmx.u, SUNWsckmu.u, SUNWsckmr						
SEE ALSO	cvcd(1M), dcs(1M), ipsecconf(1M), attributes(5), authmd5h(7M), encr3des(7M), ipsec(7P), pf_key(7P) <i>Sun Enterprise 10000 SSP Reference Manual</i> <i>Sun System Management Services (SMS) Reference Manual</i>						
NOTES	IPsec is used by Sun Fire 15K systems to secure the communication between the SC, and the cvcd(1M) and dcs(1M) daemons running on a domain. System-wide IPsec policies for these daemons are configured on a domain with ipsecconf(1M). Default policies are defined when the SUNWsckmr package is installed on a Sun Fire 15K domain at OS install time. Package SUNWsckmr configures default system-wide policies for cvcd(1M) and dcs(1M) by adding the following entries in <code>/etc/inet/ipsecinit.conf</code>: <pre>{ dport sun-dr ulp tcp } permit { auth_alg md5 } { sport sun-dr ulp tcp } apply { auth_alg md5 sa unique } { dport cvc_hostd ulp tcp } permit { auth_alg md5 } { sport cvc_hostd ulp tcp } apply { auth_alg md5 sa unique }</pre>						

sckmd(1M)

The `cvc_hostd` service represents `cvcd(1M)` and the `sun-dr` service represents `dcs(1M)` in the preceding entries.

These policies conform to the format defined by `ipsec(7P)` and require HMAC-MD5 authentication. See `authmd5h(7M)`.

System-wide policies for `cvcd(1M)` and `dcs(1M)` configured on a domain using `ipseconf(1M)` must match the IPsec policies defined for these services on the SC. On an SC, IPsec policies for these services are defined by the SMS key management daemon. Refer to `thekmd(1M)` man page in the *Sun System Management Services (SMS) Reference Manual*.

IPsec encryption or authentication with encryption can be enabled on the domain using the `encr_algs` and `encr_auth_algs` properties, as described in the `ipseconf(1M)` manual page. For example, the following `ipseconf(1M)` entries require Triple-DES and HMAC-MD5 authentication for the network console `cvcd(1M)` service:

```
{ dport cvc_hostd ulp tcp } permit
    { encr_algs 3des encr_auth_algs md5 }
{ sport cvc_hostd ulp tcp } apply
    { encr_algs 3des encr_auth_algs md5 sa unique }
```

See `encr3des(7M)` for Triple-DES authentication and `authmd5h(7M)` for HMAC-M5 authentication.

NAME	sendmail – send mail over the internet
SYNOPSIS	<pre> /usr/lib/sendmail [-Ac] [-Am] [-ba] [-bD] [-bd] [-bi] [-bm] [-bp] [-bP] [-bs] [-bt] [-bv] [-B type] [-C file] [-d X] [-F fullname] [-f name] [-G] [-h N] [-L tag] [-M xvalue] [-Nnotifications] [-n] [-Ooption =value] [-o xvalue] [-p protocol] [-q [time]] [-q Xstring] [-R ret] [-r name] [-t] [-V envuid] [-v] [-X logfile] [address...] </pre>
DESCRIPTION	The sendmail utility sends a message to one or more people, routing the message over whatever networks are necessary. sendmail does internetwork forwarding as necessary to deliver the message to the correct place. sendmail is not intended as a user interface routine. Other programs provide user-friendly front ends. sendmail is used only to deliver pre-formatted messages. With no flags, sendmail reads its standard input up to an EOF, or a line with a single dot, and sends a copy of the letter found there to all of the addresses listed. It determines the network to use based on the syntax and contents of the addresses. Local addresses are looked up in the local <code>aliases(4)</code> file, or in a name service as defined by the <code>nsswitch.conf(4)</code> file, and aliased appropriately. In addition, if there is a <code>.forward</code> file in a recipient's home directory, sendmail forwards a copy of each message to the list of recipients that file contains. Refer to the NOTES section for more information about <code>.forward</code> files. Aliasing can be prevented by preceding the address with a backslash. There are several conditions under which the expected behavior is for the alias database to be either built or rebuilt. This cannot occur under any circumstances unless root owns <i>and</i> has exclusive write permission to the <code>/etc/mail/aliases*</code> files. If a message is found to be undeliverable, it is returned to the sender with diagnostics that indicate the location and nature of the failure; or, the message is placed in a <code>dead.letter</code> file in the sender's home directory.
Startup Options	The <code>/etc/default/sendmail</code> file stores startup options for sendmail so that the options are not removed when a host is upgraded. You can use the following variables in the <code>/etc/default/sendmail</code> startup file: CLIENTOPTIONS="string" Selects additional options to be used with the client daemon, which looks in the client-only queue (<code>/var/spool/clientmqueue</code>) and acts as a client queue runner. No syntax checking is done, so be careful when making changes to this variable. CLIENTQUEUEINTERVAL=# Similar to the <code>QUEUEINTERVAL</code> option, <code>CLIENTQUEUEINTERVAL</code> sets the time interval for mail queue runs. However, the <code>CLIENTQUEUEINTERVAL</code> option controls the functions of the client daemon, instead of the functions of the master daemon. Typically, the master daemon is able to deliver all messages to the SMTP

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port. However, if the message load is too high or the master daemon is not running, then messages go into the client-only queue, `/var/spool/clientmqueue`. The client daemon, which checks in the client-only queue, then acts as a client queue processor.

ETRN_HOSTS=*string*

Enables an SMTP client and server to interact immediately without waiting for the queue run intervals, which are periodic. The server can immediately deliver the portion of its queue that goes to the specified hosts. For more information, refer to the `etrn(1M)` man page.

MODE=`-bd`

Selects the mode to start `sendmail` with. Use the `-bd` option or leave it undefined.

OPTIONS=*string*

Selects additional options to be used with the master daemon. No syntax checking is done, so be careful when making changes to this variable.

QUEUEINTERVAL=*#*

Sets the interval for mail queue runs on the master daemon. *#* can be a positive integer that is followed by either *s* for seconds, *m* for minutes, *h* for hours, *d* for days, or *w* for weeks. The syntax is checked before `sendmail` is started. If the interval is negative or if the entry does not end with an appropriate letter, the interval is ignored and `sendmail` starts with a queue interval of 15 minutes.

QUEUEOPTIONS=*p*

Enables one persistent queue runner that sleeps between queue run intervals, instead of a new queue runner for each queue run interval. You can set this option to *p*, which is the only setting available. Otherwise, this option is not set.

OPTIONS The following options are supported:

<code>-Ac</code>	Uses <code>submit.cf</code> even if the operation mode does not indicate an initial mail submission.
<code>-Am</code>	Uses <code>sendmail.cf</code> even if the operation mode indicates an initial mail submission.
<code>-ba</code>	Goes into ARPANET mode. All input lines must end with a RETURN-LINEFEED, and all messages are generated with a RETURN-LINEFEED at the end. Also, the <code>From:</code> and <code>Sender:</code> fields are examined for the name of the sender.
<code>-bd</code>	Runs as a daemon in the background, waiting for incoming SMTP connections.
<code>-bD</code>	Runs as a daemon in the foreground, waiting for incoming SMTP connections.
<code>-bi</code>	Initializes the <code>aliases(4)</code> database. Root must own <i>and</i> have exclusive write permission to the <code>/etc/mail/aliases*</code> files for successful use of this option.

-bm	Delivers mail in the usual way (default).
-bp	Prints a summary of the mail queues.
-bP	Prints the number of entries in the queues. This option is only available with shared memory support.
-bs	Uses the SMTP protocol as described in RFC 821. This flag implies all the operations of the -ba flag that are compatible with SMTP.
-bt	Runs in address test mode. This mode reads addresses and shows the steps in parsing; it is used for debugging configuration tables.
-bv	Verifies names only. Does not try to collect or deliver a message. Verify mode is normally used for validating users or mailing lists.
-B <i>type</i>	Indicates body <i>type</i> (7BIT or 8BITMIME).
-C <i>file</i>	Uses alternate configuration file.
-d <i>X</i>	Sets debugging value to <i>X</i> .
-f <i>name</i>	Sets the name of the "from" person (that is, the sender of the mail).
-F <i>fullname</i>	Sets the full name of the sender.
-G	When accepting messages by way of the command line, indicates that they are for relay (gateway) submission. When this flag is set, sendmail might complain about syntactically invalid messages, for example, unqualified host names, rather than fixing them. sendmail does not do any canonicalization in this mode.
-h <i>N</i>	Sets the hop count to <i>N</i> . The hop count is incremented every time the mail is processed. When it reaches a limit, the mail is returned with an error message, the victim of an aliasing loop.
-L <i>tag</i>	Sets the identifier used in syslog messages to the supplied <i>tag</i> .
-Mx <i>value</i>	Sets macro <i>x</i> to the specified <i>value</i> .
-n	Does not do aliasing.
-N <i>notifications</i>	Tags all addresses being sent as wanting the indicated <i>notifications</i> , which consists of the word "NEVER" or a comma-separated list of "SUCCESS", "FAILURE", and "DELAY" for successful delivery, failure and a message that is stuck in a queue somewhere. The default is "FAILURE,DELAY".
-ox <i>value</i>	Sets option <i>x</i> to the specified <i>value</i> . Processing Options are described below.
-O <i>option=value</i>	Sets <i>option</i> to the specified <i>value</i> (for long from names). Processing Options are described below.
-p <i>protocol</i>	Sets the sending protocol. The <i>protocol</i> field can be in form <i>protocol: host</i> to set both the sending protocol and the sending host.

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	For example: <code>-pUUCP:uunet</code> sets the sending <i>protocol</i> to UUCP and the sending host to uunet. Some existing programs use <code>-oM</code> to set the <i>r</i> and <i>s</i> macros; this is equivalent to using <code>-p</code> .
<code>-q[time]</code>	Processes saved messages in the queue at given intervals. If <i>time</i> is omitted, processes the queue once. <i>time</i> is given as a tagged number, where <i>s</i> is seconds, <i>m</i> is minutes, <i>h</i> is hours, <i>d</i> is days, and <i>w</i> is weeks. For example, <code>-q1h30m</code> or <code>-q90m</code> would both set the timeout to one hour thirty minutes.
	By default, sendmail runs in the background. This option can be used safely with <code>-bd</code> .
<code>-qp [time]</code>	Similar to <code>-q[time]</code> , except that instead of periodically forking a child to process the queue, <code>sendmail</code> forks a single persistent child for each queue that alternates between processing the queue and sleeping. The sleep time (<i>time</i>) is specified as the argument; it defaults to 1 second. The process always sleeps at least 5 seconds if the queue was empty in the previous queue run.
<code>-qf</code>	Processes saved messages in the queue once and does not <code>fork(2)</code> , but runs in the foreground.
<code>-qG name</code>	Processes jobs in queue group called <i>name</i> only.
<code>-q[!]I substr</code>	Limits processed jobs to those containing <i>substr</i> as a substring of the queue ID or not when <code>!</code> is specified.
<code>-q[!]R substr</code>	Limits processed jobs to those containing <i>substr</i> as a substring of one of the recipients or not when <code>!</code> is specified.
<code>-q[!]S substr</code>	Limits processed jobs to those containing <i>substr</i> as a substring of the sender or not when <code>!</code> is specified.
<code>-r name</code>	An alternate and obsolete form of the <code>-f</code> flag.
<code>-R ret</code>	Identifies the information you want returned if the message bounces. <i>ret</i> can be HDRS for headers only or FULL for headers plus body.
<code>-t</code>	Reads message for recipients. <code>To:</code> , <code>Cc:</code> , and <code>Bcc:</code> lines are scanned for people to send to. The <code>Bcc:</code> line is deleted before transmission. Any addresses in the argument list is suppressed. The NoRecipientAction Processing Option can be used to change the behavior when no legal recipients are included in the message.
<code>-v</code>	Goes into verbose mode. Alias expansions are announced, and so forth.
<code>-V envid</code>	The indicated <i>envid</i> is passed with the envelope of the message and returned if the message bounces.

Processing Options

-x logfile Logs all traffic in and out of `sendmail` in the indicated *logfile* for debugging mailer problems. This produces a lot of data very quickly and should be used sparingly.

There are a number of "random" options that can be set from a configuration file. Options are represented by a single character or by multiple character names. The syntax for the single character names of is:

Oxvalue

This sets option *x* to be *value*. Depending on the option, *value* may be a string, an integer, a boolean (with legal values `t`, `T`, `f`, or `F`; the default is `TRUE`), or a time interval.

The multiple character or long names use this syntax:

o Longname=argument

This sets the option *Longname* to be *argument*. The long names are beneficial because they are easier to interpret than the single character names.

Not all processing options have single character names associated with them. In the list below, the multiple character name is presented first followed by the single character syntax enclosed in parentheses.

`AliasFile (Afile)`

Specifies possible alias files.

`AliasWait (a N)`

If set, waits up to *N* minutes for an "@:@" entry to exist in the `aliases(4)` database before starting up. If it does not appear in *N* minutes, issues a warning. Defaults to 10 minutes.

`AllowBogusHELO`

Allows a `HELO` SMTP command that does not include a host name. By default this option is disabled.

`BadRcptThrottle=N`

If set and more than the specified number of recipients in a single SMTP envelope are rejected, sleeps for one second after each rejected `RCPT` command.

`BlankSub (Bc)`

Sets the blank substitution character to *c*. Unquoted spaces in addresses are replaced by this character. Defaults to `SPACE` (that is, no change is made).

`CheckAliases (n)`

Validates the RHS of aliases when rebuilding the `aliases(4)` database.

`CheckpointInterval (CN)`

Checkpoints the queue every *N* (default 10) addresses sent. If your system crashes during delivery to a large list, this prevents retransmission to any but the last *N* recipients.

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ClassFactor (*zfact*)

The indicated factor *fact* is multiplied by the message class (determined by the `Precedence:` field in the user header and the `P` lines in the configuration file) and subtracted from the priority. Thus, messages with a higher `Priority:` are favored. Defaults to 1800.

ClientPortOptions

Sets client SMTP options. The options are key=value pairs. Known keys are:

<code>Addr Address Mask</code>	<code>Address Mask</code> defaults to <code>INADDR_ANY</code> . The address mask can be a numeric address in dot notation or a network name.
<code>Family</code>	Address family (defaults to <code>INET</code>).
<code>Listen</code>	Size of listen queue (defaults to 10).
<code>Port</code>	Name/number of listening port (defaults to <code>smtp</code>).
<code>RcvBufSize</code>	The size of the TCP/IP receive buffer.
<code>SndBufSize</code>	The size of the TCP/IP send buffer.
<code>Modifier</code>	Options (flags) for the daemon. Can be: <code>h</code> Uses name of interface for <code>HELO</code> command. If <code>h</code> is set, the name corresponding to the outgoing interface address (whether chosen by means of the <code>Connection</code> parameter or the default) is used for the <code>HELO/EHLO</code> command.

ColonOkInAddr

If set, colons are treated as a regular character in addresses. If not set, they are treated as the introducer to the RFC 822 “group” syntax. This option is on for version 5 and lower configuration files.

ConnectionCacheSize (*kN*)

The maximum number of open connections that are to be cached at a time. The default is 1. This delays closing the current connection until either this invocation of `sendmail` needs to connect to another host or it terminates. Setting it to 0 defaults to the old behavior, that is, connections are closed immediately.

ConnectionCacheTimeout (*Ktimeout*)

The maximum amount of time a cached connection is permitted to idle without activity. If this time is exceeded, the connection is immediately closed. This value should be small (on the order of ten minutes). Before `sendmail` uses a cached connection, it always sends a `NOOP` (no operation) command to check the connection. If the `NOOP` command fails, it reopens the connection. This keeps your end from failing if the other end times out. The point of this option is to be a good network neighbor and avoid using up excessive resources on the other end. The default is five minutes.

ConnectionRateThrottle

The maximum number of connections permitted per second. After this many connections are accepted, further connections are delayed. If not set or ≤ 0 , there is no limit.

ControlSocketName

Name of the control socket for daemon management. A running `sendmail` daemon can be controlled through this Unix domain socket. Available commands are: `help`, `restart`, `shutdown`, and `status`. The `status` command returns the current number of daemon children, the free disk space (in blocks) of the queue directory, and the load average of the machine expressed as an integer. If not set, no control socket is available. For the sake of security, this Unix domain socket must be in a directory which is accessible only by root; `/var/spool/mqueue/.smcontrol` is recommended for the socket name.

DaemonPortOptions (*Options*)

Sets server SMTP options. The options are *key=value* pairs. Known keys are:

Name	User-definable name for the daemon (defaults to "Daemon#"). Used for error messages and logging.																
Addr	Address mask (defaults <code>INADDR_ANY</code>). The address mask may be a numeric address in dot notation or a network name.																
Family	Address family (defaults to <code>INET</code>).																
Listen	Size of listen queue (defaults to 10).																
Modifier	Options (flags) for the daemon; can be a sequence (without any delimiters) of: <table> <tr> <td>a</td><td>Requires authentication.</td></tr> <tr> <td>b</td><td>Binds to interface through which mail has been received.</td></tr> <tr> <td>c</td><td>Performs hostname canonification (<code>.cf</code>).</td></tr> <tr> <td>f</td><td>Requires fully qualified hostname (<code>.cf</code>).</td></tr> <tr> <td>h</td><td>Uses name of interface for HELO command.</td></tr> <tr> <td>u</td><td>Allows unqualified addresses (<code>.cf</code>).</td></tr> <tr> <td>C</td><td>Does not perform hostname canonification.</td></tr> <tr> <td>E</td><td>Disallows ETRN (see RFC 2476).</td></tr> </table>	a	Requires authentication.	b	Binds to interface through which mail has been received.	c	Performs hostname canonification (<code>.cf</code>).	f	Requires fully qualified hostname (<code>.cf</code>).	h	Uses name of interface for HELO command.	u	Allows unqualified addresses (<code>.cf</code>).	C	Does not perform hostname canonification.	E	Disallows ETRN (see RFC 2476).
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Name	User-definable name for the daemon (defaults to <code>Daemon#</code>). Used for error messages and logging.																
Port	Name/number of listening port (defaults to <code>smtp</code>).																
ReceiveSize	The size of the TCP/IP receive buffer.																

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SendSize	The size of the TCP/IP send buffer.
sendmail	listens on a new socket for each occurrence of the DaemonPortOptions option in a configuration file.
DataFileBufferSize	Sets the threshold, in bytes, before a memory-based queue data file becomes disk-based. The default is 4096 bytes.
DeadLetterDrop	Defines the location of the system-wide dead.letter file, formerly hard-coded to /var/tmp/dead.letter. If this option is not set (the default), sendmail does not attempt to save to a system-wide dead.letter file in the event it cannot bounce the mail to the user or postmaster. Instead, it renames the qf file as it has in the past when the dead.letter file could not be opened.
DefaultCharSet	Sets the default character set to use when converting unlabeled 8 bit input to MIME.
DefaultUser (<i>gid</i>) or (<i>uid</i>)	Sets the default group ID for mailers to run in to <i>gid</i> or set the default userid for mailers to <i>uid</i> . Defaults to 1. The value can also be given as a symbolic group or user name.
DelayLA= <i>LA</i>	When the system load average exceeds <i>LA</i> , sendmail sleeps for one second on most SMTP commands and before accepting connections.
DeliverByMin= <i>time</i>	Sets minimum time for Deliver By SMTP Service Extension (RFC 2852). If 0, no time is listed, if less than 0, the extension is not offered, if greater than 0, it is listed as minimum time for the EHLO keyword DELIVERBY.
DeliveryMode (<i>dx</i>)	Delivers in mode <i>x</i> . Legal modes are: <i>i</i> Delivers interactively (synchronously). <i>b</i> Delivers in background (asynchronously). <i>d</i> Deferred mode. Database lookups are deferred until the actual queue run. <i>q</i> Just queues the message (delivers during queue run). Defaults to <i>b</i> if no option is specified, <i>i</i> if it is specified but given no argument (that is, <i>Od</i> is equivalent to <i>Odi</i>).
DialDelay	If a connection fails, waits this many seconds and tries again. Zero means "do not retry".

DontBlameSendmail

If set, overrides the file safety checks. This compromises system security and should not be used. See <http://www.sendmail.org/tips/DontBlameSendmail.html> for more information.

DontExpandCnames

If set, `$[ ... $]` lookups that do DNS-based lookups do not expand CNAME records.

DontInitGroups

If set, the `initgroups(3C)` routine is never invoked. If you set this, agents run on behalf of users only have their primary (`/etc/passwd`) group permissions.

DontProbeInterfaces

If set, `sendmail` does not insert the names and addresses of any local interfaces into the `$=w` class. If set, you must also include support for these addresses, otherwise mail to addresses in this list bounces with a configuration error.

DontPruneRoutes (R)

If set, does not prune route-addr syntax addresses to the minimum possible.

DoubleBounceAddress

If an error occurs when sending an error message, sends that “double bounce” error message to this address.

EightBitMode (8)

Uses 8-bit data handling. This option requires one of the following keys. The key can be selected by using just the first character, but using the full word is better for clarity.

mimify

Does any necessary conversion of 8BITMIME to 7-bit.

pass

Passes unlabeled 8-bit input through as is.

strict

Rejects unlabeled 8-bit input.

ErrorHeader (Efile/message)

Appends error messages with the indicated message. If it begins with a slash, it is assumed to be the pathname of a file containing a message (this is the recommended setting). Otherwise, it is a literal message. The error file might contain the name, email address, and/or phone number of a local postmaster who could provide assistance to end users. If the option is missing or NULL, or if it names a file which does not exist or which is not readable, no message is printed.

ErrorMode (ex)

Disposes of errors using mode *x*. The values for *x* are:

- e** Mails back errors and gives 0 exit status always.
- m** Mails back errors.
- p** Prints error messages (default).

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<code>q</code>	No messages, just gives exit status.
<code>w</code>	Writes back errors (mail if user not logged in).
FallbackMXhost (<i>Vfallbackhost</i>)	
If specified, the <i>fallbackhost</i> acts like a very low priority MX on every host. This is intended to be used by sites with poor network connectivity.	
FastSplit	
If set to a value greater than zero (the default is one), it suppresses the MX lookups on addresses when they are initially sorted, that is, for the first delivery attempt. This usually results in faster envelope splitting unless the MX records are readily available in a local DNS cache. To enforce initial sorting based on MX records set <code>FastSplit</code> to zero. If the mail is submitted directly from the command line, then the value also limits the number of processes to deliver the envelopes; if more envelopes are created they are only queued up and must be taken care of by a queue run. Since the default submission method is by way of SMTP (either from a MUA or by way of the MSP), the value of <code>FastSplit</code> is seldom used to limit the number of processes to deliver the envelopes.	
ForkEachJob (<i>Y</i>)	
If set, delivers each job that is run from the queue in a separate process. Use this option if you are short of memory, since the default tends to consume considerable amounts of memory while the queue is being processed.	
ForwardPath (<i>Jpath</i>)	
Sets the path for searching for users' <code>.forward</code> files. The default is <code>\$z/.forward</code> . Some sites that use the automounter may prefer to change this to <code>/var/forward/\$u</code> to search a file with the same name as the user in a system directory. It can also be set to a sequence of paths separated by colons; <code>sendmail</code> stops at the first file it can successfully and safely open. For example, <code>/var/forward/\$u:\$z/.forward</code> searches first in <code>/var/forward/username</code> and then in <code>~username/.forward</code> (but only if the first file does not exist). Refer to the NOTES section for more information.	
HelpFile (<i>Hfile</i>)	
Specifies the help file for SMTP.	
HoldExpensive (<i>c</i>)	
If an outgoing mailer is marked as being expensive, does not connect immediately.	
HostsFile	
Sets the file to use when doing "file" type access of host names.	
HostStatusDirectory	
If set, host status is kept on disk between <code>sendmail</code> runs in the named directory tree. If a full path is not used, then the path is interpreted relative to the queue directory.	
IgnoreDots (<i>i</i>)	
Ignores dots in incoming messages. This is always disabled (that is, dots are always accepted) when reading SMTP mail.	

`LogLevel` (*Ln*)

Sets the default log level to *n*. Defaults to 9.

(*Mx value*)

Sets the macro *x* to *value*. This is intended only for use from the command line.

`MailboxDatabase`

Type of lookup to find information about local mail boxes, defaults to `pw` which uses `getpwnam(3C)`. Other types can be introduced by adding them to the source code, see `libsm/mbdb.c` for details.

`MatchGECOS` (*G*)

Tries to match recipient names using the GECOS field. This allows for mail to be delivered using names defined in the GECOS field in `/etc/passwd` as well as the login name.

`MaxDaemonChildren`

The maximum number of children the daemon permits. After this number, connections are rejected. If not set or ≤ 0 , there is no limit.

`MaxHopCount` (*hN*)

The maximum hop count. Messages that have been processed more than *N* times are assumed to be in a loop and are rejected. Defaults to 25.

`MaxMessageSize`

The maximum size of messages that are accepted (in bytes).

`MaxMimeHeaderLength=M[/N]`

Sets the maximum length of certain MIME header field values to *M* characters. For some of these headers which take parameters, the maximum length of each parameter is set to *N* if specified. If */N* is not specified, one half of *M* is used. By default, these values are 0, meaning no checks are done.

`MaxQueueChildren=N`

When set, this limits the number of concurrent queue runner processes to *N*. This helps to control the amount of system resources used when processing the queue. When there are multiple queue groups defined and the total number of queue runners for these queue groups would exceed `MaxQueueChildren` then the queue groups are not all run concurrently. That is, some portion of the queue groups run concurrently such that `MaxQueueChildren` is not exceeded, while the remaining queue groups are run later (in round robin order). See `MaxRunnersPerQueue`.

`MaxQueueRunSize`

If set, limits the maximum size of any given queue run to this number of entries. This stops reading the queue directory after this number of entries is reached; job priority is not used. If not set, there is no limit.

`MaxRunnersPerQueue=N`

This sets the default maximum number of queue runners for queue groups. Up to *N* queue runners work in parallel on a queue group's messages. This is useful where the processing of a message in the queue might delay the processing of subsequent messages. Such a delay can be the result of non-erroneous situations

sendmail(1M)

such as a low bandwidth connection. The can be overridden on a per queue group basis by setting the `Runners` option. The default is 1 when not set.

MeToo (M)

Sends to me too, even if I am in an alias expansion.

MaxRecipientsPerMessage

If set, allows no more than the specified number of recipients in an SMTP envelope. Further recipients receive a 452 error code and are deferred for the next delivery attempt.

MinFreeBlocks (bN/M)

Insists on at least *N* blocks free on the file system that holds the queue files before accepting email by way of SMTP. If there is insufficient space, `sendmail` gives a 452 response to the `MAIL` command. This invites the sender to try again later. The optional *M* is a maximum message size advertised in the ESMTP EHLO response. It is currently otherwise unused.

MinQueueAge

Specifies the amount of time a job must sit in the queue between queue runs. This allows you to set the queue run interval low for better responsiveness without trying all jobs in each run. The default value is 0.

MustQuoteChars

Specifies the characters to be quoted in a full name phrase. `&, ; \ ( ) [ ]` are quoted automatically.

NiceQueueRun

Specifies the priority of queue runners. See `nice(1)`.

NoRecipientAction

Sets action if there are no legal recipient files in the message. The legal values are:

<code>add-apparently-to</code>	Adds an <code>Apparently-to:</code> header with all the known recipients (which may expose blind recipients).
<code>add-bcc</code>	Adds an empty <code>Bcc:</code> header.
<code>add-to</code>	Adds a <code>To:</code> header with all the known recipients (which may expose blind recipients).
<code>add-to-undisclosed</code>	Adds a <code>To: undisclosed-recipients:</code> header.
<code>none</code>	Does nothing, that is, leaves the message as it is.

OldStyleHeaders (o)

Assumes that the headers may be in old format, that is, spaces delimit names. This actually turns on an adaptive algorithm: if any recipient address contains a comma, parenthesis, or angle bracket, it is assumed that commas already exist. If this flag is not on, only commas delimit names. Headers are always output with commas between the names.

OperatorChars or **\$o**

Defines the list of characters that can be used to separate the components of an address into tokens.

PidFile

Specifies the filename of the pid file. The default is `/var/run/sendmail.pid`. The filename is macro-expanded before it is opened.

PostmasterCopy (*Ppostmaster*)

If set, copies of error messages are sent to the named *postmaster*. Only the header of the failed message is sent. Since most errors are user problems, this is probably not a good idea on large sites, and arguably contains all sorts of privacy violations, but it seems to be popular with certain operating systems vendors.

PrivacyOptions (*popt,opt,...*)

Sets privacy options. Privacy is really a misnomer; many of these options are just a way of insisting on stricter adherence to the SMTP protocol.

The *goaway* pseudo-flag sets all flags except *noreceipts*, *restrictmailq*, *restrictqrun*, *restrictexpand*, *noetrn*, and *nobodyreturn*. If *mailq* is restricted, only people in the same group as the queue directory can print the queue. If queue runs are restricted, only root and the owner of the queue directory can run the queue. The *restrict-expand* pseudo-flag instructs sendmail to drop privileges when the *-bv* option is given by users who are neither root nor the *TrustedUser* so users cannot read private aliases, forwards, or *:include:* files. It adds the *NonRootSafeAddr* to the "DontBlame-Sendmail" option to prevent misleading unsafe address warnings. It also overrides the *-v* (verbose) command line option to prevent information leakage. Authentication Warnings add warnings about various conditions that may indicate attempts to fool the mail system, such as using an non-standard queue directory.

The options can be selected from:

<i>authwarnings</i>	Puts X-Authentication-Warning: headers in messages.
<i>goaway</i>	Disallows essentially all SMTP status queries.
<i>needexpnhelo</i>	Insists on HELO or EHLO command before EXPN.
<i>needmailhelo</i>	Insists on HELO or EHLO command before MAIL.
<i>needvrfyhelo</i>	Insists on HELO or EHLO command before VRFY.
<i>noetrn</i>	Disallows ETRN entirely.
<i>noexpn</i>	Disallows EXPN entirely.
<i>noreceipts</i>	Prevents return receipts.
<i>nobodyreturn</i>	Does not return the body of a message with DSNs.
<i>novrfy</i>	Disallows VRFY entirely.
<i>public</i>	Allows open access.

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<code>restrictexpand</code>	Restricts <code>-bv</code> and <code>-v</code> command line flags.
<code>restrictmailq</code>	Restricts <code>mailq</code> command.
<code>restrictqrun</code>	Restricts <code>-q</code> command line flag.
<code>ProcessTitlePrefix</code> <i>string</i>	Prefixes the process title shown on <code>/usr/ucb/ps auxww</code> listings with <i>string</i> . The string is macro processed.
<code>QueueDirectory</code> (<i>Qdir</i>)	Uses the named <i>dir</i> as the queue directory.
<code>QueueFactor</code> (<i>qfactor</i>)	Uses <i>factor</i> as the multiplier in the map function to decide when to just queue up jobs rather than run them. This value is divided by the difference between the current load average and the load average limit (<code>x</code> flag) to determine the maximum message priority to be sent. Defaults to 600000.
<code>QueueFileMode</code> = <i>mode</i>	Defaults permissions for queue files (octal). If not set, <code>sendmail</code> uses 0600 unless its real and effective uid are different in which case it uses 0644.
<code>QueueLA</code> (<i>xLA</i>)	When the system load average exceeds <i>LA</i> , just queues messages (that is, does not try to send them). Defaults to eight times the number of processors online when <code>sendmail</code> starts.
<code>QueueSortOrder</code> = <i>algorithm</i>	Sets the algorithm used for sorting the queue. Only the first character of the value is used. Legal values are <code>host</code> (to order by the name of the first host name of the first recipient), <code>filename</code> (to order by the name of the queue file name), <code>time</code> (to order by the submission/creation time), <code>random</code> (to order randomly), <code>modification</code> (to order by the modification time of the <code>qf</code> file (older entries first)), and <code>priority</code> (to order by message priority). Host ordering makes better use of the connection cache, but may tend to process low priority messages that go to a single host over high priority messages that go to several hosts; it probably shouldn't be used on slow network links. Filename and modification time ordering saves the overhead of reading all of the queued items before starting the queue run. Creation (submission) time ordering is almost always a bad idea, since it allows large, bulk mail to go out before smaller, personal mail, but may have applicability on some hosts with very fast connections. Random is useful if several queue runners are started by hand which try to drain the same queue since odds are they are working on different parts of the queue at the same time. Priority ordering is the default.
<code>QueueTimeout</code> (<i>Trtime/wtime</i>)	Sets the queue timeout to <i>rtime</i> . After this interval, messages that have not been successfully sent are returned to the sender. Defaults to five days (5d). The optional <i>wtime</i> is the time after which a warning message is sent. If it is missing or 0, then no warning messages are sent.

RecipientFactor (*yfact*)

The indicated factor *fact* is added to the priority (thus *lowering* the priority of the job) for each recipient, that is, this value penalizes jobs with large numbers of recipients. Defaults to 30000.

RefuseLA (*xLA*)

When the system load average exceeds *LA*, refuses incoming SMTP connections. Defaults to 12 times the number of processors online when `sendmail` starts.

ResolverOptions (*I*)

Tunes DNS lookups.

RetryFactor (*zfact*)

The indicated factor *fact* is added to the priority every time a job is processed. Thus, each time a job is processed, its priority is decreased by the indicated value. In most environments this should be positive, since hosts that are down are all too often down for a long time. Defaults to 90000.

RrtImpliesDsn

If this option is set, a Return-Receipt-To: header causes the request of a DSN, which is sent to the envelope sender as required by RFC 1891, not to the address given in the header.

RunAsUser

If set, becomes this user when reading and delivering mail. Intended for use of firewalls where users do not have accounts.

SafeFileEnvironment

If set, `sendmail` does a `chroot` into this directory before writing files.

SaveFromLine (*f*)

Saves Unix-style From lines at the front of headers. Normally they are assumed redundant and discarded.

SendMimeErrors (*j*)

If set, sends error messages in MIME format (see RFC 2045 and RFC 1344 for details). If disabled, `sendmail` does not return the DSN keyword in response to an EHLO and does not do Delivery Status Notification processing as described in RFC 1891.

ServiceSwitchFile

Defines the path to the service-switch file. Since the service-switch file is defined in the Solaris operating environment this option is ignored.

SevenBitInput (*7*)

Strips input to seven bits for compatibility with old systems. This should not be necessary.

SharedMemoryKey

Specifies key to use for shared memory segment. If not set (or 0), shared memory is not be used. If this option is set, `sendmail` can share some data between different instances. For example, the number of entries in a queue directory or the available

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space in a file system. This allows for more efficient program execution, since only one process needs to update the data instead of each individual process gathering the data each time it is required.

SingleLineFromHeader

If set, `From:` lines that have embedded newlines are unwrapped onto one line.

SingleThreadDelivery

If this option and the `HostStatusDirectory` option are both set, uses single thread deliveries to other hosts.

SmtpgreetingMessage or `$e`

Specifies the initial SMTP greeting message.

StatusFile (*\$file*)

Logs statistics in the named *file*. By default, this is `/etc/mail/sendmail.st`. As root, you must `touch(1)` this file to enable `mailstats(1)`.

SuperSafe (*s*)

This option can be set to `True`, `False`, or `Interactive`. If set to `True`, `sendmail` is set to super-safe when running things, that is, always instantiate the queue file, even if you are going to attempt immediate delivery. `sendmail` always instantiates the queue file before returning control to the client under any circumstances. This should really always be set to `True`. The `Interactive` value has been introduced in 8.12 and can be used together with `DeliveryMode=i`. It skips some synchronization calls which are effectively doubled in the code execution path for this mode.

TempFileMode (*Fmode*)

Specifies the file mode for queue files.

Timeout (*rtimeouts*)

`Timeout` reads after time interval. The *timeouts* argument is a list of *keyword=value* pairs. All but *command* apply to client SMTP. For backward compatibility, a timeout with no *keyword=* part is set all of the longer values. The recognized timeouts and their default values, and their minimum values specified in RFC 1123 section 5.3.2 are:

`connect`

all connections for a single delivery attempt [0, unspecified]

`command`

command read [1h, 5m]

`connect`

initial connect [0, unspecified]

`control`

complete control socket transaction [2m, none]

`datablock`

data block read [1h, 3m]

```

datafinal
    reply to final . in data [1h, 10m]
datainit
    reply to DATA command [5m, 2m]
fileopen
    file open [60sec, none]
helo
    reply to HELO or EHLO command [5m, none]
hoststatus
    host retry [30m, unspecified]
iconnect
    first attempt to connect to a host [0, unspecified]
ident
    IDENT protocol timeout [5s, none]
initial
    wait for initial greeting message [5m, 5m]
lhlo
    wait for reply to an LMTP LHLO command [2m, unspecified]
mail
    reply to MAIL command [10m, 5m]
misc
    reply to NOOP and VERB commands [2m, none]
queuereturn
    undeliverable message returned [5d]
queuwarn
    deferred warning [4h]
quit
    reply to QUIT command [2m, none]
rcpt
    reply to RCPT command [1h, 5m]
resolver.retrans
    Resolver's retransmission time interval (in seconds) [varies]. Sets both
    Timeout.resolver.retrans.first and
    Timeout.resolver.retrans.normal.
resolver.retrans.first
    Resolver's retransmission time interval (in seconds) for the first attempt to
    deliver a message [varies].

```

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<code>resolver.retrans.normal</code>	Resolver's retransmission time interval (in seconds) for all look-ups except the first delivery attempt [varies].
<code>resolver.retry</code>	Number of times to retransmit a resolver query [varies]. Sets both <code>Timeout.resolver.retry.first</code> and <code>Timeout.resolver.retry.normal</code> .
<code>resolver.retry.first</code>	Number of times to retransmit a resolver query for the first attempt to deliver a message [varies].
<code>resolver.retry.normal</code>	Number of times to retransmit a resolver query for all look-ups except the first delivery attempt [varies].
<code>rset</code>	reply to RSET command [5m, none]
<code>TimeZoneSpec (tzinfo)</code>	Sets the local time zone info to <i>tzinfo</i> , for example, "PST8PDT ". Actually, if this is not set, the TZ environment variable is cleared (so the system default is used); if set but null, the user's TZ variable is used, and if set and non-null, the TZ variable is set to this value.
<code>TrustedUser</code>	The user parameter can be a user name (looked up in the passwd map) or a numeric user id. Trusted user for file ownership and starting the daemon. If set, generated alias databases and the control socket (if configured) are automatically owned by this user.
<code>TryNullMXList (w)</code>	If you are the "best" (that is, lowest preference) MX for a given host, you should normally detect this situation and treat that condition specially, by forwarding the mail to a UUCP feed, treating it as local, or whatever. However, in some cases (such as Internet firewalls) you may want to try to connect directly to that host as though it had no MX records at all. Setting this option causes <code>sendmail</code> to try this. The downside is that errors in your configuration are likely to be diagnosed as "host unknown" or "message timed out" instead of something more meaningful. This option is deprecated.
<code>UnixFromLine</code> or <code>\$1</code>	The "From " line used when sending to files or programs.
<code>UnsafeGroupWrites</code>	If set, group-writable <code>:include:</code> and <code>.forward</code> files are considered "unsafe", that is, programs and files cannot be directly referenced from such files.
<code>UseErrorsTo (l)</code>	If there is an <code>Errors-To:</code> header, sends error messages to the addresses listed there. They normally go to the envelope sender. Use of this option causes <code>sendmail</code> to violate RFC 1123. This option is not recommended and deprecated.

	UseMSP Uses as mail submission program, that is, allows group writable queue files if the group is the same as that of a set-group-id <code>sendmail</code> binary. UserDatabaseSpec (U) Defines the name and location of the file containing User Database information. Verbose (v) Runs in verbose mode. If this is set, <code>sendmail</code> adjusts the <code>HoldExpensive</code> and <code>DeliveryMode</code> options so that all mail is delivered completely in a single job so that you can see the entire delivery process. The <code>Verbose</code> option should <i>never</i> be set in the configuration file; it is intended for command line use only. XscriptFileBufferSize Sets the threshold, in bytes, before a memory-based queue transcript file becomes disk-based. The default is 4096 bytes. If the first character of the user name is a vertical bar, the rest of the user name is used as the name of a program to pipe the mail to. It may be necessary to quote the name of the user to keep <code>sendmail</code> from suppressing the blanks from between arguments. If invoked as <code>newaliases</code>, <code>sendmail</code> rebuilds the alias database, so long as the <code>/etc/mail/aliases*</code> files are owned by root <i>and</i> root has exclusive write permission. If invoked as <code>mailq</code>, <code>sendmail</code> prints the contents of the mail queue.																
OPERANDS	<i>address</i> address of an intended recipient of the message being sent.																
USAGE	See <code>largefile(5)</code> for the description of the behavior of <code>sendmail</code> when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).																
EXIT STATUS	<code>sendmail</code> returns an exit status describing what it did. The codes are defined in <code>/usr/include/sysexits.h</code>. <table> <tr> <td><code>EX_OK</code></td><td>Successful completion on all addresses.</td></tr> <tr> <td><code>EX_NOUSER</code></td><td>User name not recognized.</td></tr> <tr> <td><code>EX_UNAVAILABLE</code></td><td>Catchall. Necessary resources were not available.</td></tr> <tr> <td><code>EX_SYNTAX</code></td><td>Syntax error in address.</td></tr> <tr> <td><code>EX_SOFTWARE</code></td><td>Internal software error, including bad arguments.</td></tr> <tr> <td><code>EX_OSERR</code></td><td>Temporary operating system error, such as “cannot fork”.</td></tr> <tr> <td><code>EX_NOHOST</code></td><td>Host name not recognized.</td></tr> <tr> <td><code>EX_TEMPFAIL</code></td><td>Message could not be sent immediately, but was queued.</td></tr> </table>	<code>EX_OK</code>	Successful completion on all addresses.	<code>EX_NOUSER</code>	User name not recognized.	<code>EX_UNAVAILABLE</code>	Catchall. Necessary resources were not available.	<code>EX_SYNTAX</code>	Syntax error in address.	<code>EX_SOFTWARE</code>	Internal software error, including bad arguments.	<code>EX_OSERR</code>	Temporary operating system error, such as “cannot fork”.	<code>EX_NOHOST</code>	Host name not recognized.	<code>EX_TEMPFAIL</code>	Message could not be sent immediately, but was queued.
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<code>EX_TEMPFAIL</code>	Message could not be sent immediately, but was queued.																

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ENVIRONMENT VARIABLES

No environment variables are used. However, at system start-up, `/etc/init.d/sendmail` reads `/etc/default/sendmail`. In this file, if the variable `ETRN_HOSTS` is set, `/etc/init.d/sendmail` parses this variable and invokes `etrn(1M)` appropriately. `ETRN_HOSTS` should be of the form:

```
"s1:c1.1,c1.2      s2:c2.1 s3:c3.1,c3.2,c3.3"
```

That is, white-space separated groups of *server:client* where *client* can be one or more comma-separated names. The *:client* part is optional. *server* is the name of the server to prod; a mail queue run is requested for each *client* name. This is comparable to running:

```
/usr/lib/sendmail -qR client
```

on the host *server*.

FILES

<code>dead.letter</code>	Unmailable text
<code>/etc/default/sendmail</code>	Contains default settings. You can override some of the settings by command line options.
<code>/etc/mail/aliases</code>	Mail aliases file (ASCII)
<code>/etc/mail/aliases.db</code>	Database of mail aliases (binary)
<code>/etc/mail/aliases.dir</code>	Database of mail aliases (binary)
<code>/etc/mail/aliases.pag</code>	Database of mail aliases (binary)
<code>/etc/mail/sendmail.cf</code>	Defines environment for <code>sendmail</code>
<code>/var/spool/clientmqueue/*</code>	Temporary files and queued mail
<code>/var/spool/mqueue/*</code>	Temporary files and queued mail
<code>~/.forward</code>	List of recipients for forwarding messages

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWsndmu

SEE ALSO

`biff(1B)`, `mail(1)`, `mailq(1)`, `mailx(1)`, `nice(1)`, `check-hostname(1M)`, `check-permissions(1M)`, `etrn(1M)`, `newaliases(1M)`, `fork(2)`, `getpwnam(3C)`, `getusershell(3C)`, `resolver(3RESOLV)`, `aliases(4)`, `hosts(4)`, `shells(4)`, `attributes(5)`, `largefile(5)`

Postel, Jon, *Simple Mail Transfer Protocol*, RFC 821, Network Information Center, SRI International, Menlo Park, Calif., August 1982.

Crocker, Dave, *Standard for the Format of ARPA-Internet Text Messages*, RFC 822, Network Information Center, SRI International, Menlo Park, Calif., August 1982.

Costales, Bryan with Eric Allman, *sendmail, Second Edition*, O'Reilly & Associates, Inc., 1997.

NOTES

The `sendmail` program requires a fully qualified host name when starting. A script has been included to help verify if the host name is defined properly (see `check-hostname(1M)`).

The permissions and the ownership of several directories have been changed in order to increase security. In particular, access to `/etc/mail` and `/var/spool/mqueue` has been restricted.

Security restrictions have been placed users using `.forward` files to pipe mail to a program or redirect mail to a file. The default shell (as listed in `/etc/passwd`) of these users must be listed in `/etc/shells`. This restriction does not affect mail that is being redirected to another alias.

Additional restrictions have been put in place on `.forward` and `:include:` files. These files and the directory structure that they are placed in cannot be group- or world-writable. See `check-permissions(1M)`.

If you have interfaces that map to domains that have MX records that point to non-local destinations, you might need to enable the `DontProbeInterfaces` option to enable delivery to those destinations. In its default startup behavior, `sendmail` probes each interface and adds an interface's IP addresses, as well as any domains that those addresses map to, to its list of domains that are considered local. For domains thus added, being on the list of local domains is equivalent to having a 0-preference MX record, with `localhost` as the MX value. If this is not the result you want, enable `DontProbeInterfaces`.

setuname(1M)

NAME	setuname – change machine information				
SYNOPSIS	setuname [-t] [-n <i>node</i>] [-s <i>name</i>]				
DESCRIPTION	The setuname utility changes the parameter value for the system name and node name. Each parameter can be changed using setuname and the appropriate option. Either or both the -s and -n options must be given when invoking setuname. The system architecture may place requirements on the size of the system and network node name. The command will issue a fatal warning message and an error message if the name entered is incompatible with the system requirements.				
OPTIONS	The following options are supported: -n <i>node</i> Changes the node name. <i>node</i> specifies the new network node name and can consist of alphanumeric characters and the special characters dash, underbar, and dollar sign. -s <i>name</i> Changes the system name. <i>name</i> specifies new system name and can consist of alphanumeric characters and the special characters dash, underbar, and dollar sign. -t Temporary change. No attempt will be made to create a permanent change.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu (32-bit) SUNWcsxu (64-bit)</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu (32-bit) SUNWcsxu (64-bit)
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu (32-bit) SUNWcsxu (64-bit)				
SEE ALSO	attributes(5)				
NOTES	setuname attempts to change the parameter values in two places: the running kernel and, as necessary per implementation, to cross system reboots. A temporary change changes only the running kernel.				

sf880drd(1M)

NAME	sf880drd – Sun Fire 880 Dynamic Reconfiguration daemon				
SYNOPSIS	sf880drd				
DESCRIPTION	The Sun Fire 880 Dynamic Reconfiguration daemon, <code>sf880drd</code>, is part of the PCI and system bus hotplug framework. <code>sf880drd</code> starts at boot time. It has no configuration options and does not report any system status. <code>sf880drd</code> implements the Sun Fire 880 console-less system administration (per-slot pushbuttons and LED status indicators). It also manages various aspects of CPU/memory hotplug.				
FILES	<code>/usr/platform/SUNW,Sun-Fire-880/lib/sf880drd</code>				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWsfdr.u</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWsfdr.u
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWsfdr.u				
SEE ALSO	<code>cfgadm(1M)</code> , <code>cfgadm_pci(1M)</code> , <code>cfgadm_sbd(1M)</code> , <code>attributes(5)</code>				

sftp-server(1M)

NAME	sftp-server – SFTP server subsystem				
SYNOPSIS	/usr/lib/ssh/sftp-server				
DESCRIPTION	sftp-server implements the server side of the SSH File Transfer Protocol as defined in the IETF draft-ietf-secsh-filexfer. sftp-server is a subsystem for sshd(1M) and must not be run directly. There are no options or config settings. To enable the sftp-server subsystem for sshd add the following to /etc/ssh/sshd_config: <pre>Subsystem sftp /usr/lib/ssh/sftp-server</pre> See sshd_config(4) for a description of the format and contents of that file. There is no relationship between the protocol used by sftp-server and the FTP protocol (RFC 959) provided by in.ftpd.				
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>>0</td><td>An error occurred.</td></tr></table>	0	Successful completion.	>0	An error occurred.
0	Successful completion.				
>0	An error occurred.				
FILES	/usr/lib/sftp-server				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWsshdu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWsshdu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWsshdu				
SEE ALSO	sftp(1), ssh(1), ssh-add(1), ssh-keygen(1), sshd(1M), sshd_config(4), attributes(5) To view license terms, attribution, and copyright for OpenSSH, the default path is /var/sadm/pkg/SUNWsshdr/install/copyright. If the Solaris operating environment has been installed anywhere other than the default, modify the given path to access the file at the installed location.				
AUTHOR	Markus Friedl				

NAME	share – make local resource available for mounting by remote systems	
SYNOPSIS	share [-F <i>FSType</i>] [-o <i>specific_options</i>] [-d <i>description</i>] [<i>pathname</i>]	
DESCRIPTION	The share command exports, or makes a resource available for mounting, through a remote file system of type <i>FSType</i> . If the option -F <i>FSType</i> is omitted, the first file system type listed in /etc/dfs/fstypes is used as default. For a description of NFS specific options, see share_nfs(1M). <i>pathname</i> is the pathname of the directory to be shared. When invoked with no arguments, share displays all shared file systems.	
OPTIONS	-F <i>FSType</i>	Specify the filesystem type.
	-o <i>specific_options</i>	The <i>specific_options</i> are used to control access of the shared resource. (See share_nfs(1M) for the NFS specific options.) They may be any of the following:
	rw	<i>pathname</i> is shared read/write to all clients. This is also the default behavior.
	rw= <i>client[:client]</i> ...	<i>pathname</i> is shared read/write only to the listed clients. No other systems can access <i>pathname</i> .
	ro	<i>pathname</i> is shared read-only to all clients.
	ro= <i>client[:client]</i> ...	<i>pathname</i> is shared read-only only to the listed clients. No other systems can access <i>pathname</i> .
		Separate multiple options with colons.
	-d <i>description</i>	The -d flag may be used to provide a description of the resource being shared.
EXAMPLES	EXAMPLE 1 Sharing a read-only filesystem	
	This line will share the /disk file system read-only at boot time. share -F nfs -o ro /disk	
	EXAMPLE 2 Invoking multiple options	
	The following command shares the filesystem /export/manuals, with members of the netgroup having read-only access and users on the specified host having read-write access.	

share(1M)

EXAMPLE 2 Invoking multiple options (Continued)

```
share -F nfs -o ro=netgroup_name:rw=hostname /export/manuals
```

FILES

/etc/dfs/dfstab	list of share commands to be executed at boot time
/etc/dfs/fstypes	list of file system types, NFS by default
/etc/dfs/sharetab	system record of shared file systems

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO mountd(1M), nfsd(1M), share_nfs(1M), shareall(1M), unshare(1M), attributes(5)

NOTES Export (old terminology): file system sharing used to be called exporting on SunOS 4.x, so the share command used to be invoked as exportfs(1B) or /usr/sbin/exportfs.

If share commands are invoked multiple times on the same filesystem, the last share invocation supersedes the previous—the options set by the last share command replace the old options. For example, if read-write permission was given to usera on /somefs, then to give read-write permission also to userb on /somefs:

```
example% share -F nfs -o rw=usera:userb /somefs
```

This behavior is not limited to sharing the root filesystem, but applies to all filesystems.

NAME	shareall, unshareall – share, unshare multiple resources				
SYNOPSIS	shareall [-F <i>FSType</i> [, <i>FSType</i> ...]] [- <i>file</i>] unshareall [-F <i>FSType</i> [, <i>FSType</i> ...]]				
DESCRIPTION	When used with no arguments, shareall shares all resources from <i>file</i>, which contains a list of share command lines. If the operand is a hyphen (-), then the share command lines are obtained from the standard input. Otherwise, if neither a <i>file</i> nor a hyphen is specified, then the file <i>/etc/dfs/dfstab</i> is used as the default. Resources may be shared by specific file system types by specifying the file systems in a comma-separated list as an argument to -F. unshareall unshares all currently shared resources. Without a -F flag, it unshares resources for all distributed file system types.				
OPTIONS	-F <i>FSType</i> Specify file system type. Defaults to the first entry in <i>/etc/dfs/fstypes</i> .				
FILES	<i>/etc/dfs/dfstab</i>				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	share(1M) , unshare(1M) , attributes(5)				

share_nfs(1M)

NAME	share_nfs – make local NFS file systems available for mounting by remote systems						
SYNOPSIS	share [-d <i>description</i>] [-F <i>nfs</i>] [-o <i>specific_options</i>] <i>pathname</i>						
DESCRIPTION	The share utility makes local file systems available for mounting by remote systems. If no argument is specified, then share displays all file systems currently shared, including NFS file systems and file systems shared through other distributed file system packages.						
OPTIONS	The following options are supported: <table><tr><td>-d <i>description</i></td><td>Provide a comment that describes the file system to be shared.</td></tr><tr><td>-F <i>nfs</i></td><td>Share NFS file system type.</td></tr><tr><td>-o <i>specific_options</i></td><td>Specify <i>specific_options</i> in a comma-separated list of keywords and attribute-value-assertions for interpretation by the file-system-type-specific command. If <i>specific_options</i> is not specified, then by default sharing will be read-write to all clients. <i>specific_options</i> can be any combination of the following:</td></tr></table> aclok Allows the NFS server to do access control for NFS Version 2 clients (running SunOS 2.4 or earlier). When aclok is set on the server, maximal access is given to all clients. For example, with aclok set, if anyone has read permissions, then everyone does. If aclok is not set, minimal access is given to all clients. anon=<i>uid</i> Set <i>uid</i> to be the effective user ID of unknown users. By default, unknown users are given the effective user ID <code>UID_NOBODY</code>. If <i>uid</i> is set to <code>-1</code>, access is denied. index=<i>file</i> Load <i>file</i> rather than a listing of the directory containing this file when the directory is referenced by an NFS URL. log=<i>tag</i> Enables NFS server logging for the specified file system. The optional tag determines the location of the related log files. The tag is defined in <code>etc/nfs/nfslog.conf</code>. If no tag is specified, the default values associated with the “global” tag in <code>etc/nfs/nfslog.conf</code> will be used.	-d <i>description</i>	Provide a comment that describes the file system to be shared.	-F <i>nfs</i>	Share NFS file system type.	-o <i>specific_options</i>	Specify <i>specific_options</i> in a comma-separated list of keywords and attribute-value-assertions for interpretation by the file-system-type-specific command. If <i>specific_options</i> is not specified, then by default sharing will be read-write to all clients. <i>specific_options</i> can be any combination of the following:
-d <i>description</i>	Provide a comment that describes the file system to be shared.						
-F <i>nfs</i>	Share NFS file system type.						
-o <i>specific_options</i>	Specify <i>specific_options</i> in a comma-separated list of keywords and attribute-value-assertions for interpretation by the file-system-type-specific command. If <i>specific_options</i> is not specified, then by default sharing will be read-write to all clients. <i>specific_options</i> can be any combination of the following:						

share_nfs(1M)

nosub

Prevents clients from mounting subdirectories of shared directories. For example, if `/export` is shared with the `nosub` option on server *fooey* then a NFS client will not be able to do:

```
mount -F nfs fooey:/export/home/mnt
```

nosuid

By default, clients are allowed to create files on the shared file system with the `setuid` or `setgid` mode enabled. Specifying `nosuid` causes the server file system to silently ignore any attempt to enable the `setuid` or `setgid` mode bits.

public

Moves the location of the public file handle from root (`/`) to the exported directory for WebNFS-enabled browsers and clients. This option does not enable WebNFS service; WebNFS is always on. Only one file system per server may use this option. Any other option, including the `-ro=list` and `-rw=list` options can be included with the `public` option.

ro

Sharing will be read-only to all clients.

ro=access_list

Sharing will be read-only to the clients listed in *access_list*; overrides the `rw` suboption for the clients specified. See *access_list* below.

root=access_list

Only root users from the hosts specified in *access_list* will have root access. See *access_list* below. By default, no host has root access, so root users are mapped to an anonymous user ID (see the `anon=uid` option described above). Netgroups can be used if the file system shared is using UNIX authentication (`AUTH_SYS`).

rw

Sharing will be read-write to all clients.

rw=access_list

Sharing will be read-write to the clients listed in *access_list*; overrides the `ro` suboption for the clients specified. See *access_list* below.

share_nfs(1M)

	<code>sec=mode[:mode]. . .</code> Sharing will use one or more of the specified security modes. The <i>mode</i> in the <code>sec=mode</code> option must be a node name supported on the client. If the <code>sec=</code> option is not specified, the default security mode used is <code>AUTH_SYS</code>. Multiple <code>sec=</code> options can be specified on the command line, although each mode can appear only once. The security modes are defined in <code>nfssec(5)</code>. Each <code>sec=</code> option specifies modes that apply to any subsequent <code>window=</code>, <code>rw</code>, <code>ro</code>, <code>rw=</code>, <code>ro=</code> and <code>root=</code> options that are provided before another <code>sec=</code> option. Each additional <code>sec=</code> resets the security mode context, so that more <code>window=</code>, <code>rw</code>, <code>ro</code>, <code>rw=</code>, <code>ro=</code> and <code>root=</code> options can be supplied for additional modes. <code>sec=none</code> If the option <code>sec=none</code> is specified when the client uses <code>AUTH_NONE</code>, or if the client uses a security mode that is not one that the file system is shared with, then the credential of each NFS request is treated as unauthenticated. See the <code>anon=uid</code> option for a description of how unauthenticated requests are handled. <code>secure</code> This option has been deprecated in favor of the <code>sec=dh</code> option. <code>window=value</code> When sharing with <code>sec=dh</code>, set the maximum life time (in seconds) of the RPC request's credential (in the authentication header) that the NFS server will allow. If a credential arrives with a life time larger than what is allowed, the NFS server will reject the request. The default value is 30000 seconds (8.3 hours).				
<i>access_list</i>	The <i>access_list</i> argument is a colon-separated list whose components may be any number of the following: <table><tr><td>hostname</td><td>The name of a host. With a server configured for DNS or LDAP naming in the <code>nsswitch "hosts"</code> entry, any hostname must be represented as a fully qualified DNS or LDAP name.</td></tr><tr><td>netgroup</td><td>A netgroup contains a number of hostnames. With a server configured for DNS or LDAP naming in the</td></tr></table>	hostname	The name of a host. With a server configured for DNS or LDAP naming in the <code>nsswitch "hosts"</code> entry, any hostname must be represented as a fully qualified DNS or LDAP name.	netgroup	A netgroup contains a number of hostnames. With a server configured for DNS or LDAP naming in the
hostname	The name of a host. With a server configured for DNS or LDAP naming in the <code>nsswitch "hosts"</code> entry, any hostname must be represented as a fully qualified DNS or LDAP name.				
netgroup	A netgroup contains a number of hostnames. With a server configured for DNS or LDAP naming in the				

domain name suffix

nsswitch "hosts" entry, any hostname in a netgroup must be represented as a fully qualified DNS or LDAP name.

To use domain membership the server must use DNS or LDAP to resolve hostnames to IP addresses; that is, the "hosts" entry in the `/etc/nsswitch.conf` must specify "dns" or "ldap" ahead of "nis" or "nisplus", since only DNS and LDAP return the full domain name of the host. Other name services like NIS or NIS+ cannot be used to resolve hostnames on the server because when mapping an IP address to a hostname they do not return domain information. For example,

NIS or NIS+ 129.144.45.9 --> "myhost

DNS or LDAP 129.144.45.9 -->
 "myhost.mydomain.mycompany.com"

The domain name suffix is distinguished from hostnames and netgroups by a prefixed dot. For example,

`rw=.mydomain.mycompany.com`

A single dot can be used to match a hostname with no suffix. For example,

`rw=.`

will match "mydomain" but not "mydomain.mycompany.com". This feature can be used to match hosts resolved through NIS and NIS+ rather than DNS and LDAP.

network

The network or subnet component is preceded by an at-sign (@). It can be either a name or a dotted address. If a name, it will be converted to a dotted address by `getnetbyname(3SOCKET)`. For example,

`=@mynet` would be equivalent to:

`=@129.144` or `=@129.144.0.0` The network prefix assumes an octet aligned netmask determined from the zero octets in the low-order part of the address. In the case where network prefixes are not byte-aligned, the

share_nfs(1M)

	syntax will allow a mask length to be specified explicitly following a slash (/) delimiter. For example, <code>=@theothernet/17</code> or <code>=@129.144.132/22</code> where the mask is the number of leftmost contiguous significant bits in the corresponding IP address. A prefixed minus sign (-) denies access to that component of <i>access_list</i>. The list is searched sequentially until a match is found that either grants or denies access, or until the end of the list is reached. For example, if host "terra" is in the "engineering" netgroup, then <code>rw=-terra:engineering</code> will deny access to terra but <code>rw=engineering:-terra</code> will grant access to terra.								
OPERANDS	The following operands are supported: <i>pathname</i> The pathname of the file system to be shared.								
EXAMPLES	EXAMPLE 1 Sharing A File System With Logging Enabled The following example shows the /export file system shared with logging enabled: <pre>example% share -o log /export</pre> The default global logging parameters are used since no tag identifier is specified. The location of the log file, as well as the necessary logging work files, is specified by the global entry in /etc/nfs/nfslog.conf. Note that the nfslogd(1M) daemon will run only if at least one file system entry in /etc/dfs/dfstab is shared with logging enabled upon starting or rebooting the system. Simply sharing a file system with logging enabled from the command line will not start the nfslogd(1M).								
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.								
FILES	<table><tr><td>/etc/dfs/fstypes</td><td>list of system types, NFS by default</td></tr><tr><td>/etc/dfs/sharetab</td><td>system record of shared file systems</td></tr><tr><td>/etc/nfs/nfslogtab</td><td>system record of logged file systems</td></tr><tr><td>/etc/nfs/nfslog.conf</td><td>logging configuration file</td></tr></table>	/etc/dfs/fstypes	list of system types, NFS by default	/etc/dfs/sharetab	system record of shared file systems	/etc/nfs/nfslogtab	system record of logged file systems	/etc/nfs/nfslog.conf	logging configuration file
/etc/dfs/fstypes	list of system types, NFS by default								
/etc/dfs/sharetab	system record of shared file systems								
/etc/nfs/nfslogtab	system record of logged file systems								
/etc/nfs/nfslog.conf	logging configuration file								

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnfsu

SEE ALSO mount(1M), mountd(1M), nfsd(1M), nfslogd(1M), share(1M), unshare(1M), getnetbyname(3SOCKET), nfslog.conf(4), netgroup(4), attributes(5), nfssec(5)

NOTES If the `sec=` option is presented at least once, all uses of the `window=`, `rw`, `ro`, `rw=`, `ro=` and `root=` options must come after the first `sec=` option. If the `sec=` option is not presented, then `sec=sys` is implied.

If one or more explicit `sec=` options are presented, `sys` must appear in one of the options mode lists for accessing using the `AUTH_SYS` security mode to be allowed. For example:

```
share -F nfs /var
share -F nfs -o sec=sys /varwill grant read-write access to any host using
AUTH_SYS, but

share -F nfs -o sec=dh /varwill grant no access to clients that use AUTH_SYS.
```

Unlike previous implementations of `share_nfs(1M)`, access checking for the `window=`, `rw`, `ro`, `rw=`, and `ro=` options is done per NFS request, instead of per mount request.

Combining multiple security modes can be a security hole in situations where the `ro=` and `rw=` options are used to control access to weaker security modes. In this example,

```
share -F nfs -o sec=dh,rw,sec=sys,rw=hosta /varan intruder can forge the IP address
for hosta (albeit on each NFS request) to side-step the stronger controls of
AUTH_DES. Something like:
```

```
share -F nfs -o sec=dh,rw,sec=sys,ro /varis safer, because any client (intruder or
legitimate) that avoids AUTH_DES will only get read-only access. In general, multiple
security modes per share command should only be used in situations where the
clients using more secure modes get stronger access than clients using less secure
modes.
```

If `rw=`, and `ro=` options are specified in the same `sec=` clause, and a client is in both lists, the order of the two options determines the access the client gets. If client `hosta` is in two netgroups - `group1` and `group2` - in this example, the client would get read-only access:

```
share -F nfs -o ro=group1,rw=group2 /var
```

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In this example `hosta` would get read-write access:

```
share -F nfs -o rw=group2,ro=group1 /var
```

If within a `sec=` clause, both the `ro` and `rw=` options are specified, for compatibility, the order of the options rule is not enforced. All hosts would get read-only access, with the exception to those in the read-write list. Likewise, if the `ro=` and `rw` options are specified, all hosts get read-write access with the exceptions of those in the read-only list.

The `ro=` and `rw=` options are guaranteed to work over UDP and TCP but may not work over other transport providers.

The `root=` option with `AUTH_SYS` is guaranteed to work over UDP and TCP but may not work over other transport providers.

The `root=` option with `AUTH_DES` is guaranteed to work over any transport provider.

There are no interactions between the `root=` option and the `rw`, `ro`, `rw=`, and `ro=` options. Putting a host in the `root` list does not override the semantics of the other options. The access the host gets is the same as when the `root=` options is absent. For example, the following `share` command will deny access to `hostb`:

```
share -F nfs -o ro=hosta,root=hostb /var
```

The following will give read-only permissions to `hostb`:

```
share -F nfs -o ro=hostb,root=hostb /var
```

The following will give read-write permissions to `hostb`:

```
share -F nfs -o ro=hosta,rw=hostb,root=hostb /var
```

If the file system being shared is a symbolic link to a valid pathname, the canonical path (the path which the symbolic link follows) will be shared. For example, if `/export/foo` is a symbolic link to `/export/bar` (`/export/foo -> /export/bar`), the following `share` command will result in `/export/bar` as the shared pathname (and not `/export/foo`).

```
example# share -F nfs /export/foo
```

Note that an NFS mount of `server:/export/foo` will result in `server:/export/bar` really being mounted.

This line in the `/etc/dfs/dfstab` file will share the `/disk` file system read-only at boot time:

```
share -F nfs -o ro /disk
```

Note that the same command entered from the command line will not share the `/disk` file system unless there is at least one file system entry in the `/etc/dfs/dfstab` file. The `mountd(1M)` and `nfsd(1M)` daemons only run if there is a file system entry in `/etc/dfs/dfstab` when starting or rebooting the system.

NAME	showmount – show all remote mounts				
SYNOPSIS	/usr/sbin/showmount [-ade] [<i>hostname</i>]				
DESCRIPTION	showmount lists all the clients that have remotely mounted a filesystem from <i>host</i> . This information is maintained by the mountd(1M) server on <i>host</i> , and is saved across crashes in the file <i>/etc/rmtab</i> . The default value for <i>host</i> is the value returned by <i>hostname(1)</i> .				
OPTIONS	-a Print all remote mounts in the format: <i>hostname</i> : <i>directory</i> where <i>hostname</i> is the name of the client, and <i>directory</i> is the root of the file system that has been mounted. -d List directories that have been remotely mounted by clients. -e Print the list of shared file systems.				
FILES	<i>/etc/rmtab</i>				
ATTRIBUTES	See <i>attributes(5)</i> for descriptions of the following attributes:				
	<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWnfscu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnfscu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWnfscu				
SEE ALSO	<i>hostname(1)</i> , <i>mountd(1M)</i> , <i>attributes(5)</i> <i>Solaris 9 12/03 Installation Guide</i>				
BUGS	If a client crashes, its entry will not be removed from the list of remote mounts on the server.				

showrev(1M)

NAME	showrev – show machine, software revision, and patch revision information
SYNOPSIS	/usr/bin/showrev [-a] [-p -p -R <i>root_path</i>] [-w] [-c <i>command</i>] [-s <i>hostname</i>]
DESCRIPTION	showrev displays revision information for the current hardware and software. With no arguments, showrev shows the system revision information including hostname, hostid, release, kernel architecture, application architecture, hardware provider, domain, and kernel version. If a command is supplied with the -c option, showrev shows the PATH and LD_LIBRARY_PATH and finds out all the directories within the PATH that contain it. For each file found, its file type, revision, permissions, library information, and checksum are printed as well.
OPTIONS	The following options are supported: -a Print all system revision information available. Window system and patch information are added. -c <i>command</i> Print the revision information about <i>command</i>. -p Print only the revision information about patches. -R <i>root_path</i> Define the full path name of a directory to use as the <i>root_path</i>. By specifying the root path, showrev retrieves the revision information about the patch from package system information files located under a directory tree starting at <i>root_path</i>. The <i>root_path</i> can be specified when retrieving installed patch information in a client from a server, for example, /export/root/client1. -s <i>hostname</i> Perform this operation on the specified <i>hostname</i>. The -s operation completes correctly only when <i>hostname</i> is running Solaris 2.5 or compatible versions. -w Print only the OpenWindows revision information.
OUTPUT	Varies, based on flags passed. If no flags are passed, output similar to the following appears: <pre> Hostname: system1 Hostid: 7233808e Release: 5.9 Kernel architecture: sun4u Application architecture: sparc Hardware provider: Sun_Microsystems Domain: a.network.COM Kernel version: SunOS 5.9 generic February 2001 </pre>
EXIT STATUS	The following error values are returned: 0 Successful completion. >0 An error occurred.

showrev(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWadmc

SEE ALSO `arch(1)`, `ldd(1)`, `mcs(1)`, `sum(1)`, `patchadd(1M)`, `attributes(5)`

BUGS For the `-s` option to work when `hostname` is running a version of Solaris prior to 2.5, the Solstice AdminSuite must be installed on `hostname`.

shutdown(1M)

NAME	shutdown – shut down system, change system state										
SYNOPSIS	/usr/sbin/shutdown [-y] [-g <i>grace-period</i>] [-i <i>init-state</i>] [<i>message</i>]										
DESCRIPTION	shutdown is executed by the super user to change the state of the machine. In most cases, it is used to change from the multi-user state (state 2) to another state. By default, shutdown brings the system to a state where only the console has access to the operating system. This state is called single-user. Before starting to shut down daemons and killing processes, shutdown sends a warning message and, by default, a final message asking for confirmation. <i>message</i> is a string that is sent out following the standard warning message "The system will be shut down in . . ." If the string contains more than one word, it should be contained within single (') or double (") quotation marks. The warning message and the user provided <i>message</i> are output when there are 7200, 3600, 1800, 1200, 600, 300, 120, 60, and 30 seconds remaining before shutdown begins. See EXAMPLES. System state definitions are: <table> <tr> <td>state 0</td><td>Stop the operating system.</td></tr> <tr> <td>state 1</td><td>State 1 is referred to as the administrative state. In state 1 file systems required for multi-user operations are mounted, and logins requiring access to multi-user file systems can be used. When the system comes up from firmware mode into state 1, only the console is active and other multi-user (state 2) services are unavailable. Note that not all user processes are stopped when transitioning from multi-user state to state 1.</td></tr> <tr> <td>state s, S</td><td>State s (or S) is referred to as the single-user state. All user processes are stopped on transitions to this state. In the single-user state, file systems required for multi-user logins are unmounted and the system can only be accessed through the console. Logins requiring access to multi-user file systems cannot be used.</td></tr> <tr> <td>state 5</td><td>Shut the machine down so that it is safe to remove the power. Have the machine remove power, if possible. The rc0 procedure is called to perform this task.</td></tr> <tr> <td>state 6</td><td>Stop the operating system and reboot to the state defined by the initdefault entry in /etc/inittab. The rc6 procedure is called to perform this task.</td></tr> </table>	state 0	Stop the operating system.	state 1	State 1 is referred to as the administrative state. In state 1 file systems required for multi-user operations are mounted, and logins requiring access to multi-user file systems can be used. When the system comes up from firmware mode into state 1, only the console is active and other multi-user (state 2) services are unavailable. Note that not all user processes are stopped when transitioning from multi-user state to state 1.	state s, S	State s (or S) is referred to as the single-user state. All user processes are stopped on transitions to this state. In the single-user state, file systems required for multi-user logins are unmounted and the system can only be accessed through the console. Logins requiring access to multi-user file systems cannot be used.	state 5	Shut the machine down so that it is safe to remove the power. Have the machine remove power, if possible. The rc0 procedure is called to perform this task.	state 6	Stop the operating system and reboot to the state defined by the initdefault entry in /etc/inittab. The rc6 procedure is called to perform this task.
state 0	Stop the operating system.										
state 1	State 1 is referred to as the administrative state. In state 1 file systems required for multi-user operations are mounted, and logins requiring access to multi-user file systems can be used. When the system comes up from firmware mode into state 1, only the console is active and other multi-user (state 2) services are unavailable. Note that not all user processes are stopped when transitioning from multi-user state to state 1.										
state s, S	State s (or S) is referred to as the single-user state. All user processes are stopped on transitions to this state. In the single-user state, file systems required for multi-user logins are unmounted and the system can only be accessed through the console. Logins requiring access to multi-user file systems cannot be used.										
state 5	Shut the machine down so that it is safe to remove the power. Have the machine remove power, if possible. The rc0 procedure is called to perform this task.										
state 6	Stop the operating system and reboot to the state defined by the initdefault entry in /etc/inittab. The rc6 procedure is called to perform this task.										
OPTIONS	<table> <tr> <td>-y</td><td>Pre-answer the confirmation question so the command can be run without user intervention.</td></tr> <tr> <td>-g <i>grace-period</i></td><td>Allow the super user to change the number of seconds from the 60-second default.</td></tr> </table>	-y	Pre-answer the confirmation question so the command can be run without user intervention.	-g <i>grace-period</i>	Allow the super user to change the number of seconds from the 60-second default.						
-y	Pre-answer the confirmation question so the command can be run without user intervention.										
-g <i>grace-period</i>	Allow the super user to change the number of seconds from the 60-second default.										

shutdown(1M)

-i *init-state* If there are warnings, *init-state* specifies the state *init* is to be in. By default, system state 's' is used.

EXAMPLES

EXAMPLE 1 Using shutdown

In the following example, *shutdown* is being executed on host *foo* and is scheduled in 120 seconds. The warning message is output 2 minutes, 1 minute, and 30 seconds before the final confirmation message.

```
example# shutdown -i S -g 120 "==== disk replacement ====="
Shutdown started.  Tue Jun  7 14:51:40 PDT 1994

Broadcast Message from root (pts/1) on foo Tue Jun  7 14:51:41. . .
The system will be shut down in 2 minutes
==== disk replacement =====
Broadcast Message from root (pts/1) on foo Tue Jun  7 14:52:41. . .
The system will be shut down in 1 minutes
==== disk replacement =====
Broadcast Message from root (pts/1) on foo Tue Jun  7 14:53:41. . .
The system will be shut down in 30 seconds
==== disk replacement =====
Do you want to continue? (y or n):
```

FILES /etc/inittab controls process dispatching by *init*

ATTRIBUTES See *attributes(5)* for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO *boot(1M)*, *halt(1M)*, *init(1M)*, *killall(1M)*, *reboot(1M)*, *ufsdump(1M)*, *init.d(4)*, *inittab(4)*, *nologin(4)*, *attributes(5)*

NOTES When a system transitions down to the *S* or *s* state, the */etc/nologin* file (see *nologin(4)*) is created. Upon subsequent transition to state 2 (multi-user state), this file is removed by a script in the */etc/rc2.d* directory.

slpd(1M)

NAME	slpd – Service Location Protocol Daemon								
SYNOPSIS	<code>/usr/lib/inet/slpd [-f <i>configuration-file</i>]</code>								
DESCRIPTION	The <code>slpd</code> daemon provides common server functionality for the Service Location Protocol (“SLP”) versions 1 and 2, as defined by IETF in <i>RFC 2165</i> and <i>RFC 2608</i>. SLP provides a scalable framework for the discovery and selection of network services. <code>slpd</code> provides the following framework services: <table><tr><td>Directory Agent</td><td>This service automatically caches service advertisements from service agents to provide them to user agents, and makes directory agent advertisements of its services. This service is optional. <code>slpd</code> does not provide directory agent service by default. Directory agents are not databases, and they do not need to be maintained.</td></tr><tr><td>Service Agent Server</td><td>All service agents on the local host register and deregister with this server. This service responds to all requests for services, and forwards registrations to directory agents. By default, <code>slpd</code> is a service agent server.</td></tr><tr><td>Passive Directory Agent Discovery</td><td>This service listens for directory agent advertisements and maintains a table of active directory agents. When a user agent wishes to discover a directory agent, it can simply query <code>slpd</code>, obviating the need to perform discovery by means of multicast. By default, <code>slpd</code> performs this service.</td></tr><tr><td>Proxy Registration</td><td>This service can act as a proxy service agent for services that cannot register themselves. <code>slpd</code> reads the proxy registration file for information on services it is to proxy. By default, no services are registered by proxy.</td></tr></table> All configuration options are available from the configuration file. <code>slpd</code> reads its configuration file upon startup. Stop and start the <code>slpd</code> daemon by using the startup script: <code>/etc/init.d/slpd</code>. Use the command <code>/etc/init.d/slpd stop</code> to stop the <code>slpd</code> daemon. Use the command <code>/etc/init.d/slpd start</code> to start it. The file <code>/etc/inet/slp.conf</code> must exist before the startup script can start the daemon. Only the example file <code>/etc/inet/slp.conf.example</code> is present by default. To enable SLP, copy <code>/etc/inet/slp.conf.example</code> to <code>/etc/inet/slp.conf</code>.	Directory Agent	This service automatically caches service advertisements from service agents to provide them to user agents, and makes directory agent advertisements of its services. This service is optional. <code>slpd</code> does not provide directory agent service by default. Directory agents are not databases, and they do not need to be maintained.	Service Agent Server	All service agents on the local host register and deregister with this server. This service responds to all requests for services, and forwards registrations to directory agents. By default, <code>slpd</code> is a service agent server.	Passive Directory Agent Discovery	This service listens for directory agent advertisements and maintains a table of active directory agents. When a user agent wishes to discover a directory agent, it can simply query <code>slpd</code> , obviating the need to perform discovery by means of multicast. By default, <code>slpd</code> performs this service.	Proxy Registration	This service can act as a proxy service agent for services that cannot register themselves. <code>slpd</code> reads the proxy registration file for information on services it is to proxy. By default, no services are registered by proxy.
Directory Agent	This service automatically caches service advertisements from service agents to provide them to user agents, and makes directory agent advertisements of its services. This service is optional. <code>slpd</code> does not provide directory agent service by default. Directory agents are not databases, and they do not need to be maintained.								
Service Agent Server	All service agents on the local host register and deregister with this server. This service responds to all requests for services, and forwards registrations to directory agents. By default, <code>slpd</code> is a service agent server.								
Passive Directory Agent Discovery	This service listens for directory agent advertisements and maintains a table of active directory agents. When a user agent wishes to discover a directory agent, it can simply query <code>slpd</code> , obviating the need to perform discovery by means of multicast. By default, <code>slpd</code> performs this service.								
Proxy Registration	This service can act as a proxy service agent for services that cannot register themselves. <code>slpd</code> reads the proxy registration file for information on services it is to proxy. By default, no services are registered by proxy.								

OPTIONS	The following options are supported: <code>-f configuration-file</code> Specify an alternate configuration file								
EXAMPLES	EXAMPLE 1 Stopping the <code>slpd</code> daemon The following command stops the <code>slpd</code> daemon: <pre>example# /etc/init.d/slpd stop</pre> EXAMPLE 2 Restarting the <code>slpd</code> daemon The following command restarts the <code>slpd</code> daemon: <pre>example# /etc/init.d/slpd start</pre>								
FILES	<code>/etc/inet/slp.conf</code> The default configuration file <code>slpd.reg</code> The proxy registration file								
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWslpu, SUNWslpr</td></tr><tr><td>CSI</td><td>Enabled</td></tr><tr><td>Interface Stability</td><td>Evolving</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWslpu, SUNWslpr	CSI	Enabled	Interface Stability	Evolving
ATTRIBUTE TYPE	ATTRIBUTE VALUE								
Availability	SUNWslpu, SUNWslpr								
CSI	Enabled								
Interface Stability	Evolving								
SEE ALSO	<code>slp_api(3SLP)</code>, <code>slp.conf(4)</code>, <code>slpd.reg(4)</code>, <code>attributes(5)</code>, <code>slp(7P)</code> <i>SYSADV4-tt</i> Guttman, E., Perkins, C., Veizades, J., and Day, M., <i>RFC 2608, Service Location Protocol, Version 2</i>, The Internet Society, June 1999.								

smartcard(1M)

NAME	smartcard – configure and administer a smart card
SYNOPSIS	<pre> smartcard -c admin [-a <i>application</i>] [<i>propertyname</i>...] smartcard -c admin [-a <i>application</i>] [-x { add delete modify } <i>propertyname=value</i>...] smartcard -c admin -t service -j <i>classname</i> -x { add delete modify} smartcard -c admin -t terminal { -j <i>classname</i> -H <i>libraryname</i> } -d <i>device</i> -r <i>userfriendlyreadername</i> -n <i>readername</i> -x { add delete modify } [-R] smartcard -c admin -t debug -j <i>classname</i> -l <i>level</i> -x { add delete modify} smartcard -c admin -t override -x { add delete modify} <i>propertyname=value</i> smartcard -c admin -I -k <i>keytype</i> -i <i>filename</i> smartcard -c admin -E -k <i>keytype</i> -o <i>filename</i> smartcard -c load -A <i>aid</i> [-r <i>userfriendlyreadername</i>] -P <i>pin</i> [-s <i>slot</i>] [-i <i>inputfile</i>] [-p <i>propfile</i>] [-v] [<i>propertyname=value</i>...] smartcard -c load -u -P <i>pin</i> [-A <i>aid</i>] [-r <i>userfriendlyreadername</i>] [-s <i>slot</i>] [-v] smartcard -c bin2capx -T <i>cardname</i> [-i <i>inputfile</i>] [-o <i>outputfile</i>] [-p <i>propfile</i>] [-I <i>anothercapxfile</i>] [-v] [<i>propertyname=value</i>...] smartcard -c init -A <i>aid</i> [-r <i>readername</i>] [-s <i>slot</i>] -L smartcard -c init -A <i>aid</i> [-r <i>readername</i>] -P <i>pin</i> [-s <i>slot</i>] [<i>propertyname=value</i>...] smartcard -c enable smartcard -c disable </pre>
DESCRIPTION	The smartcard utility is used for all configurations related to a smart card. It comprises the following subcommands: Administration of OCF properties. (-c admin) This subcommand is used to list and modify any of the OCF properties. With no arguments it will list all the current properties. It can only be executed by root. Some OCF properties are: <pre> defaultcard # default card for an application defaultreader # default reader for an application authmechanism # authentication mechanism </pre>


```
validcards
    # list of cards valid for an application
```

A complete listing can be obtained by using the `smartcard` utility as described in the `EXAMPLES` section.

2. Loading and Unloading of applets from the smart card (`-c load`) and performing initial configuration of a non-Java card.

This subcommand administers the applets or properties on a smartcard. It can be used to load or unload applets and/or properties to and from a smart card. The applet is a Java class file that has been run through a converter to make the byte code JavaCard-compliant. This command can be used to load both an applet file in the standard format or a file converted to the `capx` format. If no `-r` option is specified, the loader tries to load to any connected reader, provided it has already been inserted using the `smartcard -c admin` command.

3. Converting card applets or properties to the `capx` format (`-c bin2capx`)

This subcommand is used to convert a Java card applet or properties into a new format called `capx` before downloading it onto the smart card. Converting to this format enables the applet developer to add applet-specific information that is useful during the downloading process and identifies the applet.

In the following example,

```
smartcard -c bin2capx -i cyberflex.bin \
-T CyberFlex aidto-000102030405060708090A0B0C0D0E0F fileID=2222 \
instanceID=2223 and more.
```

if no output file is specified, a default file with the name *input_filename.capx* is created in the current directory. The mandatory `-T` option requires the user to specify the card name for which the `capx` file is being generated.

The following example

```
smartcard -c bin2capx -T IButton
```

tells the loader that the `capx` file contains the binary for `IButton`. A single `capx` file can hold binaries for multiple cards (1 per card.) Users can, for example, hold binary files for both `CyberFlex` and `IButton` in the same `capx` file as follows:

```
smartcard -c bin2capx -T IButton -i IButton.jib -o file.capx
```

In the following example,

```
smartcard -c bin2capx -T CyberFlex -i cyberflex.bin \
-l file.capx -o file.capx
```

the `-l` option is used to provide an already-generated `capx` file. The output is directed to the same `capx` file, resulting in `capx` file holding binaries for both cards.

4. Personalizing a smart card (`-c init`)

smartcard(1M)

This subcommand is used to set user-specific information required by an applet on a smart card. For example, the Sun applet requires a user name to be set on the card. This subcommand is also used to personalize information for non-Java cars.

5. Enabling and disabling the smart card desktop login (-c {enable | disable})

OPTIONS

The following options are supported:

-a <i>application</i>	Specify application name for the configuration parameter. Parameters may differ depending on the application. If no application name is specified, then <code>ocf</code> is the default application.
-A <i>aid</i>	Specify a unique alphanumeric string that identifies the applet. The <i>aid</i> argument must be a minimum of 5 characters and can be a maximum of 16 characters in length. If an applet with an identical <i>aid</i> already exists on the card, a load will result in an error.
-c	Specify subcommand name. Valid options are: <code>admin</code> , <code>load</code> , <code>bin2capx</code> , <code>init</code> , <code>enable</code> , and <code>disable</code> .
-d <i>device</i>	Specify device on which the reader is connected (for example, <code>/dev/cua/a</code>).
-D	Disable a system from using smart cards.
-E	Export the keys to a file.
-H <i>libraryname</i>	Specify the full path of the IFD handler library for the reader.
-i <i>filename</i>	Specify input file name.
-I	Import from a file.
-j <i>classname</i>	Specify fully-qualified class name.
-k <i>keytype</i>	Specify type of key (for example, <code>challenge_response</code> , <code>pki</code> .)
-l	Specify debug level (0–9), signifying level of debug information displayed.
-L	List all properties configurable in an applet.
-n <i>readername</i>	Specify reader name as required by the driver.
-o <i>filename</i>	Specify output file name.
-p <i>propfile</i>	Specify properties file name. This file could contain a list of property names and value pairs, in the format <i>propertyname=value</i> .
-P <i>pin</i>	Specify pin used to validate to the card.

<i>-r userfriendlyreadername</i>	Specify user-defined reader name where the card to be initialized is inserted.								
<i>-R</i>	Restart the ocf server.								
<i>-s slot</i>	Specify slot number. If a reader has multiple slots, this option specifies which slot to use for initialization. If a reader has only one slot, this option is not required. If no slot number is specified, by default the first slot of the reader is used.								
<i>-t</i>	Specify type of property being updated. The valid values are: <table> <tr> <td>service</td><td>Updating a card service provider details.</td></tr> <tr> <td>terminal</td><td>Updating a card reader provider details.</td></tr> <tr> <td>debug</td><td>OCF trace level.</td></tr> <tr> <td>override</td><td>Override a system property of the same name.</td></tr> </table>	service	Updating a card service provider details.	terminal	Updating a card reader provider details.	debug	OCF trace level.	override	Override a system property of the same name.
service	Updating a card service provider details.								
terminal	Updating a card reader provider details.								
debug	OCF trace level.								
override	Override a system property of the same name.								
<i>-T cardname</i>	Specify card name.								
<i>-u</i>	Unload the applet specified by the application ID from the card. If no application ID is specified, all applets are unloaded from the card.								
<i>-v</i>	Verbose mode (displays helpful messages).								
<i>-x</i>	Specify action to be taken. Valid values are: add, delete, or modify.								

EXAMPLES**EXAMPLE 1** Viewing the Values of All Properties

Enter the following command to view the values of all the properties that are set:

```
% smartcard -c admin
```

EXAMPLE 2 Viewing the Values of Specific Properties

Enter the following command to view the values of specific properties:

```
% smartcard -c admin language country
```

EXAMPLE 3 Adding a Card Service

Enter the following command to add a card service factory for a CyberFlex card, available in the package `com.sun.services.cyberflex`, to the properties:

EXAMPLE 3 Adding a Card Service *(Continued)*

```
% smartcard -c admin -t service \
-j com.sun.services.cyberflex.CyberFlexCardServiceFactory -x add
```

EXAMPLE 4 Adding a Reader

Enter the following command to add an SCM reader, available in the package `com.sun.services.scm`, to the properties on device `/dev/cua/a` and assign it a name of SCM:

```
% smartcard -c admin -t terminal \
-j com.sun.opencard.terminal.scm.SCMStc.SCMstcCardTerminalFactory \
-x add -d /dev/cua/a -r SCM -n SunSCRI
```

Enter the following command to add a reader for which an IFD handler is available:

```
% smartcard -c admin -t terminal \
-H /usr/lib/smartcard/libifdmyserial.so \
-x add -d /dev/cua/a -r MySerialReader -n MySerial
```

EXAMPLE 5 Deleting a Reader

Enter the following command to delete the SCM reader, added in the previous example, from the properties:

```
% smartcard -c admin -t terminal -r SCM -x delete
```

EXAMPLE 6 Changing the Debug Level

Enter the following command to change the debug level for all of the `com.sun` package to 9:

```
% smartcard -c admin -t debug -j com.sun -l 9 -x modify
```

EXAMPLE 7 Setting the Default Card for an Application

Enter one of the following commands to set the default card for an application (`dtlogin`) to be CyberFlex.

If the property default card does not exist, enter the following command:

```
% smartcard -c admin -a dtlogin -x add defaultcard=CyberFlex
```

If the property default card exists, enter the following command:

```
% smartcard -c admin -a dtlogin -x modify defaultcard=CyberFlex
```

EXAMPLE 8 Exporting Keys for a User into a File

Enter the following command to export the challenge-response keys for a user into a file:

```
% smartcard -c admin -k challenge_response -E -o /tmp/mykeys
```

EXAMPLE 9 Importing Keys from a File

Enter the following command to import the challenge-response keys for a user from a file:

```
% smartcard -c admin -k challenge_response -I -i /tmp/mykeys
```

EXAMPLE 10 Downloading an Applet into a Java Card

Enter the following command to download an applet into a Java card or to configure a PayFlex (non-Java) card inserted into an SCM reader for the capx file supplied in the /usr/share/lib/smartcard directory:

```
% smartcard -c load -r SCM \
-i /usr/share/lib/smartcard/SolarisAuthApplet.capx
```

EXAMPLE 11 Downloading an Applet Binary

Enter the following command to download an applet binary from some place other than the capx file supplied with Solaris 8 into an IButton (the aid and input file are mandatory, the remaining parameters are optional):

```
% smartcard -c load -A A000000062030400 -i newapplet.jib
```

EXAMPLE 12 Downloading an Applet on a CyberFlex Access Card

On a CyberFlex Access Card, enter the following command to download an applet newapplet.bin at fileID 2222, instanceID 3333 using the specified verifyKey and a heap size of 2000 bytes:

```
% smartcard -c load -A newaid -i newapplet.bin \
fileID=2222 instanceID=3333 verifyKey=newKey \
MAC=newMAC heapsize=2000
```

EXAMPLE 13 Configuring a PayFlex Card

Enter the following command to configure a PayFlex (non-Java) card with specific aid, transport key, and initial pin:

```
% smartcard -c load aid=A00000006203400 \
pin=242424246A617661 transportKey=4746584932567840
```

smartcard(1M)

EXAMPLE 14 Unloading an Applet from a Card

Enter the following command to unload an applet from iButton:

```
% smartcard -c load -u
```

EXAMPLE 15 Displaying Usage of smartcard -c load

Enter the following command to display the usage of the smartcard -c load command:

```
% smartcard -c load
```

EXAMPLE 16 Displaying All Configurable Parameters for an Applet

Enter the following command to display all the configurable parameters for an applet with aid 123456 residing on a card inserted into an SCM reader:

```
% smartcard -c init -r SM -A 123456 -L
```

EXAMPLE 17 Changing the PIN

Enter the following command to change the pin for the SolarisAuthApplet residing on a card or to change the PIN for a PayFlex (non-Java) card inserted into an SCM reader:

```
% smartcard -c init -A A000000062030400 -P oldpin pin=newpin
```

EXAMPLE 18 Displaying All Configurable Parameters for the SolarisAuthApplet.

Enter the following command to display all the configurable parameters for the SolarisAuthApplet residing on a card inserted into an SCM reader:

```
% smartcard -c init -A A000000062030400 -L
```

EXAMPLE 19 Setting a Property to a Value on a smart card

Enter the following command to set properties called "user" to the value "james" and "application" to the value "login" on a card inserted into an SCM reader that has a pin "testpin":

```
% smartcard -c init -A A000000062030400 -r CyberFlex -P testpin \  
application=login user=james
```

EXAMPLE 20 Converting an Applet for the CyberFlex Card into capx Format.

Enter the following command to convert an applet for the CyberFlex card into the capx format required for downloading the applet into the card:

```
% smartcard -c bin2capx \  
-i /usr/share/lib/smartcard/SolarisAuthApplet.bin \  

```

EXAMPLE 20 Converting an Applet for the CyberFlex Card into capx Format. (Continued)

```
-T CyberFlex -o /home/CorporateCard.capx -v memory=128 heapsize=12
```

EXAMPLE 21 Converting an Applet for the IButton Card into capx Format

Enter the following command to convert an applet for the IButton card into the capx format required for downloading the applet into the button:

```
% smartcard -c bin2capx \  
-i /usr/share/lib/smartcard/SolarisAuthApplet.jib \  
-T IButton -o /home/CorporateCard.capx -v
```

EXIT STATUS The following exit values are returned:

0	Successful completion.
1	An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWocf
Interface Stability	Stable

SEE ALSO `ocfserv(1M)`, `attributes(5)`, `smartcard(5)`

NOTES The command line options contain only alphanumeric input.

smattrpop(1M)

NAME	smattrpop – populate security attribute databases in a name service
SYNOPSIS	smattrpop [-c] [-f] [-m] [-p <i>policy</i>] [-r] -s <i>scope</i> -t <i>scope</i> [-v] <i>database</i>
DESCRIPTION	The smattrpop command updates the <code>auth_attr(4)</code>, <code>exec_attr(4)</code>, <code>prof_attr(4)</code>, and <code>user_attr(4)</code> role-based access control databases in a target NIS, NIS+, LDAP, or local <code>/etc</code> files name service from the corresponding databases in a source name service or files. This command processes the table entries from the source database and merges each source entry field into the same field in the corresponding table entry in the target database. If a source entry does not exist in the target database, the entry is created. If the source entry exists in the target database, the fields are merged or replaced according to the command options. Any errors encountered while updating the target entry are reported to <code>stdout</code>, and the command continues with the next source database entry.
OPTIONS	The following options are supported: -c Performs cross-table checking. If you specify this option and a check error occurs, a message identifying the check error is written to <code>stdout</code>. The target entry values are checked against entries in related databases: ■ <code>auths</code> values — Each value must exist as the name of an authorization in the <code>auth_attr(4)</code> database. ■ <code>profiles</code> values — Each value must exist as a name of a profile in the <code>prof_attr(4)</code> database. ■ <code>roles</code> values — Each value must exist as the name of a role identity in the <code>user_attr(4)</code> database. ■ For each <code>exec_attr(4)</code> entry in the source database, the name must exist as the name of a profile in the <code>prof_attr(4)</code> database. -f Specifies that the value in each field in the source entry replaces the value in the corresponding field in the target entry, if the source entry field has a non-empty value. -m For the <code>auths</code>, <code>profiles</code>, and <code>roles</code> attributes, specifies that the values in each field in the source entry are merged with the values in the corresponding target entry field. If a source value does not exist in the target field, the value is appended to the set of target values. If the target field is empty, the source values replace the target field. The attribute values that merge depend on the database being updated: ■ <code>prof_attr(4)</code> — the <code>auths</code> and <code>profiles</code> attribute values are merged.

	■ <code>user_attr(4)</code> — the <code>auths</code>, <code>profiles</code>, and <code>roles</code> attribute values are merged. ■ <code>exec_attr(4)</code> — the <code>uid</code>, <code>gid</code>, <code>euid</code>, and <code>egid</code> values are merged.
<code>-p policy</code>	Specifies the value of the <code>policy</code> field in the <code>exec_attr(4)</code> database. Valid values are <code>suser</code> (standard Solaris superuser) and <code>tsol</code> (Trusted Solaris). If you specify this option, only the entries in the source <code>exec_attr</code> database with the specified policy are processed. If you omit this option, all entries in the source <code>exec_attr</code> database are processed.
<code>-r</code>	Specifies that role identities in the <code>user_attr(4)</code> database in the source name service are processed. If you omit this option, only the normal user entries in the <code>user_attr</code> source database are processed.
<code>-s scope</code>	Specifies the source name service or local file directory for database updates, using the following syntax: <i>type</i> : <i>/server/domain</i> where <i>type</i> indicates the type of name service. Valid values for <i>type</i> are: ■ <code>file</code> — local files ■ <code>nis</code> — NIS name service ■ <code>nisplus</code> — NIS+ name service ■ <code>ldap</code> — LDAP name service <i>server</i> indicates the local host name of the Solaris system on which the <code>smattrpop</code> command is executed, and on which both the source and target databases exist. <i>domain</i> specifies the management domain name for the name service. You can use two special cases of <i>scope</i> values: ■ To indicate the databases in the <code>/etc/security</code> local system directory, use the scope <code>file:/server</code>, where <i>server</i> is the name of the local system. ■ To load from databases in an arbitrary directory on the Solaris server, use the scope <code>file:/server/pathname</code>, where <i>server</i> is the name of the local system and <i>pathname</i> is the fully-qualified directory path name to the database files.
<code>-t scope</code>	Specifies the target name service or local file directory for database updates, using the following syntax: <i>type</i> : <i>/server/domain</i>

smattrpop(1M)

where *type* indicates the type of name service. Valid values for *type* are:

- *file* — local files
- *nis* — NIS name service
- *nisplus* — NIS+ name service
- *ldap* — LDAP name service

server indicates the local host name of the Solaris system on which the `smattrpop` command is executed, and on which both the source and target databases exist.

domain specifies the management domain name for the name service.

You can use two special cases of *scope* values:

- To indicate the databases in the `/etc/security` local system directory, use the scope `file:/server`, where *server* is the name of the local system.
- To update to databases in an arbitrary directory on the Solaris server, use the scope `file:/server/pathname`, where *server* is the name of the local system and *pathname* is the fully-qualified directory path name to the database files.

`-v` Specifies that verbose messages are written. A message is written to `stdout` for each entry processed.

OPERANDS The following operands are supported:

database Populates one or all databases. You can specify either the name of the database you want to process (for example, `auth_attr`), or `all` to process all databases. If you specify `all`, the databases are processed in the following order:

1. `auth_attr(4)`
2. `prof_attr(4)`
3. `exec_attr(4)`
4. `user_attr(4)`

EXAMPLES **EXAMPLE 1** Populating all tables in the NIS name service

The following example merges the values from all four attribute databases in the `/etc/security` directory of the local system into the corresponding tables in the NIS domain, `east.sun.com`. The command is executed on the master server, `hoosier`, for the NIS domain and the source files are in the `/etc` and `/etc/security` directories on the NIS master server. No cross-table checking is performed. A summary message indicating the number of entries processed and updated for each table is written to `stdout`.

EXAMPLE 1 Populating all tables in the NIS name service (Continued)

```
/usr/sadm/bin/smattrpop -s file:/hoosier \
-t nis:/hoosier/east.sun.com all
```

EXAMPLE 2 Updating the authorization table in the NIS+ name service

This example merges new authorization data from a local system file in the `auth_attr` text format into the existing `auth_attr` database in the NIS+ domain, `east.sun.com`. The command is executed on the NIS+ master server, `foobar`. Values from the source `auth_attr` file replace the corresponding field values in the NIS+ tables for each entry. A message is written to `stdout` for each entry processed. Database cross-checking is performed and any check error is written to `stdout`. A summary message indicating the number of entries processed and updated for the `auth_attr` database is written to `stdout`.

```
/usr/sadm/bin/smattrpop -c -f -v -s file:/foobar/var/temp \
-t nisplus:/foobar/East.Sun.COM auth_attr
```

ENVIRONMENT VARIABLES

See `environ(5)` for a description of the `JAVA_HOME` environment variable, which affects the execution of the `smattrpop` command. If this environment variable is not specified, the `/usr/java` location is used. See `smc(1M)`.

EXIT STATUS

Any errors encountered while updating the target entry are reported to `stdout`. The following exit values are returned:

- 0 The specified tables were updated. Individual entries may have encountered checking errors.
- 1 A syntax error occurred in the command line.
- 2 A fatal error occurred and the tables were not completely processed. Some entries may have been updated before the failure.

FILES

<code>/etc/security/auth_attr</code>	Authorization description database. See <code>auth_attr(4)</code> .
<code>/etc/security/exec_attr</code>	Execution profiles database. See <code>exec_attr(4)</code> .
<code>/etc/security/prof_attr</code>	Profile description database. See <code>prof_attr(4)</code> .
<code>/etc/user_attr</code>	Extended user attribute database. See <code>user_attr(4)</code> .

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

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ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmga

SEE ALSO smc(1M), smexec(1M), smprofile(1M), auth_attr(4), exec_attr(4),
prof_attr(4), user_attr(4), attributes(5), environ(5)

NAME	smc – start the Solaris Management Console
SYNOPSIS	smc [<i>subcommand</i>] [<i>args</i>] smc [<i>subcommand</i>] [<i>args</i>] -T <i>tool_name</i> [- - <i>tool_args</i>]
DESCRIPTION	The smc command starts the Solaris Management Console. The Solaris Management Console is a graphical user interface that provides access to Solaris system administration tools. It relies on Solaris Management Console servers running on one or more computers to perform modifications and report data. Each of these servers is a repository for code which the console can retrieve after the user of the console has authenticated himself or herself to the server. The console can also retrieve toolboxes from the server. These toolboxes are descriptions of organized collections of tools available on that and possibly other servers. Once one of these toolboxes is loaded, the console will display it and the tools referenced in it. The console can also run in a terminal (non-graphically), for use over remote connections or non-interactively from a script. For information on the use of the graphical console, and for more detailed explanations of authentication, tools, and toolboxes, please refer to the Solaris Management Console online help available under the "Help" menu in the Solaris Management Console. To enable an NIS/NIS+ map to be managed from the Solaris Management Console, you must use the smc edit command to create a new toolbox for that map and enter the information about your NIS/NIS+ server where necessary. For instructions on creating a new toolbox, in the Solaris Management Console Help menu, select "Contents," then "About the Solaris Management Console Editor," then "To Create a Toolbox."
<i>subcommands</i>	smc subcommands are: open The default subcommand for the Solaris Management Console is open. This will launch the console and allow you to run tools from the toolboxes you load. It does not need to be specified explicitly on the command line. edit The edit subcommand will also launch the console, like the open subcommand. However, after loading a toolbox, you will not be able to run the referenced tools. Instead, you will be able to edit that toolbox, that is, add, remove, or modify any tools or folders in that toolbox.
OPTIONS	The following options are supported. These letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either -D or --domain with the <i>domain</i> argument. If <i>tool_args</i> are specified, they must be preceded by the -- option and separated from the double dashes by a space.

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-auth-data *file*

Specifies a file which the console can read to collect authentication data. When running the Solaris Management Console non-interactively, the console will still need to authenticate itself with the server to retrieve tools. This data can either be passed on the command line using the `-u`, `-p`, `-r`, and `-l` options (which is insecure, because any user can see this data), or it can be placed in a file for the console to read. For security reasons, this file should be readable only by the user running the console, although the console does not enforce this restriction.

The format of *file* is:

```
hostname=host name
username=user name
password=password for user name
rolename=role name
rolepassword=password for role name
```

Only one set of `hostname-username-password-rolename-rolepassword` may be specified in any one file. If the `rolename` is not specified, no role will be assumed.

-B | - -toolbox *toolbox*

Loads the specified toolbox. *toolbox* can be either a fully-qualified URL or a filename. If you specify an HTTP URL as, for example,

```
http://host_name:port/. . .
```

it must point to a *host_name* and *port* on which an Solaris Management Console server is running. If you omit *port*, the default port, 898, is used. This option overrides the `-H` option.

-D | - -domain *domain*

Specifies the default domain that you want to manage. The syntax of *domain* is *type:/host_name/domain_name*, where *type* is `nis`, `nisplus`, `dns`, `ldap`, or `file`; *host_name* is the name of the machine that serves the domain; and *domain_name* is the name of the domain you want to manage. (Note: Do not use `nis+` for `nisplus`.) This option applies only to a single tool run in the terminal console.

If you do not specify this option, the Solaris Management Console assumes the `file` default domain on whatever server you choose to manage, meaning that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools.

-h | - -help

Prints a usage statement about the `smc` command and its subcommands to the terminal window. To print a usage statement for one of the subcommands, enter `-h` after the subcommand.

-H | - -hostname *host_name:port*

Specifies the *host_name* and *port* to which you want to connect. If you do not specify a *port*, the system connects to the default port, 898. If you do not specify *host_name:port*, the Solaris Management Console connects to the local host on port

898. You may still have to choose a toolbox to load into the console. To override this behavior, use the `-B` option (see above), or set your console preferences to load a “home toolbox” by default.

`-Jjava_option`

Specifies an option that can be passed directly to the Java runtime (see `java(1)`). Do not enter a space between `-J` and the argument. This option is most useful for developers.

`-l | - --rolepassword role_password`

Specifies the password for the *role_name*. If you specify a *role_name* but do not specify a *role_password*, the system prompts you to supply a *role_password*. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

`-p | - --password password`

Specifies the password for the *user_name*. If you do not specify a password, the system prompts you for one. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

`-r | - --rolename role_name`

Specifies a role name for authentication. If you are running the Solaris Management Console in a terminal and you do not specify this option, no role is assumed. The GUI console may prompt you for a role name, although you may not need to assume a role.

`-s | - --silent`

Disables informational messages printed to the terminal.

`-t`

Runs the Solaris Management Console in terminal mode. If this option is not given, the Solaris Management Console will automatically run in terminal mode if it cannot find a graphical display.

`- --trust`

Trusts all downloaded code implicitly. Use this option when running the terminal console non-interactively and you cannot let the console wait for user input.

`-T | - --tool tool_name`

Runs the tool with the Java class name that corresponds to *tool_name*. If you do not specify this option and the Solaris Management Console is running in terminal mode, the system prompts you. If the Solaris Management Console is running in graphical mode, the system either loads a toolbox or prompts you for one (see options `-H` and `-B`).

`-u | - --username user_name`

Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.

`-v | - --version`

Prints the version of the Solaris Management Console to the terminal. In the graphical console, this information can be found in the About box, available from the Help menu.

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`-y` | `-` `-yes`

Answers yes to all yes/no questions. Use this option when running the terminal console non-interactively and you cannot let the console wait for user input.

EXAMPLES

EXAMPLE 1 Printing a Usage Statement

The following prints a usage statement about the `smc` command to the terminal window:

```
smc --help
```

EXAMPLE 2 Passing an Option to Java

The following passes an option through to the Java VM, which sets the `com.example.boolean` system property to `true`. This system property is only an example; the Solaris Management Console does not use it.

```
smc -J-Dcom.example.boolean=true
```

ENVIRONMENT VARIABLES

See `environ(5)` for a description of the following environment variable that affects the execution of the `smc` command:

JAVA_HOME If you do not specify this environment variable, your `PATH` is searched for a suitable java. Otherwise, the `/usr/j2se` location is used.

EXIT STATUS

The following exit values are returned. Other error codes may be returned if you specify a tool (using `-T tool_name`) that has its own error codes. See the documentation for the appropriate tool.

0 Successful completion.
1 An error occurred.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmcc

SEE ALSO

`auths(1)`, `java(1)`, `profiles(1)`, `roles(1)`, `smccconf(1M)`, `attributes(5)`, `environ(5)`, `x(7)`

NAME	smccompile – build class list and compile Solaris Management Console service beans for remote use												
SYNOPSIS	<pre> /usr/sadm/bin/smccompile -c beanname /usr/sadm/bin/smccompile -j tool service [-n altjarname] jarfile /usr/sadm/bin/smccompile -j library [-n altjarname] ALLTOOL ALLSERVICE ALL attachedBeanname jarfile </pre>												
DESCRIPTION	The <code>smccompile</code> command is used by developers of tools, services, and libraries for the Solaris Management Console. For information regarding the Solaris Management Console, see <code>smc(1M)</code>. <code>smccompile</code> compiles service class files given by the bean name for use with the Solaris Management Console. This step builds the extra proxy and stub classes for services to be used with Solaris Management Console tools. Solaris Management Console requires running <code>smccompile -c</code> before creating service jar files, and <code>smccompile -j</code> after creating tool, service, and library jars. <code>smccompile</code>, in conjunction with <code>smcregister(1M)</code>, is intended to replace the <code>smcconf</code> command as the preferred interface for managing the Solaris Management Console repository as well as toolboxes from within scripts, due to significant performance enhancements over <code>smcconf</code>.												
OPTIONS	The following options are supported: <table> <tr> <td>ALL</td><td>Specify that the library being registered to or unregistered from the repository is for use by all tools and services.</td></tr> <tr> <td>ALLSERVICE</td><td>Specify that the library being registered to or unregistered from the repository is for use by all services.</td></tr> <tr> <td>ALLTOOL</td><td>Specify that the library being registered to or unregistered from the repository is for use by all tools.</td></tr> <tr> <td><i>attachedBeanname</i></td><td>Specify the name of a registered jar to which the library jarfile should be attached to (or detached from). This is typically the same as <i>altjarname</i> (if provided) or <i>jarfile</i> used to register the jar to which this library is being attached or detached. An attached library means the library is only available for use by the tool or service to which it is being attached.</td></tr> <tr> <td><i>beanname</i></td><td>The full package path of the bean name to be compiled. An example bean name is: <code>com.mycompany.myproduct.MyService.</code></td></tr> <tr> <td>-c</td><td>Compile and build service class files for the specified bean name. This step builds the extra proxy and stub classes for services to be used with Solaris Management Console tools. You must run <code>smccompile</code> with this option before creating service type jar files.</td></tr> </table>	ALL	Specify that the library being registered to or unregistered from the repository is for use by all tools and services.	ALLSERVICE	Specify that the library being registered to or unregistered from the repository is for use by all services.	ALLTOOL	Specify that the library being registered to or unregistered from the repository is for use by all tools.	<i>attachedBeanname</i>	Specify the name of a registered jar to which the library jarfile should be attached to (or detached from). This is typically the same as <i>altjarname</i> (if provided) or <i>jarfile</i> used to register the jar to which this library is being attached or detached. An attached library means the library is only available for use by the tool or service to which it is being attached.	<i>beanname</i>	The full package path of the bean name to be compiled. An example bean name is: <code>com.mycompany.myproduct.MyService.</code>	-c	Compile and build service class files for the specified bean name. This step builds the extra proxy and stub classes for services to be used with Solaris Management Console tools. You must run <code>smccompile</code> with this option before creating service type jar files.
ALL	Specify that the library being registered to or unregistered from the repository is for use by all tools and services.												
ALLSERVICE	Specify that the library being registered to or unregistered from the repository is for use by all services.												
ALLTOOL	Specify that the library being registered to or unregistered from the repository is for use by all tools.												
<i>attachedBeanname</i>	Specify the name of a registered jar to which the library jarfile should be attached to (or detached from). This is typically the same as <i>altjarname</i> (if provided) or <i>jarfile</i> used to register the jar to which this library is being attached or detached. An attached library means the library is only available for use by the tool or service to which it is being attached.												
<i>beanname</i>	The full package path of the bean name to be compiled. An example bean name is: <code>com.mycompany.myproduct.MyService.</code>												
-c	Compile and build service class files for the specified bean name. This step builds the extra proxy and stub classes for services to be used with Solaris Management Console tools. You must run <code>smccompile</code> with this option before creating service type jar files.												

smccompile(1M)

<code>-j</code>	Build a list of classes in text format, suitable as input to <code>smcregister</code> for registration with the Solaris Management Console repository. The output is written to standard out and should be redirected to a file. You must run <code>smccompile</code> with this option after creating any tool, service, or library jar.
<code>jarfile</code>	Specify the full path to the jar file to be registered. The name must be in the form <code>beanname.jar</code> , where <code>beanname</code> is the package path to the bean. If it is not, an alternate name must be given in that form using the <code>-n</code> option.
<code>-n altjarname</code>	Rename the jarfile in the repository to <code>altjarname</code> . Typically, this is the full bean name. For example, if the jarfile was <code>MyTool.jar</code> , then <code>altjarname</code> might be <code>com.mycompany.myproject.MyTool.jar</code> . It is recommended that an <code>altjarname</code> containing the full package path be used. You must use this same name when registering the jar with <code>smcregister</code> .

EXAMPLES

EXAMPLE 1 Compiling a Service

The following command takes a Solaris Management Console service and builds its proxy and stub classes to make the service usable by Solaris Management Console tools:

```
/usr/sadm/bin/smccompile -c com.mycompany.myproject.MyServiceImpl
```

EXAMPLE 2 Building a Class List for a Service

The following command builds the class list file (`classlist.txt`) for a service suitable for use with the `smcregister(1M)` command:

```
/usr/sadm/bin/smccompile -j service \  
-n com.mycompany.myproject.MyServiceImpl.jar \  
{HOME}/workarea/MyServiceImpl.jar > classlist.txt
```

The following command does the same thing without specifying an alternate name:

```
/usr/sadm/bin/smccompile -j service \  
{HOME}/workarea/com.mycompany.myproject.MyServiceImpl.jar > classlist.txt
```

EXAMPLE 3 Building a Class List for a Tool

The following command builds the class list file (`classlist.txt`) for a tool suitable for use with the `smcregister(1M)` command:

```
/usr/sadm/bin/smccompile -j tool \  
-n com.mycompany.myproject.MyTool.jar \  
{HOME}/workarea/MyTool.jar > classlist.txt
```

The following command does the same thing without specifying an alternate name:

EXAMPLE 3 Building a Class List for a Tool *(Continued)*

```
/usr/sadm/bin/smccompile -j tool \
    ${HOME}/workarea/com.mycompany.myproject.MyTool.jar > classlist.txt
```

EXAMPLE 4 Building a Class List for a Library Attached to All Tools

The following command builds the class list file (`classlist.txt`) for a library suitable for use with the `smcregister(1M)` command, and is attached to all tools:

```
/usr/sadm/bin/smccompile -j library \
    -n com.mycompany.myproject.MyLibrary.jar \
    ALLTOOL ${HOME}/workarea/MyLibrary.jar > classlist.txt
```

The following command does the same thing without specifying an alternate name:

```
/usr/sadm/bin/smccompile -j library \
    ALLTOOL \
    ${HOME}/workarea/com.mycompany.myproject.MyLibrary.jar > classlist.txt
```

EXAMPLE 5 Building a Class List for a Library Attached to a Specific Tool

The following command builds the class list file (`classlist.txt`) for a library suitable for use with the `smcregister(1M)` command, and is attached to a specific tool:

```
/usr/sadm/bin/smccompile -j library \
    -n com.mycompany.myproject.MyLibrary.jar \
    com.mycompany.myproject.MyTool.jar \
    ${HOME}/workarea/MyLibrary.jar > classlist.txt
```

The following command does the same thing without specifying an alternate name:

```
/usr/sadm/bin/smccompile -j library \
    com.mycompany.myproject.MyTool.jar \
    ${HOME}/workarea/com.mycompany.myproject.MyLibrary.jar > classlist.txt
```

**ENVIRONMENT
VARIABLES**

See `environ(5)` for descriptions of the following environment variables that affect the execution of `smccompile`:

JAVA_HOME

If you do not specify this environment variable, your `PATH` is searched for a suitable `java`. Otherwise, the `/usr/j2se` location is used.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	An error occurred.

smccompile(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWMc

SEE ALSO `smc(1M)`, `smcconf(1M)`, `smcregister(1M)`, `attributes(5)`, `environ(5)`

NOTES All standard shell quoting rules apply.

NAME	smcconf – configure the Solaris Management Console
SYNOPSIS	<pre> /usr/sadm/bin/smcconf [-h] [-v] toolbox [action] [target] [parameters] [options] /usr/sadm/bin/smcconf [-h] [-v] repository [action] [target] [parameters] [options] </pre>
DESCRIPTION	The <code>smcconf</code> command configures the Solaris Management Console. See <code>smc(1M)</code>. This command enables you to add to, remove from, and list the contents of the toolboxes and bean repository. Using <code>smcconf</code> to edit toolboxes is not as feature-rich as using the graphical editor in Solaris Management Console. The command line interface is intended for use in packaging scripts that do not require user interaction. To edit all the properties of a toolbox or to modify the hierarchy of folders in a toolbox, you must use the specialized graphical editor, that is, <code>smc edit</code>. See <code>smc(1M)</code>. <code>smcregister</code> is intended to replace the <code>smcconf</code> command as the preferred interface for managing the Solaris Management Console repository as well as toolboxes from within scripts, due to significant performance enhancements over <code>smcconf</code>. See <code>smcregister(1M)</code>, <code>smccompile(1M)</code>, and the Solaris Management Console SDK Guide at <code>/usr/sadm/lib/smc/docs/sdkguide/index.html</code> for details.
OPTIONS	The following options are supported: -h Prints out a usage summary for the command. -v Verbose option. Displays the debugging output at any time.
toolbox configuration	<i>action</i> Legal values are: - add - Adds a <i>target</i> to the toolbox. Specify the path to the toolbox using the <code>-B toolboxpath</code> option and, optionally, provide locale information with the <code>-L locale</code> option. - remove - Removes a <i>target</i> from the toolbox. Specify the path to the toolbox using the <code>-B toolboxpath</code> option and, as an alternative, provide locale information with the <code>-L locale</code> option. - create - Creates a new toolbox with no tools in it. The only <i>target</i> recognized is <code>toolbox</code>. - list - Lists the contents of the toolbox. No <i>target</i> is recognized. If you specify a <i>parameter</i>, it is taken as the path to a toolbox and the contents of that toolbox are listed. If you do not specify a <i>parameter</i>, the contents of the default toolbox are listed.

target

Legal values are:

tool

If the *action* is specified as *add*, this target adds a native Solaris Management Console tool from the toolbox. The required *parameter* is the full Java classname of the tool you are adding. If you specify a folder name with the *-F* option, the tool is placed inside that folder (the folder will not be created if it does not already exist). Otherwise, the tool is appended to the end of the toolbox and not placed inside any folder.

If the *action* is specified as *remove*, this target removes a native Solaris Management Console tool from the toolbox. The required *parameter* is the full Java classname of the tool you want to remove. If you specify a folder name with the *-F* option, any tool with the given name in that folder will be removed. If no folder name is specified, all tools with the given name in the toolbox are removed.

For the tool to appear in the console, the tool must also be registered in the repository. See the *repository configuration* section below for more information. If a tool is referenced in a toolbox but is not registered, it will not appear in the console when the toolbox is loaded.

Removing a tool from a toolbox does not remove the tool from the server repository.

tbxURL

If the *action* is specified as *add* or *remove*, this target adds to or removes from the toolbox a link to another toolbox. The required *parameter* is the URL to the other toolbox.

The properties of addition and removal are the same as for the *tool target*.

toolbox

If the *action* is specified as *create*, this target creates a skeleton toolbox with no tools. The required *parameters* are: the toolbox name, description, and small and large icon paths. These must be followed by the *-B toolboxpath* and *-D scope* options.

legacy

If the *action* is specified as *add* or *remove*, this target adds or removes legacy applications (command-line, X-windows, and web-based) to or from the toolbox. The *-N*, *-T*, *-E*, and *-B* options are required. The *-A* option is optional. Placement in the toolbox with the *-F* option follows the same rules as for the *tool* and *tbxURL* targets. See *NOTES* for more information about legacy applications.

	folder If the <i>action</i> is specified as <code>add</code>, this target adds a folder to the toolbox. The required <i>parameters</i> are: the folder name, description, and small and large icon paths. If the <i>action</i> is specified as <code>remove</code>, this target removes a folder from the toolbox. If the folder to be removed is itself inside a folder, the containing folder must be specified with the <code>-F</code> option.
<i>parameters</i>	Specifies values that might be required, depending on the combination of <i>action</i> and <i>target</i> .
<i>options</i>	Supported options for various <i>action</i> and <i>target</i> combinations for the toolbox configuration are: -A <i>parameters</i> Specifies the parameters to pass to the legacy application. This option is available only for the <code>legacy</code> target. -B <i>toolboxpath</i> Specifies the path of the toolbox that is being modified. If this option is not given, the modifications will be performed on the default toolbox, "This Computer". -D <i>scope</i> Specifies the scope (domain) in which the tool should be run. The legal values for <i>scope</i> are <code>file</code>, <code>nis</code>, <code>nisplus</code>, <code>dns</code>, and <code>ldap</code>. This can also be specified for a folder or a toolbox. In the former case, all tools in that folder and its subfolders are run in that scope; in the latter, all tools in the toolbox are run in that scope. -E <i>appPath</i> Specifies the absolute executable path of the legacy application. This option is available only for the <code>legacy</code> target. -F <i>folder</i> Specifies the full path of the container folder. If this option is not given, the default folder is the 'root' folder of the toolbox. -H [<i>host_name</i>][:<i>port</i>] Specifies the host and port from which a tool should be loaded. If <i>host_name</i> is not given, the default host is used. The default host is <code>localhost</code>, if the toolbox is loaded from the local file system, or the host from which the toolbox is loaded if loaded from a remote Solaris Management Console server. If <code>:port</code> is not given, the default port will be used. If this option is not given at all, both the default host and the default port are used.

smcconf(1M)

repository configuration

-L *locale*

Specifies the locale of the toolbox that is being modified. The default is the C locale.

-N *appName*

Specifies the name of the legacy application being registered. This is the name that appears in the console. This option is available only for the legacy target.

-P *key:value*

Specifies the key/value pairs that define parameters to a tool. Multiple key/value pairs can be specified at a time.

-T *appType*

Specifies the legacy application type. Legal values are CLI, XAPP, or HTML. This option is available only for the legacy target.

The Solaris Management Console repository stores information about the registered tools and services, as well as libraries (for instance, resource jars) and properties attached to tools or services.

action

Legal values are:

add

Adds information to the repository. If the -f option is given to add, the information overwrites any information of the same name already in the repository. If the -f option is not given, an error might be returned if the information is already in the repository.

remove

Removes information from the repository.

list

Lists the contents of the repository:

- All registered tools
- All registered services
- All libraries attached to all tools
- All libraries attached to all services
- All libraries attached to all tools and services

target

Legal values are:

bean

If the *action* is specified as add, this target will add a tool or service bean (which kind is determined by the contents of the bean) to the repository. The required *parameter* is the path to the jar file that contains the bean to be added.

If the *action* is specified as `remove`, this target will remove a tool or service bean from the repository. The required *parameter* is the full Java classname of the desired bean.

library

If the *action* is specified as `add`, this target adds a “library” jar file to a tool or service bean. The two required *parameters* are the full Java classname of the desired bean and the path to the jar file to be attached. The bean name can also be one of the “pseudo-beans,” `ALL`, `ALLTOOL`, or `ALLSERVICE`, in which case the library is attached, respectively, to all beans, all tools, or all services in the repository.

If the *action* is specified as `remove`, this target detaches a “library” jar file from a tool or service bean. The two required *parameters* are the full Java classname of the desired bean and the name of the jar file that is attached. As with the `add` action, the three “pseudo-beans” `ALL`, `ALLTOOL`, or `ALLSERVICE` can be used.

property

If the *action* is specified as `add`, this target defines a property on a tool or service. One or more key/value pairs must be specified in the form,

`-P key=value` Following this property list is a “pseudo-bean name,” *pseudoBeanName*, as defined for the `library` target, on which the properties are defined. Optionally, a library name can follow the “pseudo-bean” name, in which case the properties are defined on the library that is attached to the named bean.

If the *action* is specified as `remove`, this target undefines a property on a tool or service. The key/value pairs, “pseudo-bean” name, and optional library are specified for the `add` action.

EXAMPLES

EXAMPLE 1 Adding Legacy Applications to a Toolbox

The following command adds to the default toolbox the command line interface (CLI) application, `/usr/bin/ls`, with arguments `-al -R`, giving it the name, `Directory Listing`:

```
/usr/sadm/bin/smcconf toolbox add legacy -N "Directory Listing" \
-T CLI -E /usr/bin/ls -A "-al -R"
```

EXAMPLE 2 Adding a Folder to a Toolbox

The following command adds to the standard Management Tools toolbox a folder with the name, `New Folder`, the description, `This is a new folder`, and the small and large icons, `folder_s.gif` and `folder_l.gif`:

EXAMPLE 2 Adding a Folder to a Toolbox (Continued)

```
/usr/sadm/bin/smcconf toolbox add folder "New Folder" \
    "This is a new folder" folder_s.gif folder_l.gif \
    -B /var/sadm/smc/toolboxes/smc/smc.tbx
```

EXAMPLE 3 Adding a Native Solaris Management Console Tool to a Toolbox

The following command adds a native Solaris Management Console tool to the default toolbox. The Java classname of the tool is `HelloWorld.client>HelloTool` (the name, description, and icons visible in the console are provided by the tool itself). When loaded, it is run in the NIS domain, `syrix`, which is hosted by the machine, `temple`, and is retrieved from port 2112 on the machine from which the toolbox was loaded:

```
/usr/sadm/bin/smcconf toolbox add tool HelloWorld.client>HelloTool \
    -D nis:/temple/syrix -H :2112
```

EXAMPLE 4 Adding an Solaris Management Console Tool to the Repository

The following command adds the Java bean found in `HelloWorld.jar` to the repository. The jar file contains information that the bean is a tool:

```
/usr/sadm/bin/smcconf repository add bean HelloWorld.jar
```

EXAMPLE 5 Removing an Solaris Management Console Service from the repository

The following command removes a Java bean from the repository. Although the name of the bean implies that it is a service, that is merely a convention; the repository knows whether a particular registered bean is a tool or a service:

```
/usr/sadm/bin/smcconf repository remove bean \
    HelloWorld.server>HelloService
```

EXAMPLE 6 Attaching a Library to a Tool

The following command adds the library jar file, `HelloWorld_fr.jar` (probably a French localized version of the `HelloTool`'s resources) to the bean, `HelloWorld.client>HelloTool`:

```
/usr/sadm/bin/smcconf repository add library \
    HelloWorld.client>HelloTool HelloWorld_fr.jar
```

EXAMPLE 7 Attaching a Library to all Tools

The following command adds the library jar file, `widgets.jar`, to all tools in the repository. The library probably contains a widget set that might be useful to any registered tools:

```
/usr/sadm/bin/smcconf repository add library ALLTOOL widgets.jar
```

**ENVIRONMENT
VARIABLES**

See `environ(5)` for descriptions of the following environment variables that affect the execution of the `smcconf` command:

JAVA_HOME	If you do not specify this environment variable, your PATH is searched for a suitable java. Otherwise, the <code>/usr/j2se</code> location is used.
DISPLAY	If you do not set this environment variable, set it to null, or set it to an X(7) display to which you are not authorized to connect, the Solaris Management Console starts in terminal mode instead of graphical mode.

EXIT STATUS The following exit values are returned:

0	Successful completion.
1	An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmc

SEE ALSO `jar(1)`, `java(1)`, `javac(1)`, `smc(1M)`, `smccompile(1M)`, `smcregister(1M)`, `attributes(5)`, `environ(5)`

NOTES All standard shell quoting rules apply.

Legacy applications (X-windows, command-line, and web-based applications) are handled differently from “native” Solaris Management Console tools. Legacy tools are handled by an instantiation of a native Solaris Management Console tool, `LegacyAppLauncher`, which, through the toolbox, is given the necessary information to run the legacy application: path, options, and so forth. Thus, you do not register a legacy application into the repository as you would a native Solaris Management Console tool. Instead, legacy applications appear only in toolboxes.

smcregister(1M)

NAME	smcregister – configure the Solaris Management Console
SYNOPSIS	<pre> /usr/sadm/bin/smcregister [-h] tool [-n altjarname] jarfile classlistfile xmlfile /usr/sadm/bin/smcregister [-h] service [-n altjarname] jarfile classlistfile xmlfile [native_lib_list] /usr/sadm/bin/smcregister [-h] library [-n altjarname] jarfile classlistfile none ALLTOOL ALLSERVICE ALL Attachedbeaname /usr/sadm/bin/smcregister [-h] tool service -u jarfile /usr/sadm/bin/smcregister [-h] library -u jarfile ALL ALLTOOL ALLSERVICE Attachedbeaname /usr/sadm/bin/smcregister [-h] toolbox [-D] [action] [-f] [target] [parameters] [options] /usr/sadm/bin/smcregister [-h] property key value ALL ALLTOOL ALLSERVICE Attachedbeaname /usr/sadm/bin/smcregister [-h] property -u key ALL ALLTOOL ALLSERVICE Attachedbeaname /usr/sadm/bin/smcregister [-h] repository list /usr/sadm/bin/smcregister [-h] scripts regscript unregscript </pre>
DESCRIPTION	The <code>smcregister</code> command configures the Solaris Management Console. For information regarding the Solaris Management Console, see <code>smc(1M)</code>. This command enables you to add to, remove from, and list the contents of toolboxes and the Solaris Management Console repository. <code>smcregister</code> also allows you to register scripts to perform registrations and unregistrations. Typically, a package containing one or more tools or services posts tool and service registrations immediately after installation. On Solaris, this is by way of invocations of <code>smcregister</code> from within a package post-install script. Similarly, unregistrations would be posted from within a package pre-remove script. These are per-machine registrations - that is, registration requests must be posted on each machine on which the Solaris Management Console server will be running. However, due to the way that diskless clients are installed, registration requests cannot be made at install time. Therefore, packages should include and install registration and unregistration scripts, and then register these scripts during installation by way of the <code>scripts</code> subcommand. These scripts should contain tool, toolbox, service, library or property configurations in any of its forms as listed in this man page. While these scripts function very much like package post-install and pre-remove scripts, do not assume the normal package environment is available. However, <code>PATH</code> can assumed to be <code>/usr/sbin:/usr/bin</code>

Using `smcregister` to edit toolboxes is not as feature-rich as using the Solaris Management Console's graphical editor. The command line interface is intended for use in packaging scripts that do not require user interaction. To edit all the properties of a toolbox or to modify the hierarchy of folders in a toolbox, you must use the specialized graphical editor, that is, `smc edit`. See `smc(1M)`.

`smcregister` is intended to replace the `smcconf` command as the preferred interface for managing the Solaris Management Console repository as well as toolboxes from within scripts, due to significant performance enhancements over `smcconf`.

OPTIONS The following options are supported:

`-h`

Prints out a usage summary for the command.

**Scripts
Configuration**

`regscript`

The full path of a script containing registration commands. The script is executed upon the next restart of the Solaris Management Console server after the package containing the script is installed.

`unregscript`

The full path of a script containing unregistration commands. The script is executed upon the next restart of the Solaris Management Console server after the package containing the script is removed.

**Toolbox
Configuration**

`action`

Legal values are:

`add`

Adds a target to the toolbox. Specify the path to the toolbox using the `-B toolboxpath` option and, optionally, provide locale information with the `-L locale` option.

`create`

Creates a new toolbox with no tools in it. The only target recognized is `toolbox`.

`list`

Lists the contents of the toolbox. No target is recognized. If you specify a parameter, it is taken as the path to a toolbox and the contents of that toolbox are listed. If you do not specify a parameter, the contents of the default toolbox are listed.

`remove`

Removes a target from the toolbox. Specify the path to the toolbox using the `-B toolboxpath` option and, optionally, provide locale information with the `-L locale` option.

smcregister(1M)

-D

Defers execution of the `toolbox` command until the Solaris Management Console server is restarted. This is a convenient option for use in packaging scripts during install and un-install. Additionally, the command runs much faster than if run interactively (without `-D`).

target

Legal values are:

folder

If the action is specified as `add`, this target adds a folder to the toolbox. There are four required parameters: the folder name, description, and small and large icon paths. If the action is specified as `remove`, this target removes a folder from the toolbox. If the folder to be removed is itself inside a folder, the containing folder must be specified with the `-F` option.

legacy

If the action is specified as `add` or `remove`, this target adds or removes legacy applications (command line, X-windows, and web-based) to or from the toolbox. The `-N`, `-T`, `-E`, and `-B` options are required, and the `-A` option is optional. Placement in the toolbox with the `-F` option follows the same rules as for the `tool` and `tbxURL` targets. See NOTES for more information about legacy applications.

tbxURL

If the action is specified as `add` or `remove`, this target adds to or removes from the toolbox a link to another toolbox. The required parameter is the URL to the other toolbox. The properties of addition and removal are the same as for the `tool` target.

tool

If the action is specified as `add`, this target adds a native Solaris Management Console tool from the toolbox. The required parameter is the full Java classname of the tool you are adding. If you specify a folder name with the `-F` option, the tool is placed inside that folder (the folder will not be created if it does not already exist). Otherwise, the tool is appended to the end of the toolbox and not placed inside any folder. If the action is specified as `remove`, this target removes a native Solaris Management Console tool from the toolbox. The required parameter is the full Java classname of the tool you wish to remove. If you specify a folder name with the `-F` option, any tool with the given name in that folder will be removed. If no folder name is specified, all tools with the given name in the toolbox will be removed. For the tool to show up in the console, the tool must also be registered in the repository. See the repository configuration section below for more information. If a tool is referenced in a toolbox but is not registered, it will not appear in the console when the toolbox is loaded. Removing a tool from a toolbox does not remove the tool from the server repository.

toolbox

If the action is specified as `create`, this target creates a skeleton toolbox with no tools. There are four required parameters: the toolbox name, description, and

small and large icon paths. These must be followed by the `-B toolboxpath` and `-D scope` options.

parameters

Specifies values that may be required depending on the combination of action and target.

options

Supported options for various action and target combinations for the toolbox configuration are:

`-A`

Specifies the parameters to pass to the legacy application. This option is available only for the legacy target.

`-B`

Specifies the path of the toolbox that is being modified. If this option is not given, the modifications will be performed on the default toolbox, `This Computer`.

`-D`

Specifies the scope (domain) in which the tool should be run. The legal values for scope are `file`, `nis`, `nisplus`, `dns`, and `ldap`. This may also be specified for a folder or a toolbox. In the former case, all tools in that folder and its subfolders will be run in that scope; in the latter, all tools in the toolbox will be run in that scope.

`-E`

Specifies the absolute executable path of the legacy application. This option is available only for the legacy target.

`-f`

If the `-f` option is given to add, the information will overwrite any information of the same name already in the toolbox. If the `-f` option is not given, an error may be returned if the information is already in the toolbox.

`-F folder`

Specifies the full path of the container folder. If this option is not given, the default folder is the `root` folder of the toolbox.

`-H [host_name][:port]`

Specifies the host and port from which a tool should be loaded. If `host_name` is not given, the default host (`localhost`, if the toolbox is loaded from the local filesystem, or the host from which the toolbox is loaded if loaded from a remote Solaris Management Console server) will be used. If `:port` is not given, the default port will be used. If this option is not given at all, both the default host and the default port will be used.

`-L locale`

Specifies the locale of the toolbox which is being modified. The default is the `C` locale.

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Tool, Service, and Library Configuration

-N *appName*

Specifies the name of the legacy application being registered. This is the name that will appear in the console. This option is available only for the `legacy` target.

-P *key:value*

Specifies the key/value pairs that define parameters to a tool. Multiple key/value pairs can be specified at a time.

-T *appType*

Specifies the legacy application type. Legal values are `CLI`, `XAPP`, or `HTML`. This option is available only for the `legacy` target.

See NOTES for more information about registration and unregistration of tools, services, and libraries.

ALL

Specify that the library being registered to or unregistered from the repository is for use by all tools and services.

ALLSERVICE

Specify that the library being registered to or unregistered from the repository is for use by all services.

ALLTOOL

Specify that the library being registered to or unregistered from the repository is for use by all tools.

attachedBeannname

The name of a registered jar to which the library jarfile should be attached to (or detached from). This is typically the same as *altjarnname* (if provided) or *jarfile* used to register the jar to which this library is being attached or detached. An attached library means the library is only available for use by the tool or service to which it is being attached.

classlistfile

The classlist text file generated from the `smccompile(1M)` command.

Library registration does not require that a classlist file be specified. Instead, you can substitute the keyword `none` in place of the classlist path argument to `smcregister`, in which case one will be generated automatically. Generating the classlist automatically during server startup will cause the next server restart to take longer, so it is strongly suggested that developers always provide a classlist file with their libraries. Auto-generation is more appropriately used to register 3rd-party library jars.

jarfile

The full path to the jar file to be registered/unregistered. The name must be in the form *beannname.jar*, where *beannname* is the package path to the bean. If it is not, an alternate name must be given in that form using the `-n` option.

Repository Configuration

-n altjarname

Rename the jarfile in the repository to *altjarname*. This would typically be the full bean name. For example, if the jarfile was `MyTool.jar`, then *altjarname* might be `com.mycompany.myproduct.MyTool.jar`. It is recommended that an *altjarname* containing the full package path be used.

native_lib_list

List of up to 4 native libraries that can be associated with a service bean.

-u

The operation will be to un-register the jar with the Solaris Management Console repository. The jarfile argument must be identical to the *altjarname* used to register the jar (if provided), or jarfile.

xmlfile

The xml descriptor file that describes this jarfile. Every tool or services must have one. See the Solaris Management Console SDK Guide located at `/usr/sadm/lib/smc/docs/sdkguide/index.html`.

The Solaris Management Console repository stores information about the registered tools and services, as well as libraries (for instance, resource jars) and properties attached to tools or services.

list

Lists the contents of the repository:

- All registered tools
- All registered services
- All libraries attached to all tools
- All libraries attached to all services
- All libraries attached to all tools and services

Property Configuration

See NOTES for more information about registration and unregistration of properties. If registering a property, this defines a property on a tool or service. Only one key value pair at a time can be registered.

beanname

The name of a registered jar on which the properties will be defined. Optionally, a library name may follow the bean name, in which case the properties are defined on the library that is attached to the named bean.

If unregistering a property, this undefines a property from a tool or service. Only one key value pair at a time can be registered. The key, *beanname*, and optional library are specified as for registering a property.

EXAMPLES**EXAMPLE 1** Adding Legacy Applications to a Toolbox

The following command adds to the default toolbox the Command Line Interface (CLI) application, `/usr/bin/ls` with arguments `-al -R`, giving it the name, Directory Listing:

```
/usr/sadm/bin/smcregister toolbox add legacy -N "Directory Listing" \
-T CLI -E /usr/bin/ls -A "-al -R"
```

EXAMPLE 1 Adding Legacy Applications to a Toolbox *(Continued)*

Use this variation to defer execution of this command until the Solaris Management Console server is restarted:

```
/usr/sadm/bin/smcregister toolbox -D add legacy -N "Directory Listing" \
-T CLI -E /usr/bin/ls -A "-al -R"
```

EXAMPLE 2 Adding a Folder to a Toolbox

The following command adds to the standard Management Tools toolbox a folder with the name, New Folder, the description, This is a new folder, and the small and large icons, folder_s.gif and folder_l.gif:

```
/usr/sadm/bin/smcregister toolbox add folder "New Folder" \
"This is a new folder" folder_s.gif folder_l.gif \
-B /var/sadm/smc/toolboxes/smc/smc.tbx
```

EXAMPLE 3 Adding a Native Solaris Management Console Tool to a Toolbox

The following command adds a native Solaris Management Console tool to the default toolbox. The Java classname of the tool is com.mycompany.myproject.client.MyTool (the name, description, and icons visible in the console are provided by the tool itself). When loaded, it will be run in the NIS domain, syrinx, which is hosted by the machine, temple, and will be retrieved from port 2112 on the machine from which the toolbox was loaded.

```
/usr/sadm/bin/smcregister toolbox add tool \
com.mycompany.myproject.client.MyTool \
-D nis:/temple/syrinx -H :2112
```

EXAMPLE 4 Adding an Solaris Management Console Tool to the Repository

The following command adds the Java bean found in MyTool.jar to the repository. The xml file contains information about the tool. The classlist file would have been generated by smccompile -j:

```
/usr/sadm/bin/smcregister tool -n com.mycompany.myproject.client.MyTool.jar \
${HOME}/workarea/MyTool.jar \
${HOME}/workarea/MyTool_classlist.txt \
${HOME}/workarea/MyTool.xml
```

Use this variation to add an Solaris Management Console tool to the repository without specifying an alternate name:

```
/usr/sadm/bin/smcregister tool \
${HOME}/workarea/com.mycompany.myproject.client.MyTool.jar \
${HOME}/workarea/MyTool_classlist.txt \
${HOME}/workarea/MyTool.xml
```

EXAMPLE 5 Adding an Solaris Management Console Service to the Repository

The following command adds the Java bean found in MyServiceImpl.jar to the repository. The xml file contains information about the service. The classlist file would have been generated by smccompile -j. The extra proxy and stub classes included in the jar would have been generated by smccompile -c:

EXAMPLE 5 Adding an Solaris Management Console Service to the Repository
(Continued)

```
/usr/sadm/bin/smcregister service \
-n com.mycompany.myproject.server.MyServiceImpl.jar \
${HOME}/workarea/MyServiceImpl.jar \
${HOME}/workarea/MyServiceImpl_classlist.txt \
${HOME}/workarea/MyServiceImpl.xml
```

Use this variation to add a Solaris Management Console service to the repository without specifying an alternate name:

```
/usr/sadm/bin/smcregister service \
${HOME}/workarea/com.mycompany.myproject.server.MyServiceImpl.jar \
${HOME}/workarea/MyServiceImpl_classlist.txt \
${HOME}/workarea/MyServiceImpl.xml
```

EXAMPLE 6 Removing an Solaris Management Console Tool From the Repository

The following command removes a Java tool bean from the repository:

```
/usr/sadm/bin/smcregister tool \
-u com.mycompany.myproject.client.MyTool.jar
```

EXAMPLE 7 Removing an Solaris Management Console Service From the Repository

The following command removes a Java service bean from the repository:

```
/usr/sadm/bin/smcregister service \
-u com.mycompany.myproject.server.MyServiceImpl.jar
```

EXAMPLE 8 Attaching a Library to a Specific Tool

The following command adds the library jar file, MyTool_fr.jar (probably a French localized version of the MyTool's resources) to the bean, com.mycompany.myproject.client.MyTool:

```
/usr/sadm/bin/smcregister library \
-n MyTool_fr.jar \
${HOME}/workarea/MyTool_fr.jar \
${HOME}/workarea/MyTool_fr_classlist.txt \
com.mycompany.myproject.client.MyTool
```

EXAMPLE 9 Attaching a Library to All Tools

The following command adds the library jar file, widgets.jar, to all tools in the repository. The library probably contains a widget set which might be useful to any registered tools. The classlist file would have been generated by smccompile -j.

```
/usr/sadm/bin/smcregister library \
${HOME}/workarea/lib/widgets.jar\
${HOME}/workarea/lib/widgets_classlist.txt \
ALLTOOL
```

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EXAMPLE 9 Attaching a Library to All Tools (Continued)

Alternatively, to add a 3rd-party library jar to all tools, replace the classlist file with none:

```
/usr/sadm/bin/smcregister library \  
    /opt/lib/XYZwidgets.jar none ALLTOOL
```

EXAMPLE 10 Detaching a Library from All Tools

The following command removes the Java library bean from the repository:

```
/usr/sadm/bin/smcregister library -u MyTool_fr.jar ALLTOOL
```

EXAMPLE 11 Detaching a Library from a Specific Tool

The following command detaches the library jar file, MyTool_fr.jar (probably a French localized version of the MyTool's resources) from the bean com.mycompany.myproject.client.MyTool, and removes it from the repository:

```
/usr/sadm/bin/smcregister library -u MyTool_fr.jar \  
    com.mycompany.myproject.client.MyTool
```

EXAMPLE 12 Registering Scripts

The following command registers the following scripts containing registration and unregistration commands. MyProduct_reg.sh will be executed upon the next server restart after the file is installed by the owning package. MyProduct_unreg.sh will be executed upon the next server restart after the file is removed by the owning package:

```
/usr/sadm/bin/smcregister scripts \  
    /usr/sadm/lib/myProduct/MyProduct_reg.sh \  
    /usr/sadm/lib/myProduct/MyProduct_unreg.sh
```

ENVIRONMENT VARIABLES

See environ(5) for descriptions of the following environment variables that affect the execution of smcregister:

JAVA_HOME

If you do not specify this environment variable, your PATH is searched for a suitable java. Otherwise, the /usr/j2se location is used.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	An error occurred.

smcregister(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmc

SEE ALSO smc(1M), smcconf(1M), smccompile(1M), attributes(5), environ(5)

NOTES All standard shell quoting rules apply.

Legacy applications (X-windows, command-line, and web-based applications) are handled differently from native Solaris Management Console tools. Legacy tools are handled by an instantiation of a native Solaris Management Console tool, LegacyAppLauncher, which, through the toolbox, is given the necessary information to run the legacy application: path, options, and so forth. Thus, you do not register a legacy application into the repository as you would a native Solaris Management Console tool. Instead, legacy applications appear only in toolboxes.

Registration and unregistration of tools, services, libraries, and properties do not take effect until the Solaris Management Console server is restarted. Run `/etc/init.d/init.wbem stop` followed by `/etc/init.d/init.wbem start`

smcron(1M)

NAME	smcron – manage jobs in the crontab database								
SYNOPSIS	<code>/usr/sadm/bin/smcron subcommand [auth_args] - - [subcommand_args]</code>								
DESCRIPTION	The smcron command manages jobs in the crontab(1) database.								
<i>subcommands</i>	smcron <i>subcommands</i> are: <table> <tr> <td>add</td><td>Adds a job to the crontab(1) database. To add a job, the administrator must have the <code>solaris.jobs.user</code> authorization. To add a job to another user's crontab file, the administrator must have the <code>solaris.jobs.admin</code> authorization.</td></tr> <tr> <td>delete</td><td>Deletes a job from the crontab(1) database. To delete a job, the administrator must have the <code>solaris.jobs.user</code> authorization. To delete a job from another user's crontab file, the administrator must have the <code>solaris.jobs.admin</code> authorization.</td></tr> <tr> <td>list</td><td>Lists one or more jobs in the crontab(1) database. To list all jobs, the administrator must have the <code>solaris.jobs.user</code> authorization. To list a job in another user's crontab file, the administrator must have the <code>solaris.jobs.admin</code> authorization. No authorization is needed to list a user's own jobs.</td></tr> <tr> <td>modify</td><td>Modifies a job in the crontab(1) database. To modify a job, the administrator must have the <code>solaris.jobs.user</code> authorization. To modify a job in another user's crontab file, the administrator must have the <code>solaris.jobs.admin</code> authorization.</td></tr> </table>	add	Adds a job to the crontab(1) database. To add a job, the administrator must have the <code>solaris.jobs.user</code> authorization. To add a job to another user's crontab file, the administrator must have the <code>solaris.jobs.admin</code> authorization.	delete	Deletes a job from the crontab(1) database. To delete a job, the administrator must have the <code>solaris.jobs.user</code> authorization. To delete a job from another user's crontab file, the administrator must have the <code>solaris.jobs.admin</code> authorization.	list	Lists one or more jobs in the crontab(1) database. To list all jobs, the administrator must have the <code>solaris.jobs.user</code> authorization. To list a job in another user's crontab file, the administrator must have the <code>solaris.jobs.admin</code> authorization. No authorization is needed to list a user's own jobs.	modify	Modifies a job in the crontab(1) database. To modify a job, the administrator must have the <code>solaris.jobs.user</code> authorization. To modify a job in another user's crontab file, the administrator must have the <code>solaris.jobs.admin</code> authorization.
add	Adds a job to the crontab(1) database. To add a job, the administrator must have the <code>solaris.jobs.user</code> authorization. To add a job to another user's crontab file, the administrator must have the <code>solaris.jobs.admin</code> authorization.								
delete	Deletes a job from the crontab(1) database. To delete a job, the administrator must have the <code>solaris.jobs.user</code> authorization. To delete a job from another user's crontab file, the administrator must have the <code>solaris.jobs.admin</code> authorization.								
list	Lists one or more jobs in the crontab(1) database. To list all jobs, the administrator must have the <code>solaris.jobs.user</code> authorization. To list a job in another user's crontab file, the administrator must have the <code>solaris.jobs.admin</code> authorization. No authorization is needed to list a user's own jobs.								
modify	Modifies a job in the crontab(1) database. To modify a job, the administrator must have the <code>solaris.jobs.user</code> authorization. To modify a job in another user's crontab file, the administrator must have the <code>solaris.jobs.admin</code> authorization.								
OPTIONS	The smcron authentication arguments, <i>auth_args</i>, are derived from the smc(1M) arg set and are the same regardless of which subcommand you use. The smcron command requires the Solaris Management Console to be initialized for the command to succeed (see smc(1M)). After rebooting the Solaris Management Console server, the first Solaris Management Console connection might time out, so you might need to retry the command. The subcommand-specific options, <i>subcommand_args</i>, must come after the <i>auth_args</i> and must be separated from them by the - - option.								
<i>auth_args</i>	The valid <i>auth_args</i> are -D, -H, -l, -p, -r, and -u; they are all optional. If no <i>auth_args</i> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. These letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either -D or - --domain with the <i>domain</i> argument. -D - --domain <i>domain</i> Specifies the default domain that you want to manage. smcron accepts only <i>file</i> for this option. <i>file</i> is also the default value.								

The `file` default domain means that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools.

-H | - `-hostname host_name:port`

Specifies the *host_name* and *port* to which you want to connect. If you do not specify a *port*, the system connects to the default port, 898. If you do not specify *host_name:port*, the Solaris Management Console connects to the local host on port 898. You may still have to choose a toolbox to load into the console. To override this behavior, use the `smcron(1M) -B` option, or set your console preferences to load a "home toolbox" by default.

-l | - `-rolepassword role_password`

Specifies the password for the *role_name*. If you specify a *role_name* but do not specify a *role_password*, the system prompts you to supply a *role_password*. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-p | - `-password password`

Specifies the password for the *user_name*. If you do not specify a password, the system prompts you for one. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-r | - `-rolename role_name`

Specifies a role name for authentication. If you do not specify this option, no role is assumed.

-u | - `-username user_name`

Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.

- -

This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the `- -` option.

subcommand_args

For the time-related subcommands described below, `-m`, `-M`, `-t`, and `-w`, you can enter multiple arguments, separated only by commas. `smcron` will construct `crontab` entries appropriate for your arguments. See **EXAMPLES**.

Note: Descriptions and other `arg` options that contain white spaces must be enclosed in double quotes.

■ For subcommand `add`:

-c `command`

Specifies the command that you want to run.

-h

(Optional) Displays the command's usage statement.

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-m *day_of_month*

(Optional) Specifies the day of the month you want to run the job. Valid values are 1–31. If you specify both **-t** and **-m** options, the job executes one day per month at the time specified by **-t**.

-M *month*

(Optional) Specifies the month that you want to run the job. Valid values are 1–12. If you specify both **-t** and **-M** options, the job executes during the specified month at the time specified by **-t**.

-n *name*

Specifies the unique name of the job.

-o *owner*

(Optional) Specifies the user name that is the owner of the job. If you do not specify this option, the user name specified by the **-U** option is assumed.

-t *time_of_day*

Specifies the time (in *hh:mm*) that you want to execute the command. If no other time-related options are specified (**-m**, **-M**, or **-w**), the job executes every day at the time specified by **-t**. If you specify both **-t** and **-w** options, the job executes one day per week at the time specified by **-t**. If you specify both **-t** and **-m** options, the job executes one day per month at the time specified by **-t**. If you specify both **-t** and **-M** options, the job executes each day during the specified month at the time specified by **-t**.

-w *day_of_week*

(Optional) Specifies the day of the week you want to execute the command. Valid values are as follows:

- 0=Sunday
- 1=Monday
- 2=Tuesday
- 3=Wednesday
- 4=Thursday
- 5=Friday
- 6=Saturday

If you specify both **-t** and **-w** options, the job executes one day per week at the time specified by **-t**.

■ For subcommand **delete**:

-h

(Optional) Displays the command's usage statement.

-n *name*

Specifies the unique name of the job.

-o *owner*

(Optional) Specifies the user name that is the owner of the job. If you do not specify this option, the user name specified by the **-U** option is assumed.

■ For subcommand **list**:

- f *n|s|v*
(Optional) Specifies the format of the output. See EXAMPLES for examples of each output type.
 - *n* — Displays the data in native format, as it appears in the `crontab(1)` database.
 - *s* — Default format. Displays the data in summary format.
 - *v* — Displays the data in verbose format.
- h
(Optional) Displays the command's usage statement.
- o *owner*
(Optional) Lists all jobs for the specified owner (user name). If you do not specify this option, all jobs in the `crontab(1)` database are listed.
- For subcommand `modify`:
 - c *command*
(Optional) Specifies the command that you want to run.
 - h
(Optional) Displays the command's usage statement.
 - m *day_of_month*
(Optional) Specifies the day of the month you want to run the job. Valid values are 1–31. If you specify both `-t` and `-m` options, the job executes one day per month at the time specified by `-t`.
 - M *month*
(Optional) Specifies the month that you want to run the job. Valid values are 1–12. If you specify both `-t` and `-M` options, the job executes during the specified month at the time specified by `-t`.
 - n *name*
Specifies the current unique name of the job.
 - N *new_name*
(Optional) Specifies the new unique name of the job.
 - o *owner*
(Optional) Specifies the user name that is the owner of the job. If you do not specify this option, the user name specified by the `-U` option is assumed.
 - O *new_owner*
(Optional) Specifies the new owner of the job.
 - t *time_of_day*
(Optional) Specifies the time (in *hh:mm*) that you want to execute the command. If no other time-related options are specified (`-m`, `-M`, or `-w`), then the job executes every day at the time specified by `-t`. If you specify both `-t` and `-w` options, the job executes one day per week at the time specified by `-t`. If you specify both `-t` and `-m` options, the job executes one day per month at the time specified by `-t`. If you specify both `-t` and `-M`, then the job executes each day during the specified month at the time specified by `-t`.

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-w day_of_week

(Optional) Specifies the day of the week you want to execute the command.
Valid values are as follows:

- 0=Sunday
- 1=Monday
- 2=Tuesday
- 3=Wednesday
- 4=Thursday
- 5=Friday
- 6=Saturday

If you specify both *-t* and *-w* options, the job executes one day per week at the time specified by *-t*.

EXAMPLES

EXAMPLE 1 Adding a Job

The following adds a new job, owned by *root*, that removes the old log files from */tmp* daily at 1:30 AM.

```
./smcron add -H myhost -u root -p mypassword -- -n "Remove old logs" \  
-t 1:30 -c "rm /tmp/*.log" -o root
```

EXAMPLE 2 Deleting a Job

The following deletes the job *Remove old logs* owned by *root*:

```
./smcron delete -H myhost -u root -p mypassword -- \  
-n "Remove old logs" -o root
```

EXAMPLE 3 Listing Jobs in Native Format

The following lists all jobs in native, or *crontab(1)*, format:

```
./smcron list -H myhost -u root -p mypassword -- -f n  
MINUTE HOUR DATE MONTH DAY COMMAND  
  
10 3 * * * /usr/sbin/logadm  
15 3 * * 0 /usr/lib/fs/nfs/nfsfind  
1 2 * * * [ -x /usr/sbin/rtc ] && /usr/sbin/rtc -c > /dev/null 2>&1  
30 3 * * * [ -x /usr/lib/gss/gsscred_clean ] && /usr/lib/gss/gsscred_clean
```

EXAMPLE 4 Listing Jobs in Standard Format

The following lists all jobs owned by *lp* in standard format:

```
./smcron list -H myhost -u root -p mypassword -- -f s -o lp  
NAME::OWNER::SCHEDULE::COMMAND  
  
NoName_1765663371::lp::Weekly on Sundays at 3:13 AM::cd /var/lp/logs;  
if [ -f requests ]; then if [ -f requests.1 ]; then /bin/mv requests.1  
requests.2; fi; /usr/bin/cp requests requests.1; > requests; fi  
NoName_512822673::lp::Weekly on Sundays at 4:15 AM::cd /var/lp/logs;
```

EXAMPLE 4 Listing Jobs in Standard Format *(Continued)*

```
if [ -f lpsched ]; then if [ -f lpsched.1 ]; then /bin/mv lpsched.1
lpsched.2; fi; /usr/bin/cp lpsched lpsched.1; >lpsched; fi
```

EXAMPLE 5 Listing jobs in verbose format

The following lists all jobs in verbose format:

```
./smcron list -H myhost -u root -p mypassword -- -f v
NAME::OWNER::SCHEDULE::NEXT_RUN::STATUS::COMMAND

NoName_1075488942::root::Advanced:::Finished on Feb 10 3:10 with code 1
::/etc/cron.d/logchecker
databackup::root::Weekly on Sundays at 3:10 AM::3/19/00 3:10 AM
::Finished on Sep 19 3:10::/usr/lib/newsyslog
runlog::root::Daily at 2:01 AM::3/14/00 2:01 AM::Finished on Feb 11
2:01 AM::/usr/sbin/rtc
```

EXAMPLE 6 Changing a Job

The following modifies the job Remove old logs owned by root to execute daily at 2:00 AM:

```
./smcron modify -H myhost -u root -p mypassword -- -n "Remove old logs" \
-o root -t 2:00
```

EXAMPLE 7 Specifying Multiple Time Arguments

smcron allows you to specify a range of times for all of its time-related subcommands, -m, -M, -t, and -w. For example, the following command:

```
# smcron add -u root -p xxxx -- -n cronjob1 -w 1-4,5 \
-t 12:00,13:15,14:30 -c ls
```

...creates the following entry in crontab:

```
0,15,30 12,13,14 * * 1,2,3,4,6 ls #cronjob1
```

This job would run on Monday through Thursday and Saturday at the following times:

```
12:00 12:15 12:30
13:00 13:15 13:30
14:00 14:15 14:30
```

**ENVIRONMENT
VARIABLES**

See environ(5) for a description of the JAVA_HOME environment variable, which affects the execution of the smcron command. If this environment variable is not specified, the /usr/java location is used. See smc(1M).

EXIT STATUS

The following exit values are returned:

```
0            Successful completion.
```

smcron(1M)

- 1 Invalid command syntax. A usage message displays.
- 2 An error occurred while executing the command. An error message displays.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmga

SEE ALSO `crontab(1)`, `cron(1M)`, `smc(1M)`, `attributes(5)`, `environ(5)`

NOTES The timezone of the `cron` daemon sets the system-wide timezone for `cron` entries. This, in turn, is by set by default system-wide using `/etc/default/init`.

If some form of *daylight savings* or *summer/winter time* is in effect, then jobs scheduled during the switchover period could be executed once, twice, or not at all.

NAME	smcwebserver – start the Sun Management Center console web server														
SYNOPSIS	<code>/usr/sadm/bin/smcwebserver subcommand</code>														
DESCRIPTION	The <code>smcwebserver</code> utility starts the Sun Management Center web console server. Sun Management Center Web Console is a browser-based interface that performs systems management. System administrators can manage systems, devices and services from the console. When the console webserver is running, you can view the console by opening a browser and pointing to: <code>https://host:6789</code> <i>host</i> is the machine where the console has been installed and the console server is running.														
SUBCOMMANDS	The following subcommands are supported: <table> <tr> <td><code>disable</code></td><td>Disable automatic start or stop. Until the administrator reruns the script with the <code>smcwebserver enable</code> subcommand the webserver can be started/stopped only when the administrator executes the script manually using the following command:</td></tr> <tr> <td></td><td><code>/usr/sadm/bin/smcwebserver [start stop]</code></td></tr> <tr> <td><code>enable</code></td><td>Enable the webserver to startup automatically during subsequent system boot and gracefully stop during system shutdown.</td></tr> <tr> <td><code>help</code></td><td>Display the usage statement.</td></tr> <tr> <td><code>restart</code></td><td>Stop and subsequently start the console webserver.</td></tr> <tr> <td><code>start</code></td><td>Start the console webserver.</td></tr> <tr> <td><code>stop</code></td><td>Stop the console webserver.</td></tr> </table>	<code>disable</code>	Disable automatic start or stop. Until the administrator reruns the script with the <code>smcwebserver enable</code> subcommand the webserver can be started/stopped only when the administrator executes the script manually using the following command:		<code>/usr/sadm/bin/smcwebserver [start stop]</code>	<code>enable</code>	Enable the webserver to startup automatically during subsequent system boot and gracefully stop during system shutdown.	<code>help</code>	Display the usage statement.	<code>restart</code>	Stop and subsequently start the console webserver.	<code>start</code>	Start the console webserver.	<code>stop</code>	Stop the console webserver.
<code>disable</code>	Disable automatic start or stop. Until the administrator reruns the script with the <code>smcwebserver enable</code> subcommand the webserver can be started/stopped only when the administrator executes the script manually using the following command:														
	<code>/usr/sadm/bin/smcwebserver [start stop]</code>														
<code>enable</code>	Enable the webserver to startup automatically during subsequent system boot and gracefully stop during system shutdown.														
<code>help</code>	Display the usage statement.														
<code>restart</code>	Stop and subsequently start the console webserver.														
<code>start</code>	Start the console webserver.														
<code>stop</code>	Stop the console webserver.														
EXAMPLES	EXAMPLE 1 Displaying the Usage Statement The following command displays the <code>smcwebserver</code> usage statement: <pre>smcwebserver help</pre>														
ENVIRONMENT VARIABLES	See <code>environ(5)</code> for descriptions of the following environment variables that affect the execution of <code>smcwebserver</code>: JAVA_HOME If you do not specify this environment variable, your <code>PATH</code> is searched for a suitable java. Otherwise, the <code>/usr/j2se</code> location is used. CATALINA_HOME If you do not specify this environment variable, your <code>PATH</code> is searched for a suitable Tomcat 4.X version. Otherwise, the command returns with an error status.														

smcwebserver(1M)

EXIT STATUS The following exit values are returned:

- 0 Successful completion.
- 1 An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmcon

SEE ALSO `attributes(5)`, `environ(5)`

NAME	smdiskless – manage diskless client support for a server								
SYNOPSIS	<code>/usr/sadm/bin/smdiskless subcommand [auth_args] - - [subcommand_args]</code>								
DESCRIPTION	The <code>smdiskless</code> command manages diskless client support for a server. <code>smdiskless</code> subcommands are: <table> <tr> <td>add</td><td>Adds a new diskless client to a server. There are two usages for this command. The user can either specify all the optional arguments directly on the command line, or provide a <code>sysidcfg(4)</code> formatted file as input. A future enhancement will allow specifying both a <code>sysidcfg(4)</code> formatted file and optional arguments, which will override the values in the <code>sysidcfg(4)</code> file.</td></tr> <tr> <td>delete</td><td>Deletes an existing diskless client from the system databases and removes any server support associated with the host, depending on the <code>os_server</code> type.</td></tr> <tr> <td>list</td><td>Lists existing diskless clients served by <code>os_server</code>.</td></tr> <tr> <td>modify</td><td>Modifies the specified attributes of the diskless client <code>os_server</code>.</td></tr> </table>	add	Adds a new diskless client to a server. There are two usages for this command. The user can either specify all the optional arguments directly on the command line, or provide a <code>sysidcfg(4)</code> formatted file as input. A future enhancement will allow specifying both a <code>sysidcfg(4)</code> formatted file and optional arguments, which will override the values in the <code>sysidcfg(4)</code> file.	delete	Deletes an existing diskless client from the system databases and removes any server support associated with the host, depending on the <code>os_server</code> type.	list	Lists existing diskless clients served by <code>os_server</code> .	modify	Modifies the specified attributes of the diskless client <code>os_server</code> .
add	Adds a new diskless client to a server. There are two usages for this command. The user can either specify all the optional arguments directly on the command line, or provide a <code>sysidcfg(4)</code> formatted file as input. A future enhancement will allow specifying both a <code>sysidcfg(4)</code> formatted file and optional arguments, which will override the values in the <code>sysidcfg(4)</code> file.								
delete	Deletes an existing diskless client from the system databases and removes any server support associated with the host, depending on the <code>os_server</code> type.								
list	Lists existing diskless clients served by <code>os_server</code> .								
modify	Modifies the specified attributes of the diskless client <code>os_server</code> .								
OPTIONS	The <code>smdiskless</code> authentication arguments, <code>auth_args</code>, are derived from the <code>smc(1M)</code> arg set and are the same regardless of which subcommand you use. The <code>smdiskless</code> command requires the Solaris Management Console to be initialized for the command to succeed (see <code>smc(1M)</code>). After rebooting the Solaris Management Console server, the first Solaris Management Console connection might time out, so you might need to retry the command. The subcommand-specific options, <code>subcommand_args</code>, must come after the <code>auth_args</code> and must be separated from them by the <code>- -</code> option.								
auth_args	The valid <code>auth_args</code> are <code>-D</code>, <code>-H</code>, <code>-l</code>, <code>-p</code>, <code>-r</code>, and <code>-u</code>; they are all optional. If no <code>auth_args</code> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. These letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either <code>-D</code> or <code>- -domain</code>. Note – <code>smdiskless</code> supports the <code>--auth-data file</code> option, which enables you to specify a file the console can read to collect authentication data. See <code>smc(1M)</code> for a description of this option. <code>-D - -domain domain</code> Specifies the default domain that you want to manage. The syntax of <code>domain</code> is <code>type:/host_name/domain_name</code>, where <code>type</code> is <code>nis</code>, <code>nis+</code>, <code>dns</code>, <code>ldap</code>, or <code>file</code>; <code>host_name</code> is the name of the machine that serves the domain; and <code>domain_name</code> is the name of the domain you want to manage. (Note: Do <i>not</i> use <code>nis+</code> for <code>nisplus</code>.)								

smdiskless(1M)

If you do not specify this option, the Solaris Management Console assumes the `file` default domain on whatever server you choose to manage, meaning that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools.

-H | - `-hostname host_name:port`

Specifies the *host_name* and *port* to which you want to connect. If you do not specify a *port*, the system connects to the default port, 898. If you do not specify *host_name:port*, the Solaris Management Console connects to the local host on port 898. You may still have to choose a toolbox to load into the console. To override this behavior, use the `smc(1M) -B` option, or set your console preferences to load a "home toolbox" by default.

-l | - `-rolepassword role_password`

Specifies the password for the *role_name*. If you specify a *role_name* but do not specify a *role_password*, the system prompts you to supply a *role_password*. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-p | - `-password password`

Specifies the password for the *user_name*. If you do not specify a password, the system prompts you for one. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-r | - `-rolename role_name`

Specifies a role name for authentication. If you do not specify this option, no role is assumed.

-u | - `-username user_name`

Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.

- -

This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the `- -` option.

subcommand_args

Note: Descriptions and other arg options that contain white spaces must be enclosed in double quotes.

■ For subcommand `add`:

-h

(Optional) Displays the command's usage statement.

-i *IP_address*

Specifies the IP address for the host in the form of `129.9.200.1`.

-e *ethernet_addr*

Specifies the Ethernet address.

-n *host*

Specifies the client name.

-o *os_server*

(optional) Specifies the name of the host where the OS service filesystems reside. If this option is not specified, the host will be the same as that specified

in the `smc(1M) -D` option. This option is useful in the event that the name service server and the OS server are not the same machine.

`-x os=platform`

Specifies the operating system. The syntax for *platform* is as follows:

instruction_set.implementation.Solaris_version

where

- *instruction_set* is one of `sparc` or `i386`
- *implementation* is the implementation architecture, that is, `i86pc` and `sun4u`.
- *version* is the Solaris version number. The supported *version* numbers are 2.6, 2.7 (for Solaris 7), 8, and 9. Examples are:

`sparc.sun4u.Solaris_8`

`-x root=pathname`

(Optional) Specifies the absolute path of the directory in which to create the root directory for diskless clients. The default (and recommended) *pathname* is `/export/root/client_name`.

`-x swap=pathname`

(Optional) Specifies the absolute path of the directory in which to create the swap file for diskless clients. The default (and recommended) *pathname* is `/export/swap/client_name`.

`-x swapsize=size`

(Optional) Specifies the size, in megabytes, of the swap file for diskless clients. The default swap size is 24M.

`-x dump=pathname`

(Optional) Specifies the absolute path of the dump directory for diskless clients. The default (and recommended) *pathname* is `/export/dump/client_name`.

`-x dumpsize=size`

(Optional) Specifies the size, in megabytes, of the dump file for diskless clients. The default swap size is 24M.

`-x pw=Y`

(Optional) Prompts for the system's root password. The default is not to prompt. The following options

are used to configure workstations on first boot by `sysidtool(1M)`. They can either be specified on the command line, or in a `sysidcfg(4)` formatted file. *Note:* Use the `sysidcfg(4)` file to:

- Add a DNS client.

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- Specify use of the LDAP name service.
- Specify a security policy.

The keywords and functions supported by `sysidtool` and `sysidcfg` vary among Solaris releases. Consult the man pages for your operating system release (`uname -r`) to determine the level of support available.

- x *tz=timezone*
(Optional) Specifies the path of a timezone file, relative to `/usr/share/lib/zoneinfo`. The default is the server's timezone.
- x *ns=NIS | NIS+ | NONE*
(Optional) Specifies the client's nameservice. This is one of NIS, NIS+, or NONE. Use a `sysidcfg(4)` file to specify DNS or LDAP. The default *ns* value is NONE, which results in the use of the `files` source in `nsswitch.conf`. See `nsswitch.conf(4)` for a description of the `files` source.
- x *nameserver=hostname*
(Optional) Specifies the nameserver's hostname. The default is the server's nameserver.
- x *domain=domain*
(Optional) Specifies the client's domain. The default is the server's domain.
- x *nameserver_ipaddress=ip_address*
(Optional) Specifies the nameserver's IP address.
- x *netmask=ip_address*
(Optional) Specifies the client's IP address netmask. The default is the server's netmask.
- x *locale=locale*
(Optional) Specifies the client's system locale. The default is the C locale.
- x *terminal=term*
(Optional) Specifies the workstation's terminal type, typically, `sun` or `xterms`.
- x *passwd=root_password*
(Optional) Specifies the system's root password. The default is no password.
- x *sysidcfg=path_to_sysidcfg_file*
(Optional) Specifies the file to be placed in the `/etc` directory of the diskless client. On first boot, `/etc/.UNCONFIGURED` exists and `sysidtool(1M)` will run. If a file called `/etc/sysidcfg` exists, `sysidtool(1M)` reads this file and uses the information for system configuration.
- For subcommand `delete`:
 - h
(Optional) Displays the command's usage statement.
 - n *host*
Specifies the hostname of the diskless client to delete. This host is deleted from relevant tables and OS Services for this client are deleted.

-o *os_server*
 (Optional) Specifies the name of the host where the OS service filesystems reside. If this option is not specified, the host will be the same as that specified in the `smc(1M)` -D option. This option is useful in the event that the name service server and the OS server are not the same machine.

■ For subcommand `list`:

-h
 (Optional) Displays the command's usage statement.

-o *os_server*
 (Optional) Specifies the name of the host where the OS service filesystems reside. If this option is not specified, the host will be the same as that specified in the `smc(1M)` -D option. This option is useful in the event that the name service server and the OS server are not the same machine.

■ For subcommand `modify`:

-e *ethernet_addr*
 Changes the specified diskless client's ethernet address to *ethernet_addr*.

-h
 (Optional) Displays the command's usage statement.

-n *host*
 Specifies the host name of the diskless client to modify.

-o *os_server*
 (Optional) Specifies the name of the host where the OS service filesystems reside. If this option is not specified, the host will be the same as that specified in the `smc(1M)` -D option. This option is useful in the event that the name service server and the OS server are not the same machine.

-x *tz=timezone*
 (Optional) Changes the specified diskless client's timezone.

EXAMPLES

EXAMPLE 1 Creating a new diskless client

The following command adds a new diskless client named `client1` which will run Solaris 9 on a sun4u machine:

```
example% /usr/sadm/bin/smdiskless add -- -i 129.9.200.1 \
-e 8:0:11:12:13:14 -n client1 -x os=sparc.sun4u.Solaris_9 \
-x root=/export/root/client1 -x swap=/export/swap/client1 \
-x swapsize=32 -x tz=US/Eastern -x locale=en_US
```

EXAMPLE 2 Deleting an existing diskless client

The following command deletes the diskless client named `client1` from the OS server named `osserver`, where the OS server is using NIS+ and the NIS+ server is `nisplusservice`:

```
example% /usr/sadm/bin/smdiskless delete \
-D nisplus:/nisplusservice/my.domain.com -- \
-o osserver -n client1
```

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EXAMPLE 3 Listing the diskless clients served by a host

The following command lists the diskless clients running on the OS server, `osserver`:

```
example% /usr/sadm/bin/smdiskless list -D file:/osserver/osserver -- \
-o oserver
```

EXAMPLE 4 Modifying the attributes of the diskless client host

The following command modifies the ethernet address for the client named `client1` on the OS server, `osserver`, to be `8:0:11:12:13:15`:

```
example% /usr/sadm/bin/smdiskless modify -D file:/osserver/osserver -- \
-o oserver -n client1 -e 8:0:11:12:13:15
```

ENVIRONMENT VARIABLES

See `environ(5)` for a description of the `JAVA_HOME` environment variable, which affects the execution of the `smdiskless` command. If this environment variable is not specified, the `/usr/java1.2` location is used. See `smc(1M)`.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	Invalid command syntax. A usage message displays.
2	An error occurred while executing the command. An error message displays.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWdclnt

SEE ALSO

`smc(1M)`, `smosservice(1M)`, `sysidtool(1M)`, `nsswitch.conf(4)`, `sysidcfg(4)`, `attributes(5)`, `environ(5)`

NAME	smexec – manage entries in the exec_attr database						
SYNOPSIS	<code>/usr/sadm/bin/smexec subcommand [auth_args] - - [subcommand_args]</code>						
DESCRIPTION	The smexec command manages an entry in the exec_attr(4) database in the local /etc files name service or a NIS or NIS+ name service.						
<i>subcommands</i>	smexec <i>subcommands</i> are: <table> <tr> <td>add</td><td>Adds a new entry to the exec_attr(4) database. To add an entry to the exec_attr database, the administrator must have the solaris.profmgr.execattr.write authorization.</td></tr> <tr> <td>delete</td><td>Deletes an entry from the exec_attr(4) database. To delete an entry from the exec_attr database, the administrator must have the solaris.profmgr.execattr.write authorization.</td></tr> <tr> <td>modify</td><td>Modifies an entry in the exec_attr(4) database. To modify an entry in the exec_attr database, the administrator must have the solaris.profmgr.execattr.write authorization.</td></tr> </table>	add	Adds a new entry to the exec_attr(4) database. To add an entry to the exec_attr database, the administrator must have the solaris.profmgr.execattr.write authorization.	delete	Deletes an entry from the exec_attr(4) database. To delete an entry from the exec_attr database, the administrator must have the solaris.profmgr.execattr.write authorization.	modify	Modifies an entry in the exec_attr(4) database. To modify an entry in the exec_attr database, the administrator must have the solaris.profmgr.execattr.write authorization.
add	Adds a new entry to the exec_attr(4) database. To add an entry to the exec_attr database, the administrator must have the solaris.profmgr.execattr.write authorization.						
delete	Deletes an entry from the exec_attr(4) database. To delete an entry from the exec_attr database, the administrator must have the solaris.profmgr.execattr.write authorization.						
modify	Modifies an entry in the exec_attr(4) database. To modify an entry in the exec_attr database, the administrator must have the solaris.profmgr.execattr.write authorization.						
OPTIONS	The smexec authentication arguments, <i>auth_args</i>, are derived from the smc(1M) arg set and are the same regardless of which subcommand you use. The smexec command requires the Solaris Management Console to be initialized for the command to succeed (see smc(1M)). After rebooting the Solaris Management Console server, the first Solaris Management Console connection might time out, so you might need to retry the command. The subcommand-specific options, <i>subcommand_args</i>, must come after the <i>auth_args</i> and must be separated from them by the - - option.						
<i>auth_args</i>	The valid <i>auth_args</i> are -D, -H, -l, -p, -r, and -u; they are all optional. If no <i>auth_args</i> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. These letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either -D or - -domain with the <i>domain</i> argument. -D - -domain <i>domain</i> Specifies the default domain that you want to manage. The syntax of <i>domain</i> is <i>type: /host_name /domain_name</i>, where <i>type</i> is nis, nisplus, dns, ldap, or file; <i>host_name</i> is the name of the machine that serves the domain; and <i>domain_name</i> is the name of the domain you want to manage. (Note: Do not use nis+ for nisplus.) If you do not specify this option, the Solaris Management Console assumes the file default domain on whatever server you choose to manage, meaning that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools. -H - -hostname <i>host_name:port</i> Specifies the <i>host_name</i> and <i>port</i> to which you want to connect. If you do not specify a <i>port</i>, the system connects to the default port, 898. If you do not specify						

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host_name:port, the Solaris Management Console connects to the local host on port 898. You may still have to choose a toolbox to load into the console. To override this behavior, use the `smc(1M) -B` option, or set your console preferences to load a “home toolbox” by default.

`-l | -rolepassword role_password`

Specifies the password for the *role_name*. If you specify a *role_name* but do not specify a *role_password*, the system prompts you to supply a *role_password*. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

`-p | -password password`

Specifies the password for the *user_name*. If you do not specify a password, the system prompts you for one. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

`-r | -rolename role_name`

Specifies a role name for authentication. If you do not specify this option, no role is assumed.

`-u | -username user_name`

Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.

`- -`

This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the `- -` option.

subcommand_args

Note: Descriptions and other arg options that contain white spaces must be enclosed in double quotes.

■ For subcommand `add`:

`-c command_path`

Specifies the full path to the command associated with the new `exec_attr` entry.

`-g egid`

(Optional) Specifies the effective group ID that executes with the command.

`-G gid`

(Optional) Specifies the real group ID that executes with the command.

`-h`

(Optional) Displays the command’s usage statement.

`-n profile_name`

Specifies the name of the profile associated with the new `exec_attr` entry.

`-t type`

Specifies the type for the command. Currently, the only acceptable value for *type* is `cmd`.

- u *euid*
(Optional) Specifies the effective user ID that executes with the command.
- U *uid*
(Optional) Specifies the real user ID that executes with the command.
- For subcommand `delete`:
 - c *command_path*
Specifies the full path to the command associated with the `exec_attr` entry.
 - h
(Optional) Displays the command's usage statement.
 - n *profile_name*
Specifies the name of the profile associated with the `exec_attr` entry.
 - t *type*
Specifies the type `cmd` for command. Currently, the only acceptable value for *type* is `cmd`.
- For subcommand `modify`:
 - c *command_path*
Specifies the full path to the command associated with the `exec_attr` entry that you want to modify.
 - g *egid*
(Optional) Specifies the new effective group ID that executes with the command.
 - G *gid*
(Optional) Specifies the new real group ID that executes with the command.
 - h
(Optional) Displays the command's usage statement.
 - n *profile_name*
Specifies the name of the profile associated with the `exec_attr` entry.
 - t *type*
Specifies the type `cmd` for command. Currently, the only acceptable value for *type* is `cmd`.
 - u *euid*
(Optional) Specifies the new effective user ID that executes with the command.
 - U *uid*
(Optional) Specifies the new real user ID that executes with the command.

EXAMPLES**EXAMPLE 1** Creating an `exec_attr` database entry

The following creates a new `exec_attr` entry for the User Manager profile on the local file system. The entry type is `cmd` for the command `/usr/bin/cp`. The command has an effective user ID of 0 and an effective group ID of 0.

```
./smexec add -H myhost -p mypasswd -u root -- -n "User Manager" \
-t cmd -c /usr/bin/cp -u 0 -g 0
```

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EXAMPLE 2 Deleting an exec_attr database entry

The following example deletes an `exec_attr` database entry for the User Manager profile from the local file system. The entry designated for the command `/usr/bin/cp` is deleted.

```
./smexec delete -H myhost -p mypasswd -u root -- -n "User Manager" \  
-t cmd -c /usr/bin/cp
```

EXAMPLE 3 Modifying an exec_attr database Entry

The following modifies the attributes of the `exec_attr` database entry for the User Manager profile on the local file system. The `/usr/bin/cp` entry is modified to execute with the real user ID of 0 and the real group ID of 0.

```
./smexec modify -H myhost -p mypasswd -u root -- -n "User Manager" \  
-t cmd -c /usr/bin/cp -U 0 -G 0
```

ENVIRONMENT VARIABLES

See `environ(5)` for a description of the `JAVA_HOME` environment variable, which affects the execution of the `smexec` command. If this environment variable is not specified, the `/usr/java` location is used. See `smc(1M)`.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	Invalid command syntax. A usage message displays.
2	An error occurred while executing the command. An error message displays.

FILES

The following file is used by the `smexec` command:

<code>/etc/security/exec_attr</code>	Execution profiles database. See <code>exec_attr(4)</code> .

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmga

SEE ALSO

`smc(1M)`, `exec_attr(4)`, `attributes(5)`, `environ(5)`

NAME	smgroup – manage group entries								
SYNOPSIS	<code>/usr/sadm/bin/smgroup subcommand [auth_args] - - [subcommand_args]</code>								
DESCRIPTION	The smgroup command manages one or more group definitions in the group database for the appropriate files in the local /etc files name service or a NIS or NIS+ name service. The following smgroup subcommands are supported <table> <tr> <td>add</td><td>Adds a new group entry. To add an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.</td></tr> <tr> <td>delete</td><td>Deletes a group entry. You can delete only one entry at a time. To delete an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization. <i>Note:</i> You cannot delete the system groups with IDs less than 100, or the groups 60001, 60002, or 65534.</td></tr> <tr> <td>list</td><td>Lists one or more group entries in the form of a three-column list, containing the group name, group ID, and group members, separated by colons (:). To list entries, the administrator must have the <code>solaris.admin.usermgr.read</code> authorization.</td></tr> <tr> <td>modify</td><td>Modifies a group entry. To modify an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.</td></tr> </table>	add	Adds a new group entry. To add an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.	delete	Deletes a group entry. You can delete only one entry at a time. To delete an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization. <i>Note:</i> You cannot delete the system groups with IDs less than 100, or the groups 60001, 60002, or 65534.	list	Lists one or more group entries in the form of a three-column list, containing the group name, group ID, and group members, separated by colons (:). To list entries, the administrator must have the <code>solaris.admin.usermgr.read</code> authorization.	modify	Modifies a group entry. To modify an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.
add	Adds a new group entry. To add an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.								
delete	Deletes a group entry. You can delete only one entry at a time. To delete an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization. <i>Note:</i> You cannot delete the system groups with IDs less than 100, or the groups 60001, 60002, or 65534.								
list	Lists one or more group entries in the form of a three-column list, containing the group name, group ID, and group members, separated by colons (:). To list entries, the administrator must have the <code>solaris.admin.usermgr.read</code> authorization.								
modify	Modifies a group entry. To modify an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.								
OPTIONS	The smgroup authentication arguments, <i>auth_args</i>, are derived from the smc(1M) arg set and are the same regardless of which subcommand you use. The smgroup command requires the Solaris Management Console to be initialized for the command to succeed (see smc(1M)). After rebooting the Solaris Management Console server, the first Solaris Management Console connection might time out, so you might need to retry the command. The subcommand-specific options, <i>subcommand_args</i>, must come after the <i>auth_args</i> and must be separated from them by the - - option.								
<i>auth_args</i>	The valid <i>auth_args</i> are -D, -H, -l, -p, -r, and -u; they are all optional. If no <i>auth_args</i> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. These letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either -D or - -domain. The following <i>auth_args</i> are supported: <table> <tr> <td>-D - -domain <i>domain</i></td><td>Specifies the default domain that you want to manage. The syntax of <i>domain</i> is <i>type</i>:<i>/host_name/domain_name</i>, where <i>type</i> is nis, nisplus, dns, ldap or file; <i>host_name</i> is the name of the machine that serves the domain; and <i>domain_name</i> is the name of the domain you want to manage. (<i>Note:</i> Do not use nis+ for nisplus.)</td></tr> </table>	-D - -domain <i>domain</i>	Specifies the default domain that you want to manage. The syntax of <i>domain</i> is <i>type</i> : <i>/host_name/domain_name</i> , where <i>type</i> is nis, nisplus, dns, ldap or file; <i>host_name</i> is the name of the machine that serves the domain; and <i>domain_name</i> is the name of the domain you want to manage. (<i>Note:</i> Do not use nis+ for nisplus.)						
-D - -domain <i>domain</i>	Specifies the default domain that you want to manage. The syntax of <i>domain</i> is <i>type</i> : <i>/host_name/domain_name</i> , where <i>type</i> is nis, nisplus, dns, ldap or file; <i>host_name</i> is the name of the machine that serves the domain; and <i>domain_name</i> is the name of the domain you want to manage. (<i>Note:</i> Do not use nis+ for nisplus.)								

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If you do not specify this option, the Solaris Management Console assumes the file default domain on whatever server you choose to manage, meaning that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools.

-H | - -hostname *host_name:port*

Specifies the *host_name* and *port* to which you want to connect. If you do not specify a *port*, the system connects to the default port, 898. If you do not specify *host_name:port*, the Solaris Management Console connects to the local host on port 898. You may still have to choose a toolbox to load into the console. To override this behavior, use the smc(1M) -B option, or set your console preferences to load a "home toolbox" by default.

-l | - -rolepassword *role_password*

Specifies the password for the *role_name*. If you specify a *role_name* but do not specify a *role_password*, the system prompts you to supply a *role_password*. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-p | - -password *password*

Specifies the password for the *user_name*. If you do not specify a password, the system prompts you for one. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-r | - -rolename *role_name*

Specifies a role name for authentication. If you do not specify this option, no role is assumed.

-u | - -username *user_name*

Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.

- -

This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the - - option.

subcommand_args

Descriptions and other argument options that contain white spaces must be enclosed in double quotes.

The add subcommand supports the following *subcommand_args*:

-g *gid*

(Optional) Specifies the group ID for the new group. The group ID must be a non-negative decimal integer with a maximum value of 2MB (2,147,483,647). Group IDs 0-99 are reserved for the system and should be used with care. If you do not specify a *gid*, the system automatically assigns the next available *gid*. To maximize interoperability and compatibility, administrators are recommended to assign groups using the range of GIDs below 60000 where possible.

-h

(Optional) Displays the command's usage statement.

`-m group_member1 -m group_member2 . . .`

(Optional) Specifies the new members to add to the group.

`-n group_name`

Specifies the name of the new group. The group name must be unique within a domain, contain 2–32 alphanumeric characters, begin with a letter, and contain at least one lowercase letter.

The `delete` subcommand supports the following *subcommand_args*:

`-h`

(Optional) Displays the command's usage statement.

`-n group_name`

Specifies the name of the group you want to delete.

The `list` subcommand supports the following *subcommand_args*:

`-h`

(Optional) Displays the command's usage statement.

`-n group_name`

(Optional) Specifies the name of the group you want to list. If you do not specify a group name, all groups are listed.

The `modify` subcommand supports the following *subcommand_args*:

`-h`

(Optional) Displays the command's usage statement.

`-m group_member1 -m group_member2 . . .`

(Optional) Specifies the new members to add to the group. Note that *group_member* overwrites the existing member list in the group file.

`-n group_name`

Specifies the name of the group you want to modify.

`-N new_group`

(Optional) Specifies the new group name. The group name must be unique within a domain, contain 2–32 alphanumeric characters, begin with a letter, and contain at least one lowercase letter.

EXAMPLES

EXAMPLE 1 Creating a Test Group

The following creates the `test_group` group entry with a group ID of 123 and adds `test_member1` and `test_member2` to the group:

```
./smgroup add -H myhost -p mypasswd -u root -- -n test_group \
    -m test_member1 -m test_member2 -g 123
```

EXAMPLE 2 Deleting a Group

The following deletes `test_group`:

```
./smgroup delete -H myhost -p mypasswd -u root -- -n test_group
```

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EXAMPLE 3 Displaying All Groups

The following displays all groups in a three-column list showing the group name, group ID, and group members:

```
./smgroup list -H myhost -p mypasswd -u root --
```

EXAMPLE 4 Displaying a Group

The following displays the `group_1` data in a three-column list showing the group name, group ID, and group members:

```
./smgroup list -H myhost -p mypasswd -u root -- -n group_1
```

EXAMPLE 5 Renaming a Group

The following renames a group from `finance` to `accounting`:

```
./smgroup modify -H myhost -p mypasswd -u root -- \
-n finance -N accounting
```

ENVIRONMENT VARIABLES

See `environ(5)` for a description of the `JAVA_HOME` environment variable, which affects the execution of the `smgroup` command. If this environment variable is not specified, the `/usr/java` location is used. See `smc(1M)`.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	Invalid command syntax. A usage message displays.
2	An error occurred while executing the command. An error message displays.

FILES

The following files are used by the `smgroup` command:

`/etc/group` Group file. See `group(4)`.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmga

SEE ALSO

`smc(1M)`, `group(4)`, `attributes(5)`, `environ(5)`

NAME	smlog – manage and view WBEM log files
SYNOPSIS	<code>/usr/sadm/bin/smlog subcommand [auth_args] -- [subcommand_args]</code>
DESCRIPTION	The smlog command manages WBEM log files and allows a user to view WBEM log file records.
Subcommands	The smlog command supports the following subcommands: backup Backs up the entries in the current WBEM log file. The backup command then creates a new log file and makes this log file the current log file. delete Deletes an existing (backed up) WBEM log file. list Lists the names of all the WBEM log files available for viewing. view Allows the user to view the contents of the specified WBEM log file.
OPTIONS	The smlog authentication arguments, <i>auth_args</i>, are derived from the smc(1M) arg set and are the same regardless of which subcommand you use. The smlog command requires the Solaris Management Console to be initialized for the command to succeed (see smc(1M)). After rebooting the Solaris Management Console server, the first Solaris Management Console connection might time out, so you might need to retry the command. The subcommand-specific options, <i>subcommand_args</i>, must come after the <i>auth_args</i> and must be separated from them by the <code>--</code> option.
<i>auth_args</i>	The valid <i>auth_args</i> are <code>-D</code>, <code>-H</code>, <code>-l</code>, <code>-p</code>, <code>-r</code>, and <code>-u</code>; they are all optional. If no <i>auth_args</i> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. These letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either <code>-D</code> or <code>--domain</code> with the <i>domain</i> argument. -D --domain <i>domain</i> Specifies the default domain that you want to manage. smlog accepts only <i>file</i> for this option. <i>file</i> is also the default value. The <i>file</i> default domain means that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools. -H --hostname <i>host_name:port</i> Specifies the <i>host_name</i> and <i>port</i> to which you want to connect. If you do not specify a <i>port</i>, the system connects to the default port, 898. If you do not specify <i>host_name:port</i>, the Solaris Management Console connects to the local host on port

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898. You may still have to choose a toolbox to load into the console. To override this behavior, use the `smc -B` option (see `smc(1M)`), or set your console preferences to load a “home toolbox” by default.

`-l | - --rolepassword role_password`

Specifies the password for the *role_name*. If you specify a *role_name* but do not specify a *role_password*, the system prompts you to supply a *role_password*. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

`-p | - --password password`

Specifies the password for the *user_name*. If you do not specify a password, the system prompts you for one. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

`-r | - --rolename role_name`

Specifies a role name for authentication. If you do not specify this option, no role is assumed.

`-u | - --username user_name`

Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.

`- -`

This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the `- -` option.

subcommand_args

Descriptions and other `arg` options that contain white spaces must be enclosed in double quotes.

The `backup` subcommand supports the following *subcommand_args*:

`-h`

Displays the command’s usage statement.

This *subcommand_arg* is optional.

The `delete` subcommand supports the following *subcommand_args*:

`-h`

Displays the command’s usage statement.

This *subcommand_arg* is optional.

`-n name`

Specifies the name of the log file you want to delete.

The `list` subcommand supports the following *subcommand_args*:

`-h`

Displays the command’s usage statement.

This *subcommand_arg* is optional.

The view subcommand supports the following *subcommand_args*:

- h
Displays the command's usage statement.
This *subcommand_arg* is optional.
- n *name*
Specifies the name of the log file you want to view.
- v
Displays the data in verbose format.
This *subcommand_arg* is optional.

EXAMPLES

EXAMPLE 1 Listing WBEM Log Files

The following command lists all available WBEM log files:

```
./smlog list -H myhost -p mypasswd -u root --
```

```
Log.01/03/2001.14:38:29
Log.01/04/2001.16:34:59
Log.01/08/2001.14:13:33
Log.01/11/2001.18:39:53
Log.01/12/2001.10:31:31
Log.12/21/2000.17:41:11
```

EXAMPLE 2 Displaying a WBEM Log File

The following command displays the contents of a log file:

```
./smlog view -H myhost -p mypasswd -u root -- -n Log.01/04/2001.16:34:59
```

Date and Time	Client	User	Source	Severity	Cate gory
1/5/01 5:22:47 PM	hostname1	root	Solaris_OsService	Informational	Appl ication log No services found.
1/5/01 5:21:46 PM	hostname1	root	Solaris_OsService	Informational	Appl ication log No services found.

The smlog output wraps when it exceeds 80 characters.

ENVIRONMENT VARIABLES

See environ(5) for a description of the JAVA_HOME environment variable, which affects the execution of the smlog command. If this environment variable is not specified, the /usr/java1.2 location is used. See smc(1M).

EXIT STATUS

The following exit values are returned:

- 0 Successful completion.
- 1 Invalid command syntax. A usage message displays.
- 2 An error occurred while executing the command. An error message displays.

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ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmga

SEE ALSO

`smc(1M)`, `attributes(5)`, `environ(5)`

NAME	smmaillist – manage email alias entries								
SYNOPSIS	/usr/sadm/bin/smmaillist <i>subcommand</i> [<i>auth_args</i>] - - [<i>subcommand_args</i>]								
DESCRIPTION	The smmaillist command manages one or more email alias entries for the appropriate files in the local /etc files name service or a NIS or NIS+ name service.								
<i>subcommands</i>	smmaillist <i>subcommands</i> are: <table> <tr> <td>add</td><td>Creates a new email alias definition and adds it to the appropriate files. To add an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.</td></tr> <tr> <td>delete</td><td>Deletes an email alias entry. You can delete only one entry at a time. To delete an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization. <i>Note:</i> You cannot delete Postmaster or Mailer-Daemon aliases.</td></tr> <tr> <td>list</td><td>Lists one or more email alias entries. To list an entry, the administrator must have the <code>solaris.admin.usermgr.read</code> authorization.</td></tr> <tr> <td>modify</td><td>Modifies an email alias entry. To modify an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.</td></tr> </table>	add	Creates a new email alias definition and adds it to the appropriate files. To add an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.	delete	Deletes an email alias entry. You can delete only one entry at a time. To delete an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization. <i>Note:</i> You cannot delete Postmaster or Mailer-Daemon aliases.	list	Lists one or more email alias entries. To list an entry, the administrator must have the <code>solaris.admin.usermgr.read</code> authorization.	modify	Modifies an email alias entry. To modify an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.
add	Creates a new email alias definition and adds it to the appropriate files. To add an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.								
delete	Deletes an email alias entry. You can delete only one entry at a time. To delete an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization. <i>Note:</i> You cannot delete Postmaster or Mailer-Daemon aliases.								
list	Lists one or more email alias entries. To list an entry, the administrator must have the <code>solaris.admin.usermgr.read</code> authorization.								
modify	Modifies an email alias entry. To modify an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.								
OPTIONS	The smmaillist authentication arguments, <i>auth_args</i>, are derived from the smc(1M) arg set and are the same regardless of which subcommand you use. The smmaillist command requires the Solaris Management Console to be initialized for the command to succeed (see smc(1M)). After rebooting the Solaris Management Console server, the first Solaris Management Console connection might time out, so you might need to retry the command. The subcommand-specific options, <i>subcommand_args</i>, must come after the <i>auth_args</i> and must be separated from them by the - - option.								
<i>auth_args</i>	The valid <i>auth_args</i> are -D, -H, -l, -p, -r, and -u; they are all optional. If no <i>auth_args</i> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. These letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either -D or - -domain with the <i>domain</i> argument. -D - -domain <i>domain</i> Specifies the default domain that you want to manage. The syntax of <i>domain</i> is <i>type</i>:/<i>host_name</i>/<i>domain_name</i>, where <i>type</i> is nis, nisplus, dns, ldap, or file; <i>host_name</i> is the name of the machine that serves the domain; and <i>domain_name</i> is the name of the domain you want to manage. (<i>Note:</i> Do not use nis+ for nisplus.)								

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If you do not specify this option, the Solaris Management Console assumes the `file` default domain on whatever server you choose to manage, meaning that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools.

-H | - `-hostname host_name:port`

Specifies the *host_name* and *port* to which you want to connect. If you do not specify a *port*, the system connects to the default port, 898. If you do not specify *host_name:port*, the Solaris Management Console connects to the local host on port 898. You may still have to choose a toolbox to load into the console. To override this behavior, use the `smc(1M)` `-B` option, or set your console preferences to load a "home toolbox" by default.

-l | - `-rolepassword role_password`

Specifies the password for the *role_name*. If you specify a *role_name* but do not specify a *role_password*, the system prompts you to supply a *role_password*. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-p | - `-password password`

Specifies the password for the *user_name*. If you do not specify a password, the system prompts you for one. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-r | - `-rolename role_name`

Specifies a role name for authentication. If you do not specify this option, no role is assumed.

-u | - `-username user_name`

Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.

- -

This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the `- -` option.

subcommand_args

Note: Descriptions and other arg options that contain white spaces must be enclosed in double quotes.

■ For subcommand `add`:

`-a address1 -a address2 . . .`

(Optional) Specifies the new email address. See `sendmail(1M)`.

`-h`

(Optional) Displays the command's usage statement.

`-n alias_name`

Specifies the name of the alias you want to add. See `sendmail(1M)`.

■ For subcommand `delete`:

`-h`

(Optional) Displays the command's usage statement.

- n *alias_name*
Specifies the alias you want to delete.
- For subcommand **list**:
 - h
(Optional) Displays the command's usage statement.
 - n *alias_name*
(Optional) Specifies the name of the alias you want to display. If you do not specify an alias, all aliases are listed.
- For subcommand **modify**:
 - a *address1* -a *address2* ...
(Optional) Specifies new email address(es) to replace the existing one(s). See [sendmail\(1M\)](#).
 - h
(Optional) Displays the command's usage statement.
 - n *alias_name*
(Optional) Specifies the name of the alias you want to modify.
 - N *new_alias_name*
Specifies the new alias name. Use only when renaming an alias. See [sendmail\(1M\)](#).

EXAMPLES

EXAMPLE 1 Creating an alias

The following creates the `coworkers` alias and adds the following member list: `bill@machine1`, `sue@machine2`, and `me@machine3` to the alias.

```
./smmailist add -H myhost -p mypasswd -u root -- -n coworkers \  
-a bill@machine1 -a sue@machine2 -a me@machine3
```

EXAMPLE 2 Deleting a mail alias

The following deletes the `my_alias` alias:

```
./smmailist delete -H myhost -p mypasswd -u root -- -n my_alias
```

EXAMPLE 3 Displaying members of a mail alias

The following displays the list of members belonging to the `my_alias` alias:

```
./smmailist list -H myhost -p mypasswd -u root -- -n my_alias
```

EXAMPLE 4 Displaying members of all mail aliases

The following displays the list of members belonging to all mail aliases:

```
./smmailist list -H myhost -p mypasswd -u root --
```

EXAMPLE 5 Renaming a mail alias

The following renames the `current_name` mail alias to `new_name`:

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EXAMPLE 5 Renaming a mail alias (Continued)

```
./smmaillist modify -H myhost -p mypasswd -u root -- \  
-n current_name -N new_name
```

EXAMPLE 6 Redefining an address list

The following changes the recipients of the alias `my_alias` to `bill@machine1`. Any previous recipients are deleted from the alias.

```
./smmaillist modify -H myhost -p mypasswd -u root -- \  
-n my_alias -a bill@machine1
```

ENVIRONMENT VARIABLES

See `environ(5)` for a description of the `JAVA_HOME` environment variable, which affects the execution of the `smmaillist` command. If this environment variable is not specified, the `/usr/java` location is used. See `smc(1M)`.

EXIT STATUS

The following exit values are returned:

- 0 Successful completion.
- 1 Invalid command syntax. A usage message displays.
- 2 An error occurred while executing the command. An error message displays.

FILES

The following files are used by the `smmaillist` command:

`/var/mail/aliases` Aliases for `sendmail(1M)`. See `aliases(4)`.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmga

SEE ALSO

`sendmail(1M)`, `smc(1M)`, `aliases(4)`, `attributes(5)`, `environ(5)`

NAME	smmultiuser – manage bulk operations on user accounts						
SYNOPSIS	<code>/usr/sadm/bin/smmultiuser subcommand [auth_args] - - [subcommand_args]</code>						
DESCRIPTION	The <code>smmultiuser</code> command allows bulk operations on user entries in the local <code>/etc</code> filesystem or a NIS or NIS+ name service, using either an input file or piped input. <i>Note:</i> Both input files and piped input contain a cleartext (non-encrypted) password for each new user entry.						
subcommands	<code>smmultiuser</code> subcommands are: <table> <tr> <td>add</td><td>Adds multiple user entries to the appropriate files. To add an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.</td></tr> <tr> <td>delete</td><td>Deletes one or more user entries from the appropriate files. To delete an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.</td></tr> <tr> <td>modify</td><td> Modifies existing user entries in the user account database. To modify an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization. Here is the list of what can be modified using the <code>modify</code> subcommand: 1. UserName (only under certain conditions; see Note 2 in NOTES). 2. Password (only under certain conditions; see Note 3 in NOTES). To modify a password, the administrator must have the <code>solaris.admin.usermgr.pswd</code> authorization. 3. Description. 4. Primary Group ID. 5. Shell type. 6. FullName. </td></tr> </table>	add	Adds multiple user entries to the appropriate files. To add an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.	delete	Deletes one or more user entries from the appropriate files. To delete an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.	modify	Modifies existing user entries in the user account database. To modify an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization. Here is the list of what can be modified using the <code>modify</code> subcommand: 1. UserName (only under certain conditions; see Note 2 in NOTES). 2. Password (only under certain conditions; see Note 3 in NOTES). To modify a password, the administrator must have the <code>solaris.admin.usermgr.pswd</code> authorization. 3. Description. 4. Primary Group ID. 5. Shell type. 6. FullName.
add	Adds multiple user entries to the appropriate files. To add an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.						
delete	Deletes one or more user entries from the appropriate files. To delete an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.						
modify	Modifies existing user entries in the user account database. To modify an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization. Here is the list of what can be modified using the <code>modify</code> subcommand: 1. UserName (only under certain conditions; see Note 2 in NOTES). 2. Password (only under certain conditions; see Note 3 in NOTES). To modify a password, the administrator must have the <code>solaris.admin.usermgr.pswd</code> authorization. 3. Description. 4. Primary Group ID. 5. Shell type. 6. FullName.						
OPTIONS	The <code>smmultiuser</code> authentication arguments, <i>auth_args</i>, are derived from the <code>smc(1M)</code> arg set and are the same regardless of which subcommand you use. The <code>smmultiuser</code> command requires the Solaris Management Console to be initialized for the command to succeed (see <code>smc(1M)</code>). After rebooting the Solaris Management Console server, the first Solaris Management Console connection might time out, so you might need to retry the command. The subcommand-specific options, <i>subcommand_args</i>, must come after the <i>auth_args</i> and must be separated from them by the <code>- -</code> option.						
auth_args	The valid <i>auth_args</i> are <code>-D</code>, <code>-H</code>, <code>-l</code>, <code>-p</code>, <code>-r</code>, <code>- -trust</code>, and <code>-u</code>; they are all optional. If no <i>auth_args</i> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. These letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either <code>-D</code> or <code>- -domain</code>.						

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-D | - -domain *domain*

Specifies the default domain that you want to manage. The syntax of *domain* is *type:/host_name/domain_name*, where *type* is *nis*, *nisplus*, *dns*, *ldap*, or *file*; *host_name* is the name of the machine that serves the domain; and *domain_name* is the name of the domain you want to manage. (Note: Do not use *nis+* for *nisplus*.)

If you do not specify this option, the Solaris Management Console assumes the *file* default domain on whatever server you choose to manage, meaning that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools.

-H | - -hostname *host_name:port*

Specifies the *host_name* and *port* to which you want to connect. If you do not specify a *port*, the system connects to the default port, 898. If you do not specify *host_name:port*, the Solaris Management Console connects to the local host on port 898. You may still have to choose a toolbox to load into the console. To override this behavior, use the *smc*(1M) -B option, or set your console preferences to load a "home toolbox" by default.

-l | - -rolepassword *role_password*

Specifies the password for the *role_name*. If you specify a *role_name* but do not specify a *role_password*, the system prompts you to supply a *role_password*. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-p | - -password *password*

Specifies the password for the *user_name*. If you do not specify a password, the system prompts you for one. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-r | - -rolename *role_name*

Specifies a role name for authentication. If you do not specify this option, no role is assumed.

- -trust

Trusts all downloaded code implicitly. Use this option when running the terminal console non-interactively and you cannot let the console wait for user input.

If using piped input into any of the *smmultiuser* subcommands, it will now be necessary to use the - -trust option with the -L *logfile* option. See EXAMPLES.

-u | - -username *user_name*

Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.

- -

This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the - - option.

subcommand_args

Note: Descriptions and other arg options that contain white spaces must be enclosed in double quotes.

- For subcommand **add**:
 - h
(Optional) Displays the command's usage statement.
 - i *input_file*
Specifies the input file containing the user account information. After the command is executed, the input file is removed. The input file must follow the `/etc/passwd` file format. If you do not specify the -i *input_file* option, you must include a *pipedReader* operand immediately before the command. See EXAMPLES.
 - L *logfile*
(Optional) Specifies the full pathname to the text file that stores the command's success/failure data. *Note*: This text file is an ASCII—formatted log file; it is different from and unrelated to the output of the normal logging mechanism that also occurs within the Log Viewer tool. The -L *logfile* option is used to dump additional logging information to a text file.
- For subcommand **delete**:
 - h
(Optional) Displays the command's usage statement.
 - i *input_file*
Specifies the input file containing the user account information. After the command is executed, the input file is removed. The input file must follow the `/etc/passwd` file format. If you do not specify the -i *input_file* option, you must include a *pipedReader* operand immediately before the command. See EXAMPLES.
 - L *logfile*
(Optional) Specifies the full pathname to the text file that stores the command's success/failure data.
- For subcommand **modify**:
 - h
(Optional) Displays the command's usage statement.
 - i *input_file*
Specifies the input file containing the user account information. After the command is executed, the input file is removed. The input file must follow the `/etc/passwd` file format. If you do not specify the -i *input_file* option, you must include a *pipedReader* operand immediately before the command. See EXAMPLES. *Note*: When modifying passwords, use the pipedReader input, since it is more secure than keeping passwords in a file. See Note 1 in NOTES.
 - L *logfile*
(Optional) Specifies the full pathname to the text file that stores the command's success/failure data.

OPERANDS The following operands are supported:

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	<i>pipedReader</i> You must include <i>pipedReader</i> if you do not specify an <i>input_file</i>. Include the pipedReader immediately before the command. The pipedReader must follow the <code>/etc/passwd</code> file format. See EXAMPLES. <i>Note:</i> Use the <code>-t trust</code> option when using pipedReader with the <code>-L logfile</code> option to avoid the user prompt from the Security Alert Manager, which normally asks the user whether the log file should be created. Without the <code>-t trust</code> option, the pipedReader is improperly taken as the answer to the prompt before the user can answer “Y” or “N”, and the logging operation will probably fail.						
EXAMPLES	EXAMPLE 1 Creating multiple user accounts The following reads in user account data from the <code>/tmp/foo</code> file and creates new user accounts on the local file system. The input file is formatted in the <code>/etc/passwd</code> format. <pre>./smmultiuser add -H myhost -p mypasswd -u root -- -i /tmp/foo</pre> EXAMPLE 2 Deleting multiple user accounts The following reads in user account data from the <code>/tmp/foo</code> file and deletes the named user accounts from the local file system: <pre>./smmultiuser delete -H myhost -p mypasswd -u root -- -i /tmp/foo</pre> EXAMPLE 3 Creating a log file with pipedReader input The following example shows the use of the <code>smc(1M) -t trust</code> option that is required when creating a log file. It is applicable to the <code>delete</code> and <code>modify</code> subcommands also. <pre>cat /tmp/users.txt smmultiuser add --trust -- -L /tmp/mylog.txt</pre>						
ENVIRONMENT VARIABLES	See <code>environ(5)</code> for a description of the <code>JAVA_HOME</code> environment variable, which affects the execution of the <code>smprofile</code> command. If this environment variable is not specified, the <code>/usr/java</code> location is used. See <code>smc(1M)</code>.						
EXIT STATUS	The following exit values are returned: <table> <tr> <td>0</td><td>Successful completion.</td></tr> <tr> <td>1</td><td>Invalid command syntax. A usage message displays.</td></tr> <tr> <td>2</td><td>An error occurred while executing the command. An error message displays.</td></tr> </table>	0	Successful completion.	1	Invalid command syntax. A usage message displays.	2	An error occurred while executing the command. An error message displays.
0	Successful completion.						
1	Invalid command syntax. A usage message displays.						
2	An error occurred while executing the command. An error message displays.						
FILES	The following files are used by the <code>smprofile</code> command:						

/etc/passwd Contains the file format to use for the *input_file* and *piped_input*. See passwd(4).

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmga

SEE ALSO smc(1M), passwd(4), attributes(5), environ(5)

NOTES

1. The file format used by both the add and modify subcommands is the /etc/passwd format. But there is an allowance for a mutated version of this file format that contains an extra field at the end of each line to be used for the Full Name. If the extra field is appended to the end of each line, it will be used for the Full Name value, but if it is omitted, it will be assumed that no FullName modification is being done. The extra field is separated with a colon (:), just like all the other fields.

Example of regulation /etc/passwd entry:

```
rick2:x:101:10:description1:/home/rick2:/bin/sh
```

Example of /etc/passwd variant entry:

```
rick2:x:101:10:description1:/home/rick2:/bin/sh:Ricks_fullname
```

2. The modifies are all done based on lookups of the user name in the user tables. If a user name can not be found in this lookup, a secondary check will be made to see if the uid *and* FullName can be found in the user tables. If they are both found, assume that a user rename has occurred. If neither can be found, assume that the user account does not exist and cannot be modified.
3. If no password is supplied, assume that there is no change to the password information. If a password is being changed, it should be supplied in cleartext as piped input, although this is not required. The password can be supplied in the input file also. Once read in, the password will be changed accordingly.

smoservice(1M)

NAME	smoservice – manage OS services								
SYNOPSIS	/usr/sadm/bin/smoservice <i>subcommand</i> [<i>auth_args</i>] - - [<i>subcommand_args</i>]								
DESCRIPTION	The smoservice command manages OS services. smoservice <i>subcommands</i> are: <table> <tr> <td>add</td><td>Adds the specified OS services.</td></tr> <tr> <td>delete</td><td>Deletes the specified OS services.</td></tr> <tr> <td>list</td><td>Either lists all the installed OS services for the server if you do not specify a hostname, or lists the OS services for the specified diskless client if you do specify a hostname.</td></tr> <tr> <td>patch</td><td>Manages patches on all existing diskless clients. For example, you can use this subcommand to initially establish a patch spool directory on an OS server. Then, you can apply the patch to the spool area, verifying the patch as needed. Once the patch exists in the spool area, you can apply the patch to the clone area. In addition, you can migrate the patched clone area to clients.</td></tr> </table>	add	Adds the specified OS services.	delete	Deletes the specified OS services.	list	Either lists all the installed OS services for the server if you do not specify a hostname, or lists the OS services for the specified diskless client if you do specify a hostname.	patch	Manages patches on all existing diskless clients. For example, you can use this subcommand to initially establish a patch spool directory on an OS server. Then, you can apply the patch to the spool area, verifying the patch as needed. Once the patch exists in the spool area, you can apply the patch to the clone area. In addition, you can migrate the patched clone area to clients.
add	Adds the specified OS services.								
delete	Deletes the specified OS services.								
list	Either lists all the installed OS services for the server if you do not specify a hostname, or lists the OS services for the specified diskless client if you do specify a hostname.								
patch	Manages patches on all existing diskless clients. For example, you can use this subcommand to initially establish a patch spool directory on an OS server. Then, you can apply the patch to the spool area, verifying the patch as needed. Once the patch exists in the spool area, you can apply the patch to the clone area. In addition, you can migrate the patched clone area to clients.								
OPTIONS	The smoservice authentication arguments, <i>auth_args</i>, are derived from the smc(1M) arg set and are the same regardless of which subcommand you use. The smoservice command requires the Solaris Management Console to be initialized for the command to succeed (see smc(1M)). After rebooting the Solaris Management Console server, the first Solaris Management Console connection might time out, so you might need to retry the command. The subcommand-specific options, <i>subcommand_args</i>, must come after the <i>auth_args</i> and must be separated from them by the - - option.								
<i>auth_args</i>	The valid <i>auth_args</i> are -D, -H, -l, -p, -r, and -u; they are all optional. If no <i>auth_args</i> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. These letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either -D or - -domain. -D - -domain <i>domain</i> Specifies the default domain that you want to manage. The syntax of <i>domain</i> is <i>type</i>:/<i>host_name</i>/<i>domain_name</i>, where <i>type</i> is nis, nis+, dns, ldap, or file; <i>host_name</i> is the name of the machine that serves the domain; and <i>domain_name</i> is the name of the domain you want to manage. (<i>Note: Do not use nis+ for nisplus.</i>) If you do not specify this option, the Solaris Management Console assumes the file default domain on whatever server you choose to manage, meaning that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools.								

- H | - -hostname *host_name:port*
Specifies the *host_name* and *port* to which you want to connect. If you do not specify a *port*, the system connects to the default port, 898. If you do not specify *host_name:port*, the Solaris Management Console connects to the local host on port 898. You may still have to choose a toolbox to load into the console. To override this behavior, use the `smc(1M)` -B option, or set your console preferences to load a "home toolbox" by default.
- l | - -rolepassword *role_password*
Specifies the password for the *role_name*. If you specify a *role_name* but do not specify a *role_password*, the system prompts you to supply a *role_password*. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.
- p | - -password *password*
Specifies the password for the *user_name*. If you do not specify a password, the system prompts you for one. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.
- r | - -rolename *role_name*
Specifies a role name for authentication. If you do not specify this option, no role is assumed.
- u | - -username *user_name*
Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.
- -
This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the - - option.

subcommand_args

Note: Descriptions and other arg options that contain white spaces must be enclosed in double quotes.

- For subcommand add:

- h
(Optional) Displays the command's usage statement.
- o *os_server*
(Optional) Specifies the name of the host where the OS service filesystems reside. If this option is not specified, the host will be the same as that specified in the `smc(1M)` -D option. This option is useful in the event that the name service server and the OS server are not the same machine.
- x *mediapath=path*
Specifies the full path to the Solaris CD image.
- x *platform=platform*
Specifies the OS service to add. The instruction architecture, machine class, OS, and version are given in the form:

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instruction_set.machine_class.Solaris_os_version for example,
`sparc.sun4m.Solaris_9`

-x cluster=cluster

Specifies the Solaris cluster to install. For example, `SUNWCa11`.

-x locale=locale[locale, . . .]

(Optional) Specifies the locales to install from the specified cluster. A comma-delimited list of locales can be specified.

■ For subcommand **delete**:

-h

(Optional) Displays the command's usage statement.

-o os_server

(Optional) Specifies the name of the host where the OS service filesystems reside. If this option is not specified, the host will be the same as that specified in the `smc(1M) -D` option. This option is useful in the event that the name service server and the OS server are not the same machine.

-x rmplatform=platform

Specifies the OS service to remove. The instruction architecture, machine class, OS, and version are given in the form:

instruction_set.machine_class.Solaris_os_version for example,
`sparc.all.Solaris_9`. *Note:* Only a machine class of `all` is supported.

■ For subcommand **list**:

-h

(Optional) Displays the command's usage statement.

-o os_server

(Optional) Specifies the name of the host where the OS service filesystems reside. If this option is not specified, the host will be the same as that specified in the `smc(1M) -D` option. This option is useful in the event that the name service server and the OS server are not the same machine.

■ For subcommand **patch**:

-a patch_directory/patch_ID

Adds the specified patch, *patch_ID*, to the spool directory. *patch_directory* specifies the source path of the patch to be spooled which includes the patchid directory name. Patches are spooled to `/export/diskless/Patches/`. If the patch being added obsoletes an existing patch in the spool, the obsolete patch is moved to the archive area, `/export/diskless/Patches/Archive` (to be restored if this new patch is ever removed).

-h

(Optional) Displays the command's usage statement.

-m

(Optional) Synchronizes spooled patches with offline copies of each diskless client OS service on the server. Spooled patches and applied patches are compared so that newly spooled patches can be installed and patches recently removed from the spool can be backed out. This option does not apply to patches directly to diskless client OS services or diskless clients; the -u option must be used to update the services and clients with the changes. Clients are not required to be down at this time, as all patching is done off line. *Note:* The server is fully available during this operation.

-P

Lists all currently spooled patches with an associated synopsis. The list is split up into sections detailing the patches for each OS and architecture in this format:

```
Solaris os_rell architecture1:
patchid Synopsis
patchid Synopsis
.....
Solaris os_rell architecture2:
patchid Synopsis
.....
```

-r *patchid*

Removes the specified patchid from the spool if it is not a requirement for any of the other patches in the spool. All archived patches that were obsoleted by the removed patch are restored to the spool.

-U

(Optional) Updates all diskless client OS services and diskless clients with any changes after synchronizing patches with the -m option. Clients must be brought down during this operation. Once execution has completed, each client should be booted again.

EXAMPLES

EXAMPLE 1 Creating a new OS service

The following command adds an OS service for Solaris 9 for the sun4u machine class where the OS server is *not* using a name service:

```
example% /usr/sadm/bin/smosservice add -- \
-x mediapath=/net/imageserver/5.8/sparc \
-x platform=sparc.sun4u.Solaris_9 \
-x cluster=SUNWCXall -x locale=en_US
```

The following command adds an OS service for Solaris 9 for the sun4u machine class where the OS server is using NIS, the NIS server is nisserver, the OS server is osserver, and the port to which you connect on osserver is 898:

```
example% /usr/sadm/bin/smosservice add -D nis:/nisserver/my.domain.com -- \
-H osserver:898 -- \
-x mediapath=/net/imageserver/5.8/sparc \
-x platform=sparc.sun4u.Solaris_9 \
```

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```
-x cluster=SUNWCXall -x locale=en_US \  
-o osserver
```

In the preceding example, the OS service is placed in `/export` on `osserver`, while the `hosts.byaddr`, `ethers`, and `bootparams` maps are updated on the NIS server.

EXAMPLE 2 Deleting an OS service

The following command deletes the OS service for Solaris 9 for the `sun4u` machine class where the OS server is using NIS, the NIS server is `nissERVER`, and the OS server is `osserver`:

```
example% /usr/sadm/bin/smoservice delete\  
-D nis:/nissERVER/my.domain.com -- \  
-x rmpatform=sparc.all.Solaris_9 \  
-o osserver
```

EXAMPLE 3 Listing installed OS services

The following command lists the OS services installed on the machine, `osserver`:

```
example% /usr/sadm/bin/smoservice list \  
-D file:/osserver/osserver -- -o osserver
```

ENVIRONMENT VARIABLES

See `environ(5)` for a description of the `JAVA_HOME` environment variable, which affects the execution of the `smoservice` command. If this environment variable is not specified, the `/usr/java1.2` location is used. See `smc(1M)`.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	Invalid command syntax. A usage message displays.
2	An error occurred while executing the command. An error message displays.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWdcInt

SEE ALSO

`smc(1M)`, `smdiskless(1M)`, `attributes(5)`, `environ(5)`

NAME	smpatch – manage patches
SYNOPSIS	<code>/usr/sadm/bin/smpatch subcommand [auth_args] -- [subcommand_args]</code>
DESCRIPTION	The <code>smpatch</code> command manages patch installation on single or multiple machines, analyzes patch requirements, and downloads required patches. To run this command on multiple machines, you must first create a role on each machine that contains the necessary rights to perform patch management. In addition, all of the machines on which you want to install patches must run the same version of the Solaris operating environment, have the same hardware architecture, and have the same patches installed.
Subcommands	The following subcommands are supported: add Installs patches on single or multiple machines. You can either specify the patch IDs and the machine names directly on the command line, or you can specify a <i>patchlist_file</i> and a <i>machinelist_file</i> that contains the list of patches and the machines on which you want to install the patches, respectively. analyze Analyzes and lists the patches required for a specified machine. You must first install the PatchPro application on the host machine before you run the <code>analyze</code> command. To install PatchPro, download the packages from the Sun Microsystems web site and follow the instructions to install the software on your machine. download Downloads patches from the SunSolve Online database to the patch directory. You can either specify the patches that you want to download, or you can specify a machine name to download the recommended patches for that machine. You must first install the PatchPro application on the host machine before you run the <code>download</code> command. To install PatchPro, download the packages from the Sun Microsystems web site and follow the instructions to install the software on your machine. remove Removes a single patch from a system. update Analyzes the single local or remote system, downloads the recommended patches, and installs the recommended patches on the system. The default installation policy installs the standard patches and sequesters the non-standard patches. Standard patches can be safely installed in a multi-user mode. Non-standard patches require special installation instructions. You can find these instructions in the README file for each patch. To change the installation policy, refer to PatchPro documentation (<code>pprosetup</code>). You must install the PatchPro application on the host machine before running the <code>update</code> command. To

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	install PatchPro, download the packages from http://www.sun.com and follow the instructions to install the software on your machine.
OPTIONS	There are two kinds of options: authentication arguments (<i>auth_args</i>) and subcommand arguments (<i>subcommand_args</i>).
Authentication Arguments	The <code>smpatch</code> authentication arguments, <i>auth_args</i>, are derived from the <code>smc(1M)</code> argument set and are the same regardless of which subcommand you use. Valid <i>auth_args</i> are <code>-D</code>, <code>-H</code>, <code>-l</code>, <code>-p</code>, <code>-r</code>, and <code>-u</code>; they are all optional. If no <i>auth_args</i> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. The single letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either <code>-D</code> or <code>--domain</code>. Descriptions and other arg options that contain white spaces must be enclosed in double quotes. The following authentication arguments (<i>auth_args</i>) are supported: <code>-D</code> <code>--domain</code> <i>domain</i> Specifies the default domain that you want to manage. <code>smpatch</code> only accepts files for this option. If you do not specify this option, the Solaris Management Console assumes the file default domain on whatever server you choose to manage, meaning that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools. <code>-H</code> <code>--hostname</code> <i>host_name:port</i> Specifies the host and port to which you want to connect. If you do not specify a port, the system connects to the default port, 898. If you do not specify a host (<i>host_name:port</i>, the Solaris Management Console connects to the local host on port 898. You may still have to choose a toolbox to load into the console. To override this behavior, use the <code>smc -B</code> option, or set your console preferences to load a home toolbox by default. <code>-l</code> <code>--rolepassword</code> <i>role_password</i> Specifies the password for the <i>role_name</i>. If you specify a <i>role_name</i> but do not specify a <i>role_password</i>, the system prompts you to supply a <i>role_password</i>. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure. <code>-p</code> <code>--password</code> <i>password</i> Specifies the password for the <i>user_name</i>. If you do not specify a password, the system prompts you for one. Because passwords specified on the command line can be seen by any user on the system, this option is considered insecure. <code>-r</code> <code>--rolename</code> <i>role_name</i> Specifies a role name for authentication. If you do not specify this option, no role is assumed.

Subcommand Arguments

`-u | --username user_name`

Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.

`--`

This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the `--` option.

The subcommand-specific options, `subcommand_args`, must come after the `auth_args` and must be separated from them by the `--` option. Enclose descriptions and `arg` options that contain white space in double quotes.

add

The add subcommand requires one of the following subcommand arguments:

`-i patch_id1 -i patch_id2 . . .`

Specifies the patch or patches that you want to install. You can specify the `-x idlist=patch_id_file` operand instead of specifying this option.

`-x idlist=patchlist_file`

Specifies a file that contains the list of patches that you want to install. You can specify the `-i patch_id1` option instead of specifying this operand.

The following subcommand arguments are optional for the add subcommand:

`-d patchdir`

Specifies the directory where the patches are located. If you do not specify this option, the default patch spool directory (`/var/sadm/spool`), located on the host specified with the `-H` authentication argument, is assumed. The patch directory has the following syntax: *machine_name* : *directory_path*, where *directory_path* is a fully-qualified, shared directory. You can specify just the *directory_path* if the directory is an NFS-mounted network directory or is located on the machine on which you want to install the patches.

`-h`

Displays the command's usage statement.

`-n machine_name1 -n machine_name2 . . .`

Specifies the machine(s) on which you want to install the patches. If you do not specify this option, the machine is assumed to be that specified with the `-H` authentication argument. You can specify the `-x mlist=machine_name_file` operand instead of specifying this option.

`-x mlist=machinelist_file`

Specifies a file that contains the list of machines to which you want to install patches. You can specify the `-n machine_name1` option instead of specifying this operand.

analyze

The following subcommand arguments are optional for the analyze subcommand:

`-h`

Displays the command's usage statement.

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-n machine_name

Specifies the machine for which you want to display a list of patches recommended by SunSolve. If you do not specify this option, the machine is assumed to be that specified by the *-H* authentication argument.

download

The `download` subcommand requires one of the following subcommand arguments:

-i patch_id1 -i patch_id2 . . .

Specifies the patch or patches that you want to download. You can specify the *-x idlist=patch_id_file* operand instead of this option or you can omit this argument in favor of *-n download_machine* option.

-x idlist=patchlist_file

Specifies the file containing the list of patches that you want to download. You can specify this operand instead of specifying the *-i patch_id1* option.

The following subcommand arguments are optional for the `download` subcommand:

-n download_machine

Specifies the machine on which you want to download the recommended patches. If you do not specify this option, the machine is assumed to be that specified by the *-H* authentication argument.

-d download_dir

Specifies the directory where the patches are downloaded. This directory must have write permission and be accessible to the `download_machine`. If you do not specify this option, the default patch spool directory (`/var/sadm/spool`) located on the download machine is assumed.

remove

The `remove` subcommand requires the following arguments:

-i patch_id

Specifies the patch that you want to remove.

The following subcommand arguments are optional for the `remove` subcommand:

-n machine

Specifies the machine on which you want to remove the recommended patches. If you do not specify this option, the machine is assumed to be that specified by the *-H* authentication argument.

update

The following subcommand arguments are optional for the `update` subcommand:

-n machine_name

Specifies the machine for which you want to display a list of patches recommended by SunSolve. If you do not specify this option, the machine is assumed to be that specified by the *-H* authentication argument.

-d *patchdir*

Specifies the directory where the patches are downloaded. This directory must have write permission and must be accessible to the machine that is being analyzed. If you do not specify this option, the default patch spool directory (`/var/sadm/spool`) located on the machine that is being analyzed is assumed. After the required patches are downloaded, they are installed from the effective patch directory.

Patches that could not be installed are sequestered to the `patchdir/patchproSequester` directory, where *patchdir* is the effective patch directory. See `update -d`.

OPERANDS The following operands are supported:

<i>machinelist_file</i>	Specifies the fully-qualified path and file name of the file containing the list of machine names on which you want to install the patches. The <i>machinelist_file</i> file contains one machine name per line.
<i>patchlist_file</i>	Specifies the fully-qualified path and file name of the file containing the list of patches that you want to install. The <i>patchlist_file</i> contains one patch ID per line.

EXAMPLES **EXAMPLE 1** Installing Patches on Multiple Machines

The following example installs patches 102893-01, 106895-09, and 106527-05 on the machines lab1 and lab2. The patches are located in the `/files/patches/s9` shared directory on the machine fileserver:

```
/usr/sadm/bin/smpatch add -H myhost -p mypasswd -u root -- \
-i 102893-01 -i 106895-09 -i 106527-05 \
-d fileserver:/files/patches/s9 \
-n lab1 -n lab2
```

EXAMPLE 2 Installing Patches Using a `patch_list` File

The following example specifies the `/tmp/patch/patch_file` to install patches on the machines lab1 and lab2. The patches are located in the NFS network-mounted directory `/net/fileserver/export/patchspool/Solaris9`:

```
/usr/sadm/bin/smpatch add -H myhost -p mypasswd -u root -- \
-x mlist=/tmp/patch/patch_file \
-d /net/fileserver/export/patchspool/Solaris9 \
-n lab1 -n lab2
```

EXAMPLE 3 Installing Patches Using a `patch_list` File and a `machine_list` File

The following example installs the patches listed in `/tmp/patch/patch_file` on the machines listed in `/tmp/patch/machine_file`. The patches are located in the default `/var/sadm/spool` directory on the default machine myhost.

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EXAMPLE 3 Installing Patches Using a patch_list File and a machine_list File *(Continued)*

```
/usr/sadm/bin/smpatch add -H myhost -p mypasswd -u root -- \
-x mlist=/tmp/patch/patch_file \
-x mlist=/tmp/patch/machine_file
```

EXAMPLE 4 Analyzing and Downloading Patches from Sunsolve Online

The following example analyzes the lab1 machine and downloads the assessed patches from the Sunsolve Online database to the default patch spool directory.

```
/usr/sadm/bin/smpatch download -p mypasswd -u root -- -n lab1
```

EXAMPLE 5 Downloading Patches From the Sunsolve Database

The following example downloads the 102893-01 and 106895-09 patches from the Sunsolve Online database to the /files/patches/s8 directory located on the default machine.

```
/usr/sadm/bin/smpatch download -p mypasswd -u root -- \
-i 102893-01 -i 106895-09 -d /files/patches/s8
```

EXAMPLE 6 Removing Patches

The following example removes patch 102893-01:

```
/usr/sadm/bin/smpatch remove -p mypasswd -u root -- \
-i 10283-01
```

EXAMPLE 7 Updating Your System

The following example analyzes your local or remote system and lists the recommended patches. It downloads them in a specified directory and installs the standard patches:

```
/usr/sadm/bin/smpatch update -u root --
```

ENVIRONMENT VARIABLES

See environ(5) for descriptions of the following environment variables that affect the execution of smpatch: JAVA_HOME. If this environment variable is not specified, the /usr/java location is used. See smc(1M).

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	Invalid command syntax. A usage message displays.
2	An error occurred while executing the command. An error message displays.

smpatch(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmga

SEE ALSO arch(1), uname(1), patchadd(1M), patchrm(1M), share(1M), smc(1M), attributes(5), environ(5)

smprofile(1M)

NAME	smprofile – manage profiles in the prof_attr and exec_attr databases								
SYNOPSIS	<code>/usr/sadm/bin/smprofile subcommand [auth_args] - - [subcommand_args]</code>								
DESCRIPTION	The smprofile command manages one or more profiles in the prof_attr(4) or exec_attr(4) databases in the local /etc files name service or a NIS or NIS+ name service.								
<i>subcommands</i>	smprofile subcommands are: <table> <tr> <td>add</td><td>Adds a new profile (right) to the prof_attr(4) database. To add a profile, the administrator must have the solaris.profmgr.write authorization.</td></tr> <tr> <td>delete</td><td>Deletes a profile from the prof_attr(4) database, deletes all associated entries from the exec_attr(4) database, and deletes the assigned profile from the user_attr(4) database. To delete a profile, the administrator must have the solaris.profmgr.execattr.write and solaris.profmgr.write authorization.</td></tr> <tr> <td>list</td><td>Lists one or more profiles from the prof_attr(4) or exec_attr(4) databases. To list a profile, the administrator must have the solaris.profmgr.read authorization.</td></tr> <tr> <td>modify</td><td>Modifies a profile in the prof_attr(4) database. To modify a profile, the administrator must have the solaris.profmgr.write authorization.</td></tr> </table>	add	Adds a new profile (right) to the prof_attr(4) database. To add a profile, the administrator must have the solaris.profmgr.write authorization.	delete	Deletes a profile from the prof_attr(4) database, deletes all associated entries from the exec_attr(4) database, and deletes the assigned profile from the user_attr(4) database. To delete a profile, the administrator must have the solaris.profmgr.execattr.write and solaris.profmgr.write authorization.	list	Lists one or more profiles from the prof_attr(4) or exec_attr(4) databases. To list a profile, the administrator must have the solaris.profmgr.read authorization.	modify	Modifies a profile in the prof_attr(4) database. To modify a profile, the administrator must have the solaris.profmgr.write authorization.
add	Adds a new profile (right) to the prof_attr(4) database. To add a profile, the administrator must have the solaris.profmgr.write authorization.								
delete	Deletes a profile from the prof_attr(4) database, deletes all associated entries from the exec_attr(4) database, and deletes the assigned profile from the user_attr(4) database. To delete a profile, the administrator must have the solaris.profmgr.execattr.write and solaris.profmgr.write authorization.								
list	Lists one or more profiles from the prof_attr(4) or exec_attr(4) databases. To list a profile, the administrator must have the solaris.profmgr.read authorization.								
modify	Modifies a profile in the prof_attr(4) database. To modify a profile, the administrator must have the solaris.profmgr.write authorization.								
OPTIONS	The smprofile authentication arguments, <i>auth_args</i>, are derived from the smc(1M) arg set and are the same regardless of which subcommand you use. The smprofile command requires the Solaris Management Console to be initialized for the command to succeed (see smc(1M)). After rebooting the Solaris Management Console server, the first Solaris Management Console connection might time out, so you might need to retry the command. The subcommand-specific options, <i>subcommand_args</i>, must come after the <i>auth_args</i> and must be separated from them by the - - option.								
<i>auth_args</i>	The valid <i>auth_args</i> are -D, -H, -l, -p, -r, and -u; they are all optional. If no <i>auth_args</i> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. These letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either -D or - -domain with the <i>domain</i> argument. -D - -domain <i>domain</i> Specifies the default domain that you want to manage. The syntax of <i>domain</i> is <i>type:/host_name/domain_name</i>, where <i>type</i> is nis, nisplus, dns, ldap, or file; <i>host_name</i> is the name of the machine that serves the domain; and <i>domain_name</i> is the name of the domain you want to manage. (Note: Do not use nis+ for nisplus.)								

If you do not specify this option, the Solaris Management Console assumes the file default domain on whatever server you choose to manage, meaning that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools.

-H | - *-hostname host_name:port*

Specifies the *host_name* and *port* to which you want to connect. If you do not specify a *port*, the system connects to the default port, 898. If you do not specify *host_name:port*, the Solaris Management Console connects to the local host on port 898. You may still have to choose a toolbox to load into the console. To override this behavior, use the `smc(1M) -B` option, or set your console preferences to load a "home toolbox" by default.

-l | - *-rolepassword role_password*

Specifies the password for the *role_name*. If you specify a *role_name* but do not specify a *role_password*, the system prompts you to supply a *role_password*. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-p | - *-password password*

Specifies the password for the *user_name*. If you do not specify a password, the system prompts you for one. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-r | - *-rolename role_name*

Specifies a role name for authentication. If you do not specify this option, no role is assumed.

-u | - *-username user_name*

Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.

- -

This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the **- -** option.

subcommand_args

Note: Descriptions and other arg options that contain white spaces must be enclosed in double quotes.

■ For subcommand **add**:

-a *addauth1* **-a** *addauth2* . . .

(Optional) Specifies the authorization name(s) to add to the new profile. The administrator must have the `solaris.profmgr.write` authorization and must have the corresponding "grant" authorization. A "grant" authorization is one in which the lowest component of the authorization name is replaced by the word `grant`. For example, to grant some profile the `solaris.role.write` authorization, the administrator needs that authorization and also the `solaris.role.grant` authorization. For more information on granting authorizations, see `auth_attr(4)`.

smprofile(1M)

- d *description*
Specifies the description of the new profile.
- h
(Optional) Displays the command's usage statement.
- m *html_help*
Specifies the HTML help file name for the new profile. The help file name must be put in the `/usr/lib/help/profiles/locale/C` directory.
- n *name*
Specifies the name of the new profile.
- p *addprof1* -p *addprof2* . . .
(Optional) Specifies the supplementary profile name(s) to add to the new profile.
- For subcommand `delete`:
 - h
(Optional) Displays the command's usage statement.
 - n *name*
Specifies the name of the profile you want to delete.
- For subcommand `list`:
 - h
(Optional) Displays the command's usage statement.
 - l
(Optional) Displays the detailed output for each profile in a block of *key:value* pairs, followed by a blank line that delimits each profile block. Each *key:value* pair is displayed on a separate line. All the attributes associated with a profile from the `prof_attr` and `exec_attr` databases are displayed. If you do not specify this option, only the specified profile name(s) and associated profile description(s) are displayed.
 - n *name1* -n *name2* . . .
(Optional) Specifies the profile(s) that you want to display. If you do not specify a profile name, all profiles are displayed.
- For subcommand `modify`:
 - a *addauth1* -a *addauth2* . . .
(Optional) Specifies the authorization name(s) to add to the profile. The administrator must currently have been granted each of the specified authorizations and must have the ability to grant each of those authorizations to other users or roles. For more information on granting authorizations, see `auth_attr(4)`.
 - d *description*
(Optional) Specifies the new description of the profile.
 - h
(Optional) Displays the command's usage statement.

- m *html_help*
(Optional) Specifies the new HTML help file name of the profile. If you change this name, you must accordingly rename the help file name entered in the `/usr/lib/help/profiles/locale/C` directory.
- n *name*
Specifies the name of the profile you want to modify.
- p *addprof1* -p *addprof2* ...
(Optional) Specifies the supplementary profile name(s) to add to the profile. The administrator must have the `solaris.profmgr.assign` authorization to add any profile and the `solaris.profmgr.delegate` authorization to add any profile that has been assigned to the authenticated user.
- q *delprof1* -q *delprof2* ...
(Optional) Specifies the supplementary profile name(s) to delete from the profile. The administrator must have the `solaris.profmgr.assign` authorization to delete any profile and the `solaris.profmgr.delegate` authorization to delete any profile that has been assigned to the authenticated user.
- r *delauth1* -r *delauth2* ...
(Optional) Specifies the authorization name(s) to delete from the profile. The administrator must have the `solaris.profmgr.write` authorization and must have the corresponding "grant" authorization. For more information about "grant" authorizations, see the `-a` option description for the `add` subcommand above.

EXAMPLES**EXAMPLE 1** Creating a new profile

The following creates a new User Manager profile on the local file system. The new profile description is Manage users and groups, and the authorizations assigned are `solaris.admin.usermgr.write` and `solaris.admin.usermgr.read`. The supplementary profile assigned is Operator. The help file name is `RtUserMgmt.html`.

```
./smprofile add -H myhost -p mypasswd -u root -- -n "User Manager" \
-d "Manage users and groups" -a solaris.admin.usermgr.write \
-a solaris.admin.usermgr.read -p Operator -m RtUserMgmt.html
```

EXAMPLE 2 Deleting a profile

The following deletes the User Manager profile from the local file system:

```
./smprofile delete -H myhost -p mypasswd -u root -- -n "User Manager"
```

EXAMPLE 3 Listing all profiles

The following lists all profiles and their associated profile descriptions on the local file system.

```
./smprofile list -H myhost -p mypasswd -u root --
```

smprofile(1M)

EXAMPLE 4 Modifying a profile

The following modifies the User Manager profile on the local file system. The new profile description is Manage world, the new authorization assignment is solaris.admin.usermgr.* authorizations, and the new supplementary profile assignment is All. (The -a option argument must be enclosed in double quotes when the wildcard character (*) is used.)

```
./smprofile modify -H myhost -p mypasswd -u root -- -n "User Manager" \  
-d "Manage world" -a "solaris.admin.usermgr.*" -p All
```

ENVIRONMENT VARIABLES

See environ(5) for a description of the JAVA_HOME environment variable, which affects the execution of the smprofile command. If this environment variable is not specified, the /usr/java location is used. See smc(1M).

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	Invalid command syntax. A usage message displays.
2	An error occurred while executing the command. An error message displays.

FILES

The following files are used by the smprofile command:

/etc/security/exec_attr	Execution profiles database. See exec_attr(4).
/etc/security/prof_attr	Profile description database. See prof_attr(4).
/etc/user_attr	Extended user attribute database. See user_attr(4).

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmga

SEE ALSO

smc(1M), auth_attr(4), exec_attr(4), prof_attr(4), user_attr(4), attributes(5), environ(5)

NAME	smrole – manage roles and users in role accounts								
SYNOPSIS	<code>/usr/sadm/bin/smrole subcommand [auth_args] - - [subcommand_args]</code>								
DESCRIPTION	The smrole command manages roles and adds or deletes users in role accounts.								
subcommands	smrole subcommands are: <table> <tr> <td>add</td><td>Adds a new role entry. To add an entry, the administrator must have the <code>solaris.role.write</code> authorization.</td></tr> <tr> <td>delete</td><td>Deletes one or more roles. To delete an entry, the administrator must have the <code>solaris.role.write</code> authorization.</td></tr> <tr> <td>list</td><td>Lists one or more roles. If you do not specify a role name, all roles are listed. To list an entry, the administrator must have the <code>solaris.admin.usermgr.read</code> authorization.</td></tr> <tr> <td>modify</td><td>Adds or deletes users from a role account. To modify an entry, the administrator must have the <code>solaris.role.write</code> authorization.</td></tr> </table>	add	Adds a new role entry. To add an entry, the administrator must have the <code>solaris.role.write</code> authorization.	delete	Deletes one or more roles. To delete an entry, the administrator must have the <code>solaris.role.write</code> authorization.	list	Lists one or more roles. If you do not specify a role name, all roles are listed. To list an entry, the administrator must have the <code>solaris.admin.usermgr.read</code> authorization.	modify	Adds or deletes users from a role account. To modify an entry, the administrator must have the <code>solaris.role.write</code> authorization.
add	Adds a new role entry. To add an entry, the administrator must have the <code>solaris.role.write</code> authorization.								
delete	Deletes one or more roles. To delete an entry, the administrator must have the <code>solaris.role.write</code> authorization.								
list	Lists one or more roles. If you do not specify a role name, all roles are listed. To list an entry, the administrator must have the <code>solaris.admin.usermgr.read</code> authorization.								
modify	Adds or deletes users from a role account. To modify an entry, the administrator must have the <code>solaris.role.write</code> authorization.								
OPTIONS	The smrole authentication arguments, <i>auth_args</i>, are derived from the smc(1M) arg set and are the same regardless of which subcommand you use. The smrole command requires the Solaris Management Console to be initialized for the command to succeed (see smc(1M)). After rebooting the Solaris Management Console server, the first Solaris Management Console connection might time out, so you might need to retry the command. The subcommand-specific options, <i>subcommand_args</i>, must come after the <i>auth_args</i> and must be separated from them by the - - option.								
auth_args	The valid <i>auth_args</i> are -D, -H, -l, -p, -r, and -u; they are all optional. If no <i>auth_args</i> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. These letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either -D or - --domain with the <i>domain</i> argument. -D - --domain <i>domain</i> Specifies the default domain that you want to manage. The syntax of <i>domain</i> is <i>type: /host_name /domain_name</i>, where <i>type</i> is nis, nisplus, dns, ldap, or file; <i>host_name</i> is the name of the machine that serves the domain; and <i>domain_name</i> is the name of the domain you want to manage. (Note: Do not use nis+ for nisplus.) If you do not specify this option, the Solaris Management Console assumes the file default domain on whatever server you choose to manage, meaning that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools. -H - --hostname <i>host_name:port</i> Specifies the <i>host_name</i> and <i>port</i> to which you want to connect. If you do not specify a <i>port</i>, the system connects to the default port, 898. If you do not specify								

smrole(1M)

host_name:port, the Solaris Management Console connects to the local host on port 898. You may still have to choose a toolbox to load into the console. To override this behavior, use the `smc(1M) -B` option, or set your console preferences to load a “home toolbox” by default.

`-l | - -rolepassword role_password`

Specifies the password for the *role_name*. If you specify a *role_name* but do not specify a *role_password*, the system prompts you to supply a *role_password*. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

`-p | - -password password`

Specifies the password for the *user_name*. If you do not specify a password, the system prompts you for one. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

`-r | - -rolename role_name`

Specifies a role name for authentication. If you do not specify this option, no role is assumed.

`-u | - -username user_name`

Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.

`- -`

This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the `- -` option.

subcommand_args

Note: Descriptions and other arg options that contain white spaces must be enclosed in double quotes.

■ For subcommand `add`:

`-a adduser1 -a adduser2 . . .`

(Optional) Specifies the user name(s) to add to the new role. The administrator must have the `solaris.role.assign` authorization.

`-c comment`

(Optional) Includes a short description of the role. Consists of a string of up to 256 printable characters, excluding the colon (:).

`-d dir`

(Optional) Specifies the home directory of the new role, limited to 1024 characters.

`-F full_name`

(Optional) Specifies the full, descriptive name of the role. The *full_name* must be unique within a domain, and can contain alphanumeric characters and spaces. If you use spaces, you must enclose the *full_name* in double quotes.

-G *group1* -G *group2* . . .

(Optional) Specifies the new role's supplementary group membership in the system group database with the character string names of one or more existing groups. *Note:* You cannot assign a primary group to a role. A role's primary group is always sysadmin (group 14).

-h

(Optional) Displays the command's usage statement.

-n *rolename*

Specifies the name of the role you want to create.

-p *addprof1* -p *addprof2* . . .

(Optional) Specifies the profile(s) to add to the role. To assign a profile to a role, the administrator must have the `solaris.profmgr.assign` or `solaris.profmgr.delegate` authorization.

-P *password*

(Optional) Specifies the role's password. The *password* can contain up to eight characters. If you do not specify a password, the system prompts you for one. To set the password, the administrator must have the `solaris.admin.usermgr.pswd` authorization. *Note:* When you specify a password using the **-P** option, you type the password in plain text. Specifying a password using this method introduces a security gap while the command is running. However, if you do not specify a password (and the system prompts you for one), the echo is turned off when you type in the password.

-s *shell*

(Optional) Specifies the full pathname of the program used as the role's shell on login. Valid entries are `/bin/pfcs` (C shell), `/bin/pfksh` (Korn shell), and `/bin/pfsh` (Bourne shell), the default.

-u *uid*

(Optional) Specifies the ID of the role you want to add. If you do not specify this option, the system assigns the next available unique ID greater than 100.

-x *autohome=Y|N*

(Optional) Sets the role's home directory. The home directory path in the password entry is set to `/home/login name`.

-x *perm=home_perm*

(Optional) Sets the permissions on the role's home directory. *perm* is interpreted as an octal number, and the default is 0775.

-x *serv=homedir_server*

(Optional) If **-D** is `nis`, `nisplus`, or `ldap`, use this option to specify the name of the server where the user's home directory resides. Users created in a local scope must have their home directory server created on their local machines.

■ For subcommand **delete**:

-h

(Optional) Displays the command's usage statement.

smrole(1M)

- n *rolename1* -n *rolename2* ...
Specifies the name of the role(s) you want to delete.
- For subcommand **list**:
 - h
(Optional) Displays the command's usage statement.
 - l
(Optional) Displays the output for each user in a block of *key:value* pairs (for example, *user name:root*), followed by a blank line that delimits each user block. Each *key:value* pair is displayed on a separate line. The keys are:
autohome setup, comment, home directory, login shell, primary group, secondary groups, server, user ID (UID), and user name.
 - n *role1* -n *role2* ...
(Optional) Specifies the role(s) that you want to list. If you do not specify a role name, all roles are listed.
- For subcommand **modify**:
 - a *adduser1* -a *adduser2* ...
(Optional) Specifies the user name(s) to add to the new role. The administrator must have the `solaris.role.assign` authorization, or must have the `solaris.role.delegate` authorization and be a member of the role being modified.
 - c *comment*
(Optional) Includes a short description of the role. Consists of a string of up to 256 printable characters, excluding the colon (:).
 - d *dir*
(Optional) Specifies the home directory of the new role, limited to 1024 characters.
 - F *full_name*
(Optional) Specifies the full, descriptive name of the role. The *full_name* must be unique within a domain, and can contain alphanumeric characters and spaces. If you use spaces, you must enclose the *full_name* in double quotes.
 - G *group1* -G *group2* ...
(Optional) Specifies the new role's secondary group membership in the system group database with the character string names of one or more existing groups.
Note: You cannot assign a primary group to a role. A role's primary group is always `sysadmin` (group 14).
 - h
(Optional) Displays the command's usage statement.
 - n *rolename*
Specifies the name of the role you want to modify.
 - N *new_rolename*
(Optional) Specifies the new name of the role.

- p *addprof1* -p *addprof2* . . .
(Optional) Specifies the profile(s) to add to the role. To assign a profile to a role, the administrator must have the `solaris.profmgr.assign` or `solaris.profmgr.delegate` authorization.
- P *password*
(Optional) Specifies the role's password. The *password* can contain up to eight characters. To set the password, the administrator must have the `solaris.admin.usermgr.pswd` authorization. *Note:* When you specify a password, you type the password in plain text. Specifying a password using this method introduces a security gap while the command is running.
- q *delprof1* -q *delprof2* . . .
(Optional) Specifies the profile(s) to delete from the role.
- r *deluser1* -r *deluser2* . . .
(Optional) Specifies the user name(s) to delete from the role.
- s *shell*
(Optional) Specifies the full pathname of the program used as the role's shell on login. Valid entries are `/bin/pfcsk` (C shell), `/bin/pfksh` (Korn shell), and `/bin/pfsh` (Bourne shell), the default.
- x *autohome=Y|N*
(Optional) Sets the role's home directory. The home directory path in the password entry is set to `/home/login_name`.
- x *perm=home_perm*
(Optional) Sets the permissions on the role's home directory. *perm* is interpreted as an octal number, and the default is 0775.

EXAMPLES**EXAMPLE 1** Creating a role account

The following creates the `role1` account with a full name of Engineering Admin and a password of `abc123` on the local file system, and assigns `user1` and `user2` to the role. This role has Name Service Security and Audit Review rights. The system assigns the next available unique UID greater than 100.

```
./smrole add -H myhost -p mypasswd -u root -- -n role1 \
-F "Engineering Admin" -P abc123 -a user1 -a user2 \
-p "Name Service Security" -p "Audit Review"
```

EXAMPLE 2 Deleting role accounts

The following deletes the `role1` and `role2` accounts from the local file system.

```
./smrole delete -H myhost -p mypasswd -u root -- -n role1 -n role2
```

EXAMPLE 3 Listing role accounts

The following lists all role accounts on the local file system in summary form.

```
./smrole list -H myhost -p mypasswd -u root --
```

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EXAMPLE 4 Modifying a role account

The following modifies the `role1` account so the role defaults to the Korn shell, includes the `user3` account, and does not include the `user2` account.

```
./smrole modify -H myhost -p mypasswd -u root -- -n role1 \  
-s /bin/pfksh -a user3 -r user2
```

ENVIRONMENT VARIABLES

See `environ(5)` for a description of the `JAVA_HOME` environment variable, which affects the execution of the `smrole` command. If this environment variable is not specified, the `/usr/java` location is used. See `smc(1M)`.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	Invalid command syntax. A usage message displays.
2	An error occurred while executing the command. An error message displays.

FILES

The following files are used by the `smrole` command:

<code>/etc/aliases</code>	Mail aliases. See <code>aliases(4)</code> .
<code>/etc/auto_home</code>	Automatic mount points. See <code>automount(1M)</code> .
<code>/etc/group</code>	Group file. See <code>group(4)</code> .
<code>/etc/passwd</code>	Password file. See <code>passwd(4)</code> .
<code>/etc/security/policy.conf</code>	Configuration file for security policy. See <code>policy.conf(4)</code> .
<code>/etc/shadow</code>	Shadow password file. See <code>shadow(4)</code> .
<code>/etc/user_attr</code>	Extended user attribute database. See <code>user_attr(4)</code> .

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmga

SEE ALSO

`automount(1M)`, `smc(1M)`, `aliases(4)`, `group(4)`, `passwd(4)`, `policy.conf(4)`, `shadow(4)`, `user_attr(4)`, `attributes(5)`, `environ(5)`

NAME	smrsh – restricted shell for sendmail				
SYNOPSIS	smrsh -c <i>command</i>				
DESCRIPTION	The smrsh program is intended as a replacement for the sh command in the program mailer in sendmail(1M) configuration files. The smrsh program sharply limits commands that can be run using the program syntax of sendmail. This improves overall system security. smrsh limits the set of programs that a programmer can execute, even if sendmail runs a program without going through an alias or forward file. Briefly, smrsh limits programs to be in the directory /var/adm/sm.bin, allowing system administrators to choose the set of acceptable commands. It also rejects any commands with the characters: , , < , > , , ; , & , \$, \r (RETURN), or \n (NEWLINE) on the command line to prevent end run attacks. Initial pathnames on programs are stripped, so forwarding to /usr/ucb/vacation, /usr/bin/vacation, /home/server/mydir/bin/vacation, and vacation all actually forward to /var/adm/sm.bin/vacation. System administrators should be conservative about populating /var/adm/sm.bin. Reasonable additions are utilities such as vacation(1) and procmail. Never include any shell or shell-like program (for example, perl) in the sm.bin directory. This does not restrict the use of shell or perl scripts in the sm.bin directory (using the #! syntax); it simply disallows the execution of arbitrary programs.				
OPTIONS	The following options are supported: -c <i>command</i> Where <i>command</i> is a valid command, executes <i>command</i>.				
FILES	/var/adm/sm.bin directory for restricted programs				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWcsr, SUNWcsu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsr, SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsr, SUNWcsu				
SEE ALSO	sendmail(1M), attributes(5)				

smserialport(1M)

NAME	smserialport – manage serial port								
SYNOPSIS	<code>/usr/sadm/bin/smserialport subcommand [auth_args] -- [subcommand_args]</code>								
DESCRIPTION	The smserialport command manages serial ports.								
Sub-commands	The following smserialport sub-commands (<i>subcommand</i>) are supported: <table> <tr> <td>configure</td><td>Configures a serial port's basic settings for a device such as a terminal, modem or no connection.</td></tr> <tr> <td>delete</td><td>Deletes a given port. You can disable a port and prevent new services from being spawned for incoming connections, without interfering with existing services.</td></tr> <tr> <td>list</td><td>Lists all serial ports.</td></tr> <tr> <td>modify</td><td>Modifies a serial port's parameters.</td></tr> </table>	configure	Configures a serial port's basic settings for a device such as a terminal, modem or no connection.	delete	Deletes a given port. You can disable a port and prevent new services from being spawned for incoming connections, without interfering with existing services.	list	Lists all serial ports.	modify	Modifies a serial port's parameters.
configure	Configures a serial port's basic settings for a device such as a terminal, modem or no connection.								
delete	Deletes a given port. You can disable a port and prevent new services from being spawned for incoming connections, without interfering with existing services.								
list	Lists all serial ports.								
modify	Modifies a serial port's parameters.								
OPTIONS	There are two kinds of options: authentication arguments (<i>args</i>) and sub-command arguments (<i>subcommand_args</i>).								
Authentication Arguments	The smserialport authentication arguments, <i>args</i>, are derived from the smc(1M) argument set and are the same regardless of which sub-command you use. Valid <i>args</i> are -D, -H, -l, -p, -r, and -u; they are all optional. If no <i>args</i> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. The single letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either -D or --domain. Descriptions and other arg options that contain white spaces must be enclosed in double quotes. The following authentication arguments (<i>args</i>) are supported: -D --domain <i>domain</i> Specifies the default domain that you want to manage. smserialport accepts only the <i>file</i> value for this option. <i>file</i> is also the default value. The <i>file</i> default domain means that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the <i>domain</i> for all other tools. -H --hostname <i>host_name:port</i> Specifies the host and port to which you want to connect. If you do not specify a port, the system connects to the default port, 898. If you do not specify a host (<i>host_name:port</i>, the Solaris Management Console connects to the local host on port 898. You may still have to choose a toolbox to load into the console. To override this behavior, use the smc -B option, or set your console preferences to load a home toolbox by default.								

	-l --rolepassword <i>role_password</i> Specifies the password for the <i>role_name</i>. If you specify a <i>role_name</i> but do not specify a <i>role_password</i>, the system prompts you to supply a <i>role_password</i>. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure. -p --password <i>password</i> Specifies the password for the <i>user_name</i>. If you do not specify a password, the system prompts you for one. Because passwords specified on the command line can be seen by any user on the system, this option is considered insecure. -r --rolename <i>role_name</i> Specifies a role name for authentication. If you do not specify this option, no role is assumed. -u --username <i>user_name</i> Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed. -- This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the -- option.
Sub-command Arguments	The sub-command specific options, <i>subcommand_args</i>, must come after the <i>args</i> and must be separated from them by the -- option. Enclose descriptions and <i>arg</i> options that contain white space in double quotes. configure The configure sub-command requires the following sub-command argument: -n <i>port_name</i> Specifies the name of the serial port to reconfigure. The following sub-command arguments are optional for the configure sub-command: -b <i>baudrate</i> Specifies the port baud rate. The supported baud rate are 38400, 19200, 9600, 4800, 2400, 1200, 300 and auto. The default is 9600. -c <i>comment</i> Specifies a short comment description of the service. The default is a description of the requested device type. -h Displays the command's usage statement. -l <i>login_prompt</i> Specifies the login prompt. The default is <i>tty 'port_name' login:.</i>

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	-t <i>terminal_type</i> Specifies the terminal type. The default is <code>tvi925</code>. -x device=<i>device_name</i> Specifies the device to be configured. Valid <i>device_names</i> are: <code>terminal</code>, <code>modemdialin</code>, <code>modemdialout</code>, <code>modemdialinout</code> or <code>initializeonly</code> for no connection. The default is <code>terminal</code>. -x service=y n Specifies the status of service, that is y for enabled or n for disabled. The default is y.
delete	The <code>delete</code> sub-command requires the following sub-command arguments: -n <i>port_name</i> Specifies the name of the serial port to be disabled. The following sub-command arguments are optional for the <code>delete</code> sub-command: -h Displays the command's usage statement.
list	The <code>list</code> sub-command does not require any sub-command arguments. The following sub-command arguments are optional for the <code>list</code> sub-command: -h Displays the command's usage statement. -v Displays the data in verbose format.
modify	The <code>modify</code> sub-command requires the following sub-command arguments: -n <i>port_name</i> Specifies the name of the serial port to modify. The following sub-command arguments are optional for the <code>modify</code> sub-command: -b <i>baudrate</i> Specifies the port baud rate. The supported baud rate are 38400, 19200, 9600, 4800, 2400, 1200, 300 and <code>auto</code>. -c <i>comment</i> A short comment description of the service.

- h
Displays the command usage statement.
- l *login_prompt*
Specifies the login prompt.
- t *terminal_type*
Specifies the terminal type.
- x *bidirectional=y | n*
Specifies the bi-directional port flag, *y* for set or *n* for not set.
When this flag is set, the line can be used in both directions.
- x *connect_on_carrier=y | n*
Specifies if to connect on carrier, that is *y* or *n*.
- x *initialize_only=y | n*
Specifies if the service invocation. If *y* the service is invoked only once. This can be used to configure a particular device without actually monitoring it, as with software carrier.
- x *service_program=command*
Specifies the full pathname of the service command to invoke when a connection request is received.
- x *service_status=y | n*
Specifies the status of service, that is *y* for enabled or *n* for disabled.
- x *software_carrier=y | n*
Specifies the carrier detection. *y* for software or *n* for hardware.
- x *timeout=timeout*
Specifies the time to close a port if the open on the port succeeds, and no input data is received in *timeout* seconds. The supported *timeout* are never, 30, 60 and 90.

EXAMPLES

EXAMPLE 1 Listing Serial Ports

The following example lists the serial ports:

```
example% ./smserialport list -H myhost -u root -p mypassword --
```

Port	Service	Baud-Rate	Terminal-Type	Prompt	Comment
a	enabled	9600	xterm	as	welcome
b	enabled	9600	tvi925	ttyb login:	

EXAMPLE 2 Modifying Serial Ports

The following example contains two commands. The first command modifies serial port *b* for a baud rate of 4800, an *xterm* as terminal type, a *b:* for login prompt and a comment. The second command lists the ports.

```
example% ./smserialport modify -H myhost -u root -p mypassword -- \
-n b -b 4800 -t xterm -l b: -c "modified port b"
```

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EXAMPLE 2 Modifying Serial Ports (Continued)

```
example% ./smserialport list -H myhost -u root -p mypassword --
```

Port	Service	Baud-Rate	Terminal-Type	Prompt	Comment
a	enabled	9600	xterm	as	welcome
b	enabled	4800	xterm	b:	modified port b

EXAMPLE 3 Deleting a Serial Port

The following example contains two commands. The first command deletes serial port b. The second command lists the ports.

```
example% ./smserialport delete -H myhost -u root \
        -p mypassword -- -n b
```

```
example% ./smserialport list -H myhost -u root -p mypassword --
```

Port	Service	Baud-Rate	Terminal-Type	Prompt	Comment
a	enabled	9600	xterm	as	welcome
b	disabled	9600	tvi925	ttyb login:	

EXAMPLE 4 Configuring a Serial Port

The following example contains two commands. The first command configures serial port b for a bi-directional modem. The second command lists the ports.

```
example% ./smserialport configure -H myhost -u root \
        -p mypassword -- -n b -x device=modemdialinout
```

```
example% ./smserialport list -H myhost -u root -p mypassword --
```

Port	Service	Baud-Rate	Terminal-Type	Prompt	Comment
a	enabled	9600	xterm	as	welcome
b	enabled	9600	tvi925	ttyb login:	Modem - Dial In and Out

ENVIRONMENT VARIABLES

See environ(5) for descriptions of the following environment variables that affect the execution of smserialport: JAVA_HOME. If this environment variable is not specified, the /usr/java location is used. See smc(1M).

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	Invalid command syntax. A usage message displays.
2	An error occurred while executing the command. An error message displays.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

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ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmga

SEE ALSO tip(1), pmadm(1M), sacadm(1M), smc(1M), ttyadm(1M), ttymon(1M), attributes(5), environ(5)

smuser(1M)

NAME	smuser – manage user entries								
SYNOPSIS	<code>/usr/sadm/bin/smuser subcommand [auth_args] - - [subcommand_args]</code>								
DESCRIPTION	The <code>smuser</code> command manages one or more user entries in the local <code>/etc</code> filesystem or a NIS or NIS+ target name service.								
<i>subcommands</i>	<code>smuser subcommands</code> are: <table> <tr> <td><code>add</code></td><td>Adds a new user entry to the appropriate files. You can use a template and input file instead of supplying the additional command line options. If you use a template and command line options, the command line options take precedence and override any conflicting template values. To add an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.</td></tr> <tr> <td><code>delete</code></td><td>Deletes one or more user entries from the appropriate files. To delete an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization. <i>Note:</i> You cannot delete the system accounts with IDs less than 100, or 60001, 60002, or 65534.</td></tr> <tr> <td><code>list</code></td><td>Lists one more user entries from the appropriate files. To list entries, the administrator must have the <code>solaris.admin.usermgr.read</code> authorization.</td></tr> <tr> <td><code>modify</code></td><td>Modifies a user entry in the appropriate files. To modify an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.</td></tr> </table>	<code>add</code>	Adds a new user entry to the appropriate files. You can use a template and input file instead of supplying the additional command line options. If you use a template and command line options, the command line options take precedence and override any conflicting template values. To add an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.	<code>delete</code>	Deletes one or more user entries from the appropriate files. To delete an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization. <i>Note:</i> You cannot delete the system accounts with IDs less than 100, or 60001, 60002, or 65534.	<code>list</code>	Lists one more user entries from the appropriate files. To list entries, the administrator must have the <code>solaris.admin.usermgr.read</code> authorization.	<code>modify</code>	Modifies a user entry in the appropriate files. To modify an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.
<code>add</code>	Adds a new user entry to the appropriate files. You can use a template and input file instead of supplying the additional command line options. If you use a template and command line options, the command line options take precedence and override any conflicting template values. To add an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.								
<code>delete</code>	Deletes one or more user entries from the appropriate files. To delete an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization. <i>Note:</i> You cannot delete the system accounts with IDs less than 100, or 60001, 60002, or 65534.								
<code>list</code>	Lists one more user entries from the appropriate files. To list entries, the administrator must have the <code>solaris.admin.usermgr.read</code> authorization.								
<code>modify</code>	Modifies a user entry in the appropriate files. To modify an entry, the administrator must have the <code>solaris.admin.usermgr.write</code> authorization.								
OPTIONS	The <code>smuser</code> authentication arguments, <i>auth_args</i>, are derived from the <code>smc(1M)</code> arg set and are the same regardless of which subcommand you use. The <code>smuser</code> command requires the Solaris Management Console to be initialized for the command to succeed (see <code>smc(1M)</code>). After rebooting the Solaris Management Console server, the first Solaris Management Console connection might time out, so you might need to retry the command. The subcommand-specific options, <i>subcommand_args</i>, must come after the <i>auth_args</i> and must be separated from them by the <code>- -</code> option.								
<i>auth_args</i>	The valid <i>auth_args</i> are <code>-D</code>, <code>-H</code>, <code>-l</code>, <code>-p</code>, <code>-r</code>, and <code>-u</code>; they are all optional. If no <i>auth_args</i> are specified, certain defaults will be assumed and the user may be prompted for additional information, such as a password for authentication purposes. These letter options can also be specified by their equivalent option words preceded by a double dash. For example, you can use either <code>-D</code> or <code>- -domain</code> with the <i>domain</i> argument. <code>-D - -domain domain</code> Specifies the default domain that you want to manage. The syntax of <i>domain</i> is <i>type:/host_name/domain_name</i>, where <i>type</i> is <code>nis</code>, <code>nisplus</code>, <code>dns</code>, <code>ldap</code>, or <code>file</code>; <i>host_name</i> is the name of the machine that serves the domain; and <i>domain_name</i> is the name of the domain you want to manage. (<i>Note:</i> Do not use <code>nis+</code> for <code>nisplus</code>.)								

If you do not specify this option, the Solaris Management Console assumes the file default domain on whatever server you choose to manage, meaning that changes are local to the server. Toolboxes can change the domain on a tool-by-tool basis; this option specifies the domain for all other tools.

-H | - *-hostname host_name:port*

Specifies the *host_name* and *port* to which you want to connect. If you do not specify a *port*, the system connects to the default port, 898. If you do not specify *host_name:port*, the Solaris Management Console connects to the local host on port 898. You may still have to choose a toolbox to load into the console. To override this behavior, use the smc(1M) **-B** option, or set your console preferences to load a "home toolbox" by default.

-l | - *-rolepassword role_password*

Specifies the password for the *role_name*. If you specify a *role_name* but do not specify a *role_password*, the system prompts you to supply a *role_password*. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-p | - *-password password*

Specifies the password for the *user_name*. If you do not specify a password, the system prompts you for one. Passwords specified on the command line can be seen by any user on the system, hence this option is considered insecure.

-r | - *-rolename role_name*

Specifies a role name for authentication. If you do not specify this option, no role is assumed.

-u | - *-username user_name*

Specifies the user name for authentication. If you do not specify this option, the user identity running the console process is assumed.

-

This option is required and must always follow the preceding options. If you do not enter the preceding options, you must still enter the **-** option.

subcommand_args

Note: Descriptions and other arg options that contain white spaces must be enclosed in double quotes.

■ For subcommand **add**:

-c *comment*

(Optional) Includes a short description of the login, which is typically the user's name. Consists of a string of up to 256 printable characters, excluding the colon (:).

-d *dir*

(Optional) Specifies the home directory of the new user, limited to 1024 characters.

-e *ddmmyyyy*

(Optional) Specifies the expiration date for a login. After this date, no user can access this login. This option is useful for creating temporary logins. Specify a

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null value (" ") to indicate that the login is always valid. The administrator must have the `solaris.admin.usermgr.pswd` authorization.

-f *inactive*

(Optional) Specifies the maximum number of days allowed between uses of a login ID before that ID is declared invalid. Normal values are positive integers. Enter zero to indicate that the login account is always active.

-F *full_name*

(Optional) Specifies the full, descriptive name of the user. The *full_name* must be unique within a domain and can contain alphanumeric characters and spaces. If you use spaces, you must enclose the *full_name* in double quotes.

-g *group*

(Optional) Specifies the new user's primary group membership in the system group database with an existing group's integer ID.

-G *group1 -G group2 . . .*

(Optional) Specifies the new user's supplementary group membership in the system group database with the character string names of one or more existing groups. Duplicates of groups specified with the **-g** and **-G** options are ignored.

-h

(Optional) Displays the command's usage statement.

-n *login*

Specifies the new user's login name. The login name must be unique within a domain, contain 2–32 alphanumeric characters, begin with a letter, and contain at least one lowercase letter.

-P *password*

(Optional) Specifies up to an eight-character password assigned to the user account. *Note:* When you specify a password, you type the password in plain text. Specifying a password using this method introduces a security gap while the command is running. To set the password, the administrator must have the `solaris.admin.usermgr.pswd` authorization.

-s *shell*

(Optional) Specifies the full pathname (limited to 1024 characters) of the program used as the user's shell on login. Valid entries are a user-defined shell, `/bin/csh` (C shell), `bin/ksh` (Korn shell), and the default, `/bin/sh` (Bourne shell).

-t *template*

(Optional) Specifies a template, created using the User Manager tool, that contains a set of pre-defined user attributes. You may have entered a name service server in the template. However, when a user is actually added with this template, if a name service is unavailable, the user's local server will be used for both the Home Directory Server and Mail Server.

- u *uid*
(Optional) Specifies the user ID of the user you want to add. If you do not specify this option, the system assigns the next available unique user ID greater than 100.
- x *autohome=Y|N*
(Optional) Sets the home directory to automount if set to Y. The user's home directory path in the password entry is set to */home/login name*.
- x *mail=mail_server*
(Optional) Specifies the host name of the user's mail server, and creates a mail file on the server. Users created in a local scope must have a mail server created on their local machines.
- x *perm=home_perm*
(Optional) Sets the permissions on the user's home directory. *perm* is interpreted as an octal number, and the default is 0775.
- x *pwmax=days*
(Optional) Specifies the maximum number of days that the user's password is valid. The administrator must have the `solaris.admin.usermgr.pswd` authorization.
- x *pwmin=days*
(Optional) Specifies the minimum number of days between user password changes. The administrator must have the `solaris.admin.usermgr.pswd` authorization.
- x *pwwarn=days*
(Optional) Specifies the number of days relative to *pwmax* that the user is warned about password expiration prior to the password expiring. The administrator must have the `solaris.admin.usermgr.pswd` authorization.
- x *serv=homedir_server*
(Optional) Specifies the name of the server where the user's home directory resides. Users created in a local scope must have their home directory server created on their local machines.
- For subcommand `delete`:
 - h
(Optional) Displays the command's usage statement.
 - n *login1*
Specifies the login name of the user you want to delete.
 - n *login2 . . .*
(Optional) Specifies the additional login name(s) of the user(s) you want to delete.
- For subcommand `list`:
 - h
(Optional) Displays the command's usage statement.

-l

Displays the output for each user in a block of *key:value* pairs (for example, *user name:root*) followed by a blank line to delimit each user block. Each *key:value* pair is displayed on a separate line. The keys are: *autohome setup*, *comment*, *days to warn*, *full name*, *home directory*, *home directory permissions*, *login shell*, *mail server*, *max days change*, *max days inactive*, *min days change*, *password expires*, *password type*, *primary group*, *rights*, *roles*, *secondary groups*, *server*, *user ID (UID)*, and *user name*.

-n *login1*

Specifies the login name of the user you want to list.

-n *login2* . . .

(Optional) Specifies the additional login name(s) of the user(s) you want to list.

■ For subcommand *modify*:

-a *addrole1* -a *addrole2* . . .

(Optional) Specifies the role(s) to add to the user account. To assign a role to a user, the administrator must have the *solaris.role.assign* authorization or must have the *solaris.role.delegate* authorization and be a member of each of the roles specified.

-c *comment*

(Optional) Describes the changes you made to the user account. Consists of a string of up to 256 printable characters, excluding the colon (:).

-d *description*

(Optional) Specifies the user's home directory, limited to 1024 characters.

-e *ddmmyyyy*

(Optional) Specifies the expiration date for a login in a format appropriate to the locale. After this date, no user can access this login. This option is useful for creating temporary logins. Specify a null value (" ") to indicate that the login is always valid.

-f *inactive*

(Optional) Specifies the maximum number of days allowed between uses of a login ID before the ID is declared invalid. Normal values are positive integers. Specify zero to indicate that the login account is always active.

-F *full_name*

(Optional) Specifies the full, descriptive name of the user. The *full_name* must be unique within a domain and can contain alphanumeric characters and spaces. If you use spaces, you must enclose the *full_name* in double quotes.

-g *group*

(Optional) Specifies the new user's primary group membership in the system group database with an existing group's integer ID.

- G *group1* -G *group2* . . .
(Optional) Specifies the new user's supplementary group membership in the system group database with the character string names of one or more existing groups. Duplicates of groups specified with the -g and -G options are ignored.
- h
(Optional) Displays the command's usage statement.
- n *name*
Specifies the user's current login name.
- N *new_name*
(Optional) Specifies the user's new login name. The login name must be unique within a domain, contain 2–32 alphanumeric characters, begin with a letter, and contain at least one lowercase letter.
- p *addprof1* -p *addprof2* . . .
(Optional) Specifies the profile(s) to add to the user account. To assign a profile to a user, the administrator must have the `solaris.profmgr.assign` or `solaris.profmgr.delegate` authorization.
- P *password*
(Optional) Specifies up to an eight-character password assigned to the user account.

When you specify a password, you type the password in plain text. Specifying a password using this method introduces a security gap while the command is running.
- q *delprof1* -q *delprof2* . . .
(Optional) Specifies the profile(s) to delete from the user account.
- r *delrole1* -r *delrole2* . . .
(Optional) Specifies the role(s) to delete from the user account.
- s *shell*
(Optional) Specifies the full pathname (limited to 1024 characters) of the program used as the user's shell on login. Valid entries are a user-defined shell, `/bin/csh` (C shell), `bin/ksh` (Korn shell), and the default, `/bin/sh` (Bourne shell).l)
- x *autohome=Y|N*
(Optional) Sets up the home directory to automount if set to Y. The user's home directory path in the password entry is set to `/home/login name`.
- x *pwmax=days*
(Optional) Specifies the maximum number of days that the user's password is valid.
- x *pwmin=days*
(Optional) Specifies the minimum number of days between password changes.

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`-x pwwarn=days`

(Optional) Specifies the number of days relative to *pwmax* that the user is warned about password expiration before the password expires.

EXAMPLES

EXAMPLE 1 Creating a new user account

The following creates a new user account on the local file system. The account name is `user1`, and the full name is Joe Smith. The comment field verifies that the account is for Joe Smith. The system will assign the next available user ID greater than 100 to this account. There is no password set for this account, so when Joe Smith logs in for the first time, he will be prompted to enter a password.

```
./smuser add -H myhost -p mypasswd -u root -- -F "Joe Smith" \
-n user1 -c "Joe's account"
```

EXAMPLE 2 Deleting a user account

The following deletes the `user1` account from the local file system:

```
./smuser delete -H myhost -p mypasswd -u root -- -n user1
```

EXAMPLE 3 Listing all user accounts

The following lists all user accounts on the local file system in summary form:

```
./smuser list -H myhost -p mypasswd -u root --
```

EXAMPLE 4 Modifying a user account

The following modifies the `user1` account to default to a Korn shell, and assigns the account to the `qa_group` secondary group.

```
./smuser modify -H myhost -p mypasswd -u root -- -n user1 \
-s /bin/ksh -G qa_group
```

ENVIRONMENT VARIABLES

See `environ(5)` for a description of the `JAVA_HOME` environment variable, which affects the execution of the `smuser` command. If this environment variable is not specified, the `/usr/java` location is used. See `smc(1M)`.

EXIT STATUS

The following exit values are returned:

- 0 Successful completion.
- 1 Invalid command syntax. A usage message displays.
- 2 An error occurred while executing the command. An error message displays.

FILES

The following files are used by the `smuser` command:

<code>/etc/aliases</code>	Mail aliases. See <code>aliases(4)</code> .
<code>/etc/auto_home</code>	Automatic mount points. See <code>automount(1M)</code> .

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/etc/group	Group file. See group(4).
/etc/passwd	Password file. See passwd(4).
/etc/security/policy.conf	Configuration file for security policy. See policy.conf(4).
/etc/shadow	Shadow password file. See shadow(4).
/etc/user_attr	Extended user attribute database. See user_attr(4).

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWmga

SEE ALSO automount(1M), smc(1M), aliases(4), group(4), passwd(4), policy.conf(4), shadow(4), user_attr(4), attributes(5), environ(5)

snmpdx(1M)

NAME	snmpdx – Sun Solstice Enterprise Master Agent														
SYNOPSIS	<pre>/usr/lib/snmpp/snmppdx [-hy] [-a filename] [-c config-dir] [-d debug-level] [-i filename] [-m GROUP -m SPLIT] [-o filename] [-p port] [-r filename]</pre>														
DESCRIPTION	The Master Agent, <i>snmpdx</i>, is the main component of Solstice Enterprise Agent technology. It runs as a daemon process and listens to User Datagram Protocol (UDP) port 161 for SNMP requests. The Master Agent also opens another port to receive SNMP trap notifications from various subagents. These traps are forwarded to various managers, as determined by the configuration file. Upon invocation, <i>snmpdx</i> reads its various configuration files and takes appropriate actions by activating subagents, determining the subtree Object Identifier (OID) for various subagents, populating its own Management Information Bases (MIBs), and so forth. The Master Agent invokes subagents, registers subagents, sends requests to subagents, receives responses from subagents, and traps notifications from subagents. The Master Agent is invoked from a start-up script at boot time only if contents of the resource configuration file <i>/etc/snmpp/conf/snmppdx.rsrc</i> are non-trivial.														
OPTIONS	The following options are supported: <table> <tr> <td><i>-a filename</i></td><td>Specify the full path of the access control file used by the Master Agent. The default access control file is <i>/etc/snmpp/conf/snmppdx.acl</i>.</td></tr> <tr> <td><i>-c config-dir</i></td><td>Specify the full path of the directory containing the Master Agent configuration files. The default directory is <i>/etc/snmpp/conf</i>.</td></tr> <tr> <td><i>-d debug-level</i></td><td>Debug. Levels from 0 to 4 are supported, giving various levels of debug information. The default is 0 which means no debug information is given.</td></tr> <tr> <td><i>-h</i></td><td>Help. Print the command line usage.</td></tr> <tr> <td><i>-i filename</i></td><td>Specify the full path of the enterprise-name OID map. This file contains the PID used by the Master Agent for recovery after a crash. It contains tuples of the UNIX process ID, port number, resource name, and agent name. The default file is <i>/var/snmpp/snmppdx.st</i>.</td></tr> <tr> <td><i>-m GROUP -m SPLIT</i></td><td>Specify the mode to use for forwarding of SNMP requests.</td></tr> <tr> <td><i>GROUP</i></td><td>Multiple variables can be included in each request from the Master Agent to the subagents. This results in, at most, one send-request per agent.</td></tr> </table>	<i>-a filename</i>	Specify the full path of the access control file used by the Master Agent. The default access control file is <i>/etc/snmpp/conf/snmppdx.acl</i> .	<i>-c config-dir</i>	Specify the full path of the directory containing the Master Agent configuration files. The default directory is <i>/etc/snmpp/conf</i> .	<i>-d debug-level</i>	Debug. Levels from 0 to 4 are supported, giving various levels of debug information. The default is 0 which means no debug information is given.	<i>-h</i>	Help. Print the command line usage.	<i>-i filename</i>	Specify the full path of the enterprise-name OID map. This file contains the PID used by the Master Agent for recovery after a crash. It contains tuples of the UNIX process ID, port number, resource name, and agent name. The default file is <i>/var/snmpp/snmppdx.st</i> .	<i>-m GROUP -m SPLIT</i>	Specify the mode to use for forwarding of SNMP requests.	<i>GROUP</i>	Multiple variables can be included in each request from the Master Agent to the subagents. This results in, at most, one send-request per agent.
<i>-a filename</i>	Specify the full path of the access control file used by the Master Agent. The default access control file is <i>/etc/snmpp/conf/snmppdx.acl</i> .														
<i>-c config-dir</i>	Specify the full path of the directory containing the Master Agent configuration files. The default directory is <i>/etc/snmpp/conf</i> .														
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<i>-h</i>	Help. Print the command line usage.														
<i>-i filename</i>	Specify the full path of the enterprise-name OID map. This file contains the PID used by the Master Agent for recovery after a crash. It contains tuples of the UNIX process ID, port number, resource name, and agent name. The default file is <i>/var/snmpp/snmppdx.st</i> .														
<i>-m GROUP -m SPLIT</i>	Specify the mode to use for forwarding of SNMP requests.														
<i>GROUP</i>	Multiple variables can be included in each request from the Master Agent to the subagents. This results in, at most, one send-request per agent.														

	SPLIT Each variable in the incoming request results in one send-request to each subagent. The default is GROUP. -o <i>filename</i> Specify the full path of the file containing the tuple (enterprise-name, OID). For example, (Sun Microsystems, 1.3.1.6.1.4.32). The Master Agent uses this file as a base for look-up in the trap-filtering and forwarding process. The default file is <code>/etc/snmp/conf/enterprises.oid</code>. -p <i>port</i> Specify the port number. The default port number is 161. -r <i>filename</i> Specify the full path of the resource file to be used by the Master Agent. This file stores information about the subagents that the Master Agent invokes and manages. The default resource file is <code>/etc/snmp/conf/snmpdx.rsrc</code>. -y Set a recovery indicator to invoke the recovery module. The recovery process discovers which subagents in the previous session are still active; those subagents not active are re-spawned by the Master Agent.
FILES	<code>/etc/snmp/conf/enterprises.oid</code> Enterprise-name OID map <code>/etc/snmp/conf/snmpdx.acl</code> Access control file <code>/etc/snmp/conf/snmpdx.rsrc</code> Resource configuration file <code>/var/snmp/snmpdx.st</code> Master Agent status file <code>/var/snmp/mib/snmpdx.mib</code> Master Agent MIB file
EXIT STATUS	The following error values are returned: 0 Successful completion. non-zero An error occurred.
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

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ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWsasnm

SEE ALSO `snmpXdmid(1M)`, `attributes(5)`

NAME	snmpXdmid – Sun Solstice Enterprise SNMP-DMI mapper subagent												
SYNOPSIS	<code>/usr/lib/dmi/snmpXdmid -s hostname [-h] [-c config-dir] [-d debug-level]</code>												
DESCRIPTION	The <code>snmpXdmid</code> utility is a subagent in the Solstice Enterprise Agent Desktop Management Interface package. It maps the SNMP requests forwarded by the Master Agent (<code>snmpdx(1M)</code>) into one or more equivalent DMI requests. Further, it remaps the DMI response into SNMP response back to <code>snmpdx</code>. By default, <code>snmpXdmid</code> also forwards the DMI indications as SNMP traps to <code>snmpdx</code>. The feature is configurable and can be disabled by setting <code>TRAP_FORWARD_TO_MAGENT=0</code> in the <code>snmpXdmid</code> configuration file, <code>snmpXdmid.conf</code>. This subagent runs as a daemon in the system. The subagent uses a set of <code>.MAP</code> files located in <code>/var/dmi/map</code> to map the SNMP Object Identifier (OID) into a corresponding DMI component. The map files are generated using the MIF-to-MIB utility, <code>miftomib</code>. They are read by <code>snmpXdmid</code> when a corresponding MIF file gets registered with the DMI Service Provider (<code>dmispd(1M)</code>). The <code>snmpXdmid.conf</code> file is used for configuration information. Each entry in the file consists of a keyword followed by an equal sign (=), followed by a parameter string. The keyword must begin in the first position. A line beginning with a pound sign (#) is treated as a comment and the subsequent characters on that line are ignored. The keywords currently supported are: <table><tr><td><code>WARNING_TIMESTAMP</code></td><td>Indication subscription expiration, warning time.</td></tr><tr><td><code>EXPIRATION_TIMESTAMP</code></td><td>Indication subscription expiration timestamp.</td></tr><tr><td><code>FAILURE_THRESHOLD</code></td><td>DMISP retries before dropping indication due to comm errors.</td></tr><tr><td><code>TRAP_FORWARD_TO_MAGENT</code></td><td></td></tr><tr><td></td><td>0 Drop indication at the subagent level.</td></tr><tr><td></td><td>non-zero Forward indications as SNMP traps to <code>snmpdx</code>.</td></tr></table> By default, the configuration file <code>snmpXdmid.conf</code> is located in the <code>/etc/dmi/conf</code> directory. You can specify an alternative directory with the <code>-c</code> option.	<code>WARNING_TIMESTAMP</code>	Indication subscription expiration, warning time.	<code>EXPIRATION_TIMESTAMP</code>	Indication subscription expiration timestamp.	<code>FAILURE_THRESHOLD</code>	DMISP retries before dropping indication due to comm errors.	<code>TRAP_FORWARD_TO_MAGENT</code>			0 Drop indication at the subagent level.		non-zero Forward indications as SNMP traps to <code>snmpdx</code> .
<code>WARNING_TIMESTAMP</code>	Indication subscription expiration, warning time.												
<code>EXPIRATION_TIMESTAMP</code>	Indication subscription expiration timestamp.												
<code>FAILURE_THRESHOLD</code>	DMISP retries before dropping indication due to comm errors.												
<code>TRAP_FORWARD_TO_MAGENT</code>													
	0 Drop indication at the subagent level.												
	non-zero Forward indications as SNMP traps to <code>snmpdx</code> .												
OPTIONS	The following options are supported: <table><tr><td><code>-c config-dir</code></td><td>Specify the directory where <code>snmpXdmid.conf</code> file is located.</td></tr><tr><td><code>-d debug-level</code></td><td>Debug. Levels from 1 to 5 are supported, giving various levels of debug information.</td></tr><tr><td><code>-h</code></td><td>Help. Print the command line usage.</td></tr><tr><td><code>-s hostname</code></td><td>Specify the host on which <code>dmispd</code> is running.</td></tr></table>	<code>-c config-dir</code>	Specify the directory where <code>snmpXdmid.conf</code> file is located.	<code>-d debug-level</code>	Debug. Levels from 1 to 5 are supported, giving various levels of debug information.	<code>-h</code>	Help. Print the command line usage.	<code>-s hostname</code>	Specify the host on which <code>dmispd</code> is running.				
<code>-c config-dir</code>	Specify the directory where <code>snmpXdmid.conf</code> file is located.												
<code>-d debug-level</code>	Debug. Levels from 1 to 5 are supported, giving various levels of debug information.												
<code>-h</code>	Help. Print the command line usage.												
<code>-s hostname</code>	Specify the host on which <code>dmispd</code> is running.												

snmpXdmid(1M)

FILES /etc/dmi/conf/snmpXdmid.conf DMI mapper configuration file

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWsadmi

SEE ALSO dmispd(1M), snmpdx(1M), attributes(5)

NAME	snmpXwbemd – SNMP Adapter Subagent for WBEM
SYNOPSIS	<code>/usr/sadm/lib/wbem/snmpXwbemd [-d] [-h] [-p port]</code>
DESCRIPTION	The <code>snmpXwbemd</code> daemon is a subagent in the Web-Based Enterprise Management (WBEM) services package. This daemon maps the Simple Network Management Protocol (SNMP) requests forwarded by the Solstice Enterprise Agents (SEA) Master Agent <code>snmpdx(1M)</code> into one or more equivalent WBEM Common Information Model (CIM) properties and instances. Further, it remaps the response from the CIM Object Manager into a SNMP response, which it passes back to <code>snmpdx(1M)</code>. A mapping file contains the corresponding Object Identifier (OID), class name, property name, and Abstract Syntax Notation 1 (ASN.1) type for each object. You can also create your own mapping file.
OPTIONS	The following options are supported: <code>-d</code> Displays all debug information. <code>-h</code> Displays help by printing the correct command line usage. <code>-p</code> Specifies the port number to use.
OPERANDS	The following operand is supported: <code>port</code> Specifies the port number you want to use.
EXAMPLES	EXAMPLE 1 An Example of a <code>050SUNWwbcou.map</code> File This mapping file that Sun Microsystems provides contains definitions of objects, in this format: <pre># #pragma ident "@(#)050SUNWwbcou.map 1.0 01/04/03 SMI" # # Copyright (c) 2001 by Sun Microsystems, Inc. # All rights reserved. # # *** Description of contents *** # # First non-commented non-blank line contains required Version label. # Remaining non-commented non-blank lines are considered map entries # used as described below: # # Column 1 - SNMP OID - Uniquely describes an SNMP variable # Column 2 - CIM Class Name - CIM class associated with this variable # Column 3 - CIM Property Name - CIM property that maps to SNMP OID variable # Column 4 - ASN.1 type - SNMP datatype that dictates how data is mapped # to/from SNMP requests. Supported types are: SnmpString, SnmpOid, # SnmpTimeticks, SnmpCounter, SnmpInt, SnmpGauge, SnmpIpAddress, # SnmpOpaque) # Column 5 and greater are ignored #</pre>

snmpXwbemd(1M)

EXAMPLE 1 An Example of a 050SUNWwbcou.map File *(Continued)*

Version 1.0

```
1.3.6.1.2.1.1.1.0 Solaris_ComputerSystem Description SnmpString
1.3.6.1.2.1.1.3.0 Solaris_OperatingSystem LastBootUpTime SnmpTimeticks
1.3.6.1.2.1.1.4.0 Solaris_ComputerSystem PrimaryOwnerContact SnmpString
1.3.6.1.2.1.1.5.0 Solaris_ComputerSystem Name SnmpString
```

```
1.3.6.1.2.1.25.1.5.0 Solaris_OperatingSystem NumberOfUsers SnmpGauge
1.3.6.1.2.1.25.1.6.0 Solaris_OperatingSystem NumberOfProcesses SnmpGauge
1.3.6.1.2.1.25.1.7.0 Solaris_OperatingSystem MaxNumberOfProcesses SnmpGauge
1.3.6.1.2.1.25.1.2.0 Solaris_OperatingSystem LocalDateTime SnmpString
```

Each definition of an object in this file contains an OID, its corresponding CIM class name, its corresponding CIM property name, and its corresponding ASN.1 type. Each of these elements is separated by a space character.

FILES

/var/sadm/wbem/snmp/map/050SUNWwbcou.map

The SNMP Adapter Subagent for WBEM MIB-2 mapping file that Sun Microsystems provides contains SNMP Management Information Base (MIB) definitions for the CIM instrumentation that SNMP manages.

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	An error occurred.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes.

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwbcou
CSI	Enabled
Interface Stability	Evolving
MT-Level	Safe

SEE ALSO

snmpdx(1M), attributes(5)

NAME	snoop – capture and inspect network packets
SYNOPSIS	snoop [-aqrCDNPSvV] [-t [r a d]] [-c <i>maxcount</i>] [-d <i>device</i>] [-i <i>filename</i>] [-n <i>filename</i>] [-o <i>filename</i>] [-p <i>first</i> [, <i>last</i>]] [-s <i>snaplen</i>] [-x <i>offset</i> [, <i>length</i>]] [<i>expression</i>]
DESCRIPTION	snoop captures packets from the network and displays their contents. snoop uses both the network packet filter and streams buffer modules to provide efficient capture of packets from the network. Captured packets can be displayed as they are received, or saved to a file (which is <i>RFC 1761</i>-compliant) for later inspection. snoop can display packets in a single-line summary form or in verbose multi-line forms. In summary form, only the data pertaining to the highest level protocol is displayed. For example, an NFS packet will have only NFS information displayed. The underlying RPC, UDP, IP, and ethernet frame information is suppressed but can be displayed if either of the verbose options are chosen. In the absence of a name service, such as LDAP or NIS, snoop displays host names as numeric IP addresses. snoop requires an interactive interface.
OPTIONS	-C List the code generated from the filter expression for either the kernel packet filter, or snoop's own filter. -D Display number of packets dropped during capture on the summary line. -N Create an IP address-to-name file from a capture file. This must be set together with the -i option that names a capture file. The address-to-name file has the same name as the capture file with .names appended. This file records the IP address to hostname mapping at the capture site and increases the portability of the capture file. Generate a .names file if the capture file is to be analyzed elsewhere. Packets are not displayed when this flag is used. -P Capture packets in non-promiscuous mode. Only broadcast, multicast, or packets addressed to the host machine will be seen. -S Display size of the entire ethernet frame in bytes on the summary line. -V Verbose summary mode. This is halfway between summary mode and verbose mode in degree of verbosity. Instead of displaying just the summary line for the highest level protocol in a packet, it displays a summary line for each protocol layer in the packet. For instance, for an NFS packet it will display a line each

snoop(1M)

	for the ETHER, IP, UDP, RPC and NFS layers. Verbose summary mode output may be easily piped through <code>grep</code> to extract packets of interest. For example, to view only RPC summary lines, enter the following: example# snoop -i rpc.cap -v grep RPC
-a	Listen to packets on <code>/dev/audio</code> (warning: can be noisy).
-c <i>maxcount</i>	Quit after capturing <i>maxcount</i> packets. Otherwise keep capturing until there is no disk left or until interrupted with Control-C.
-d <i>device</i>	Receive packets from the network using the interface specified by <i>device</i> , for example, <code>le0</code> or <code>hme0</code> . The program <code>netstat(1M)</code> , when invoked with the <code>-i</code> flag, lists all the interfaces that a machine has. Normally, <code>snoop</code> will automatically choose the first non-loopback interface it finds.
-i <i>filename</i>	Display packets previously captured in <i>filename</i> . Without this option, <code>snoop</code> reads packets from the network interface. If a <i>filename.names</i> file is present, it is automatically loaded into the <code>snoop</code> IP address-to-name mapping table (See <code>-N</code> flag).
-n <i>filename</i>	Use <i>filename</i> as an IP address-to-name mapping table. This file must have the same format as the <code>/etc/hosts</code> file (IP address followed by the hostname).
-o <i>filename</i>	Save captured packets in <i>filename</i> as they are captured. (This <i>filename</i> is referred to as the "capture file".) The format of the capture file is RFC 1761-compliant. During packet capture, a count of the number of packets saved in the file is displayed. If you wish just to count packets without saving to a file, name the file <code>/dev/null</code> .
-p <i>first</i> [, <i>last</i>]	Select one or more packets to be displayed from a capture file. The <i>first</i> packet in the file is packet number 1.
-q	When capturing network packets into a file, do not display the packet count. This can improve packet capturing performance.
-r	Do not resolve the IP address to the symbolic name. This prevents <code>snoop</code> from generating network traffic while capturing and displaying packets. However, if

	the <code>-n</code> option is used, and an address is found in the mapping file, its corresponding name will be used.
<code>-s <i>snaplen</i></code>	Truncate each packet after <i>snaplen</i> bytes. Usually the whole packet is captured. This option is useful if only certain packet header information is required. The packet truncation is done within the kernel giving better utilization of the streams packet buffer. This means less chance of dropped packets due to buffer overflow during periods of high traffic. It also saves disk space when capturing large traces to a capture file. To capture only IP headers (no options) use a <i>snaplen</i> of 34. For UDP use 42, and for TCP use 54. You can capture RPC headers with a <i>snaplen</i> of 80 bytes. NFS headers can be captured in 120 bytes.
<code>-t [<i>r a d</i>]</code>	Time-stamp presentation. Time-stamps are accurate to within 4 microseconds. The default is for times to be presented in <i>d</i> (delta) format (the time since receiving the previous packet). Option <i>a</i> (absolute) gives wall-clock time. Option <i>r</i> (relative) gives time relative to the first packet displayed. This can be used with the <code>-p</code> option to display time relative to any selected packet.
<code>-v</code>	Verbose mode. Print packet headers in lots of detail. This display consumes many lines per packet and should be used only on selected packets.
<code>-x <i>offset</i> [, <i>length</i>]</code>	Display packet data in hexadecimal and ASCII format. The <i>offset</i> and <i>length</i> values select a portion of the packet to be displayed. To display the whole packet, use an <i>offset</i> of 0. If a <i>length</i> value is not provided, the rest of the packet is displayed.
OPERANDS	<i>expression</i> Select packets either from the network or from a capture file. Only packets for which the expression is true will be selected. If no expression is provided it is assumed to be true. Given a filter expression, <code>snoop</code> generates code for either the kernel packet filter or for its own internal filter. If capturing packets with the network interface, code for the kernel packet filter is generated. This filter is implemented as a streams module, upstream of the buffer module. The buffer module accumulates packets until it becomes full and passes the packets on to <code>snoop</code>. The kernel packet filter is very efficient, since it rejects unwanted packets in the kernel before they reach the packet buffer or <code>snoop</code>. The kernel packet filter has some limitations in its implementation; it is possible to construct filter expressions that it cannot handle. In this event, <code>snoop</code> tries to split the filter and do as much filtering in the kernel as

possible. The remaining filtering is done by the packet filter for `snoop`. The `-C` flag can be used to view generated code for either the packet filter for the kernel or the packet filter for `snoop`. If packets are read from a capture file using the `-i` option, only the packet filter for `snoop` is used.

A filter *expression* consists of a series of one or more boolean primitives that may be combined with boolean operators (AND, OR, and NOT). Normal precedence rules for boolean operators apply. Order of evaluation of these operators may be controlled with parentheses. Since parentheses and other filter expression characters are known to the shell, it is often necessary to enclose the filter expression in quotes. Refer to Example 2 for information about setting up more efficient filters.

The primitives are:

host hostname

True if the source or destination address is that of *hostname*. The *hostname* argument may be a literal address. The keyword *host* may be omitted if the name does not conflict with the name of another expression primitive. For example, "pinky" selects packets transmitted to or received from the host pinky, whereas "pinky and dinky" selects packets exchanged between hosts pinky AND dinky.

The type of address used depends on the primitive which precedes the *host* primitive. The possible qualifiers are "inet", "inet6", "ether", or none. These three primitives are discussed below. Having none of the primitives present is equivalent to "inet host hostname or inet6 host hostname". In other words, `snoop` tries to filter on all IP addresses associated with *hostname*.

inet or inet6

A qualifier that modifies the *host* primitive that follows. If it is *inet*, then `snoop` tries to filter on all IPv4 addresses returned from a name lookup. If it is *inet6*, `snoop` tries to filter on all IPv6 addresses returned from a name lookup.

ipaddr, atalkaddr, or etheraddr

Literal addresses, IP dotted, AppleTalk dotted, and ethernet colon are recognized. For example,

- "129.144.40.13" matches all packets with that IP ;
- "2::9255:a00:20ff:fe73:6e35" matches all packets with that IPv6 address as source or destination;
- "65281.13" matches all packets with that AppleTalk address;
- "8:0:20:f:b1:51" matches all packets with the ethernet address as source or destination.

An ethernet address beginning with a letter is interpreted as a hostname. To avoid this, prepend a zero when specifying the address. For example, if the ethernet address is "aa:0:45:23:52:44", then specify it by add a leading zero to make it "0aa:0:45:23:52:44".

from or src

A qualifier that modifies the following *host*, *net*, *ipaddr*, *atalkaddr*, *etheraddr*, *port* or *rpc* primitive to match just the source address, port, or RPC reply.

to or dst

A qualifier that modifies the following *host*, *net*, *ipaddr*, *atalkaddr*, *etheraddr*, *port* or *rpc* primitive to match just the destination address, port, or RPC call.

ether

A qualifier that modifies the following *host* primitive to resolve a name to an ethernet address. Normally, IP address matching is performed.

ethertype *number*

True if the ethernet type field has value *number*. Equivalent to "*ether* [12:2] = *number*".

ip, ip6, arp, rarp, pppoe, pppoes

True if the packet is of the appropriate ethertype.

pppoe

True if the ethertype of the packet is either pppoe or pppoes.

broadcast

True if the packet is a broadcast packet. Equivalent to "*ether* [2:4] = 0xffffffff".

multicast

True if the packet is a multicast packet. Equivalent to "*ether* [0] & 1 = 1".

bootp, dhcp

True if the packet is an unfragmented UDP packet with either a source port of BOOTPS (67) and a destination port of BOOTPC (68), or a source port of BOOTPC (68) and a destination of BOOTPS (67).

apple

True if the packet is an Apple Ethertalk packet. Equivalent to "*ethertype* 0x809b or *ethertype* 0x80f3".

decnet

True if the packet is a DECNET packet.

greater *length*

True if the packet is longer than *length*.

less *length*

True if the packet is shorter than *length*.

udp, tcp, icmp, icmp6, ah, esp

True if the IP or IPv6 protocol is of the appropriate type.

net *net*

True if either the IP source or destination address has a network number of *net*. The *from* or *to* qualifier may be used to select packets for which the network number occurs only in the source or destination address.

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port *port*

True if either the source or destination port is *port*. The *port* may be either a port number or name from `/etc/services`. The `tcp` or `udp` primitives may be used to select TCP or UDP ports only. The `from` or `to` qualifier may be used to select packets for which the *port* occurs only as the source or destination.

rpc *prog* [, *vers* [, *proc*]]

True if the packet is an RPC call or reply packet for the protocol identified by *prog*. The *prog* may be either the name of an RPC protocol from `/etc/rpc` or a program number. The *vers* and *proc* may be used to further qualify the program *version* and *procedure* number, for example, "rpc nfs, 2, 0" selects all calls and replies for the NFS null procedure. The `to` or `from` qualifier may be used to select either call or reply packets only.

ldap

True if the packet is an LDAP packet on port 389.

gateway *host*

True if the packet used *host* as a gateway, that is, the ethernet source or destination address was for *host* but not the IP address. Equivalent to "ether host *host* and not host *host*".

nofrag

True if the packet is unfragmented or is the first in a series of IP fragments. Equivalent to "ip[6:2] & 0x1fff = 0".

expr relop expr

True if the relation holds, where *relop* is one of `>`, `<`, `>=`, `<=`, `=`, `!=`, and *expr* is an arithmetic expression composed of numbers, packet field selectors, the `length` primitive, and arithmetic operators `+`, `-`, `*`, `&`, `|`, `^`, and `%`. The arithmetic operators within *expr* are evaluated before the relational operator and normal precedence rules apply between the arithmetic operators, such as multiplication before addition. Parentheses may be used to control the order of evaluation. To use the value of a field in the packet use the following syntax:

base[*expr* [: *size*]]

where *expr* evaluates the value of an offset into the packet from a *base* offset which may be `ether`, `ip`, `ip6`, `udp`, `tcp`, or `icmp`. The *size* value specifies the size of the field. If not given, 1 is assumed. Other legal values are 2 and 4. For example,

ether[0] & 1 = 1

is equivalent to `multicast`

ether[2:4] = 0xffffffff

is equivalent to `broadcast`.

ip[ip[0] & 0xf * 4 : 2] = 2049

is equivalent to `udp[0:2] = 2049`

```
ip[0] & 0xf > 5
```

selects IP packets with options.

```
ip[6:2] & 0x1fff = 0
```

eliminates IP fragments.

```
udp and ip[6:2]&0x1fff = 0 and udp[6:2] != 0
```

finds all packets with UDP checksums.

The length primitive may be used to obtain the length of the packet. For instance "length > 60" is equivalent to "greater 60", and "ether[length - 1]" obtains the value of the last byte in a packet.

and

Perform a logical AND operation between two boolean values. The AND operation is implied by the juxtaposition of two boolean expressions, for example "dinky pinky" is the same as "dinky AND pinky".

or or ,

Perform a logical OR operation between two boolean values. A comma may be used instead, for example, "dinky, pinky" is the same as "dinky OR pinky".

not or !

Perform a logical NOT operation on the following boolean value. This operator is evaluated before AND or OR.

slp

True if the packet is an SLP packet.

sctp

True if the packet is a SCTP packet.

EXAMPLES **EXAMPLE 1** Using the snoop Command

Capture all packets and display them as they are received:

```
example# snoop
```

Capture packets with host funky as either the source or destination and display them as they are received:

```
example# snoop funky
```

Capture packets between funky and pinky and save them to a file. Then inspect the packets using times (in seconds) relative to the first captured packet:

```
example# snoop -o cap funky pinky
```

```
example# snoop -i cap -t r | more
```

To look at selected packets in another capture file:

```
example# snoop -i pkts -p 99,108
```

```
99 0.0027 boutique -> sunroof NFS C GETATTR FH=8E6
```

snoop(1M)

EXAMPLE 1 Using the snoop Command (Continued)

```
100 0.0046 sunroof -> boutique NFS R GETATTR OK
101 0.0080 boutique -> sunroof NFS C RENAME FH=8E6C MTra00192 to .nfs08
102 0.0102 marmot -> viper NFS C LOOKUP FH=561E screen.r.13.i386
103 0.0072 viper -> marmot NFS R LOOKUP No such file or directory
104 0.0085 bugbomb -> sunroof RLOGIN C PORT=1023 h
105 0.0005 kandinsky -> sparky RSTAT C Get Statistics
106 0.0004 beebledbrox -> sunroof NFS C GETATTR FH=0307
107 0.0021 sparky -> kandinsky RSTAT R
108 0.0073 office -> jeremiah NFS C READ FH=2584 at 40960 for 8192
```

To look at packet 101 in more detail:

```
example# snoop -i pkts -v -p101
ETHER: ----- Ether Header -----
ETHER:
ETHER: Packet 101 arrived at 16:09:53.59
ETHER: Packet size = 210 bytes
ETHER: Destination = 8:0:20:1:3d:94, Sun
ETHER: Source = 8:0:69:1:5f:e, Silicon Graphics
ETHER: Ethertype = 0800 (IP)
ETHER:
IP: ----- IP Header -----
IP:
IP: Version = 4, header length = 20 bytes
IP: Type of service = 00
IP: ..0. .... = routine
IP: ...0 .... = normal delay
IP: .... 0... = normal throughput
IP: .... .0.. = normal reliability
IP: Total length = 196 bytes
IP: Identification 19846
IP: Flags = 0X
IP: .0.. .... = may fragment
IP: ..0. .... = more fragments
IP: Fragment offset = 0 bytes
IP: Time to live = 255 seconds/hops
IP: Protocol = 17 (UDP)
IP: Header checksum = 18DC
IP: Source address = 129.144.40.222, boutique
IP: Destination address = 129.144.40.200, sunroof
IP:
UDP: ----- UDP Header -----
UDP:
UDP: Source port = 1023
UDP: Destination port = 2049 (Sun RPC)
UDP: Length = 176
UDP: Checksum = 0
UDP:
RPC: ----- SUN RPC Header -----
RPC:
RPC: Transaction id = 665905
RPC: Type = 0 (Call)
RPC: RPC version = 2
RPC: Program = 100003 (NFS), version = 2, procedure = 1
RPC: Credentials: Flavor = 1 (Unix), len = 32 bytes
```

EXAMPLE 1 Using the snoop Command (Continued)

```

RPC:      Time = 06-Mar-90 07:26:58
RPC:      Hostname = boutique
RPC:      Uid = 0, Gid = 1
RPC:      Groups = 1
RPC: Verifier : Flavor = 0 (None), len = 0 bytes
RPC:
NFS: ----- SUN NFS -----
NFS:
NFS: Proc = 11 (Rename)
NFS: File handle = 000016430000000100080000305A1C47
NFS:           597A0000000800002046314AFC450000
NFS: File name = MTra00192
NFS: File handle = 000016430000000100080000305A1C47
NFS:           597A0000000800002046314AFC450000
NFS: File name = .nfs08
NFS:

```

To view just the NFS packets between sunroof and boutique:

```

example# snoop -i pkts rpc nfs and sunroof and boutique
1  0.0000  boutique -> sunroof    NFS C GETATTR FH=8E6C
2  0.0046  sunroof  -> boutique    NFS R GETATTR OK
3  0.0080  boutique -> sunroof    NFS C RENAME FH=8E6C MTra00192 to .nfs08

```

To save these packets to a new capture file:

```

example# snoop -i pkts -o pkts.nfs rpc nfs sunroof boutique

```

To view encapsulated packets, there will be an indicator of encapsulation:

```

example# snoop ip-in-ip
sunroof -> boutique ICMP Echo request      (1 encap)

```

If -V is used on an encapsulated packet:

```

example# snoop -V ip-in-ip
sunroof -> boutique ETHER Type=0800 (IP), size = 118 bytes
sunroof -> boutique IP D=129.144.40.222 S=129.144.40.200 LEN=104, ID=27497
sunroof -> boutique IP D=10.1.1.2 S=10.1.1.1 LEN=84, ID=27497
sunroof -> boutique ICMP Echo request

```

EXAMPLE 2 Setting Up A More Efficient Filter

To set up a more efficient filter, the following filters should be used toward the end of the expression, so that the first part of the expression can be set up in the kernel: greater, less, port, rpc, nofrag, and relop. The presence of OR makes it difficult to split the filtering when using these primitives that cannot be set in the kernel. Instead, use parentheses to enforce the primitives that should be OR'd.

To capture packets between funky and pinky of type tcp or udp on port 80:

```

example# snoop funky and pinky and port 80 and tcp or udp

```

snoop(1M)

EXAMPLE 2 Setting Up A More Efficient Filter *(Continued)*

Since the primitive `port` cannot be handled by the kernel filter, and there is also an `OR` in the expression, a more efficient way to filter is to move the `OR` to the end of the expression and to use parentheses to enforce the `OR` between `tcp` and `udp`:

```
example# snoop funky and pinky and (tcp or udp) and port 80
```

EXIT STATUS 0 Successful completion.

1 An error occurred.

FILES `/dev/audio` Symbolic link to the system's primary audio device.
`/dev/null` The null file.
`/etc/hosts` Host name database.
`/etc/rpc` RPC program number data base.
`/etc/services` Internet services and aliases.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWrcmdc

SEE ALSO `netstat(1M)`, `hosts(4)`, `rpc(4)`, `services(4)`, `attributes(5)`, `audio(7I)`, `bufmod(7M)`, `dlpi(7P)`, `le(7D)`, `pfmod(7M)`, `tun(7M)`

Callaghan, B. and Gilligan, R. *RFC 1761, Snoop Version 2 Packet Capture File Format*. Network Working Group. February 1995.

WARNINGS The processing overhead is much higher for realtime packet interpretation. Consequently, the packet drop count may be higher. For more reliable capture, output raw packets to a file using the `-o` option and analyze the packets off-line.

Unfiltered packet capture imposes a heavy processing load on the host computer, particularly if the captured packets are interpreted realtime. This processing load further increases if verbose options are used. Since heavy use of `snoop` may deny computing resources to other processes, it should not be used on production servers. Heavy use of `snoop` should be restricted to a dedicated computer.

`snoop` does not reassemble IP fragments. Interpretation of higher level protocol halts at the end of the first IP fragment.

snoop may generate extra packets as a side-effect of its use. For example it may use a network name service (NIS or NIS+) to convert IP addresses to host names for display. Capturing into a file for later display can be used to postpone the address-to-name mapping until after the capture session is complete. Capturing into an NFS-mounted file may also generate extra packets.

Setting the snaplen (-s option) to small values may remove header information that is needed to interpret higher level protocols. The exact cutoff value depends on the network and protocols being used. For NFS Version 2 traffic using UDP on 10 Mb/s ethernet, do not set snaplen less than 150 bytes. For NFS Version 3 traffic using TCP on 100 Mb/s ethernet, snaplen should be 250 bytes or more.

snoop requires information from an RPC request to fully interpret an RPC reply. If an RPC reply in a capture file or packet range does not have a request preceding it, then only the RPC reply header will be displayed.

soconfig(1M)

NAME	soconfig – configure transport providers for use by sockets								
SYNOPSIS	<pre>/sbin/soconfig -f file</pre> <pre>/sbin/soconfig family type protocol [path]</pre>								
DESCRIPTION	The <code>soconfig</code> utility configures the transport provider driver for use with sockets. It specifies how the family, type, and protocol parameters in the <code>socket(3SOCKET)</code> call are mapped to the name of a transport provider such as <code>/dev/tcp</code>. This utility can be used to add an additional mapping or remove a previous mapping. The <code>init(1M)</code> utility uses <code>soconfig</code> with the <code>sock2path(4)</code> file during the booting sequence.								
OPTIONS	The following options are supported: <code>-f file</code> Set up the <code>soconfig</code> configuration for each driver according to the information stored in <code>file</code>. A <code>soconfig</code> file consists of lines of at least the first three fields listed below, separated by spaces: <i>family type protocol path</i> These fields are described in the OPERANDS section below. An example of <code>file</code> can be found in the EXAMPLES section below.								
OPERANDS	The following operands are supported: <table><tr><td><i>family</i></td><td>The protocol family as listed in the <code>/usr/include/sys/socket.h</code> file, expressed as an integer.</td></tr><tr><td><i>type</i></td><td>The socket type as listed in the <code>/usr/include/sys/socket.h</code> file, expressed as an integer.</td></tr><tr><td><i>protocol</i></td><td>The protocol number as specified in the family-specific <code>include</code> file, expressed as an integer. For example, for <code>AF_INET</code> this number is specified in <code>/usr/include/netinet/in.h</code>. An unspecified protocol number is denoted with the value zero.</td></tr><tr><td><i>path</i></td><td>The string that specifies the path name of the device that corresponds to the transport provider. If this parameter is specified, the configuration will be added for the specified family, type, and protocol. If this parameter is not specified, the configuration will be removed.</td></tr></table>	<i>family</i>	The protocol family as listed in the <code>/usr/include/sys/socket.h</code> file, expressed as an integer.	<i>type</i>	The socket type as listed in the <code>/usr/include/sys/socket.h</code> file, expressed as an integer.	<i>protocol</i>	The protocol number as specified in the family-specific <code>include</code> file, expressed as an integer. For example, for <code>AF_INET</code> this number is specified in <code>/usr/include/netinet/in.h</code> . An unspecified protocol number is denoted with the value zero.	<i>path</i>	The string that specifies the path name of the device that corresponds to the transport provider. If this parameter is specified, the configuration will be added for the specified family, type, and protocol. If this parameter is not specified, the configuration will be removed.
<i>family</i>	The protocol family as listed in the <code>/usr/include/sys/socket.h</code> file, expressed as an integer.								
<i>type</i>	The socket type as listed in the <code>/usr/include/sys/socket.h</code> file, expressed as an integer.								
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<i>path</i>	The string that specifies the path name of the device that corresponds to the transport provider. If this parameter is specified, the configuration will be added for the specified family, type, and protocol. If this parameter is not specified, the configuration will be removed.								
EXAMPLES	EXAMPLE 1 Using <code>soconfig</code> The following example sets up <code>/dev/tcp</code> for family <code>AF_INET</code> and type <code>SOCK_STREAM</code>: <pre>example# soconfig 2 2 0 /dev/tcp</pre>								

EXAMPLE 1 Using soconfig (Continued)

The following is a sample file used with the -f option. Comment lines begin with a number sign (#):

#	Family	Type	Protocol	Path
	2	2	0	/dev/tcp
	2	2	6	/dev/tcp
	2	1	0	/dev/udp
	2	1	17	/dev/udp
	1	2	0	/dev/ticotsord
	1	1	0	/dev/ticlts
	2	4	0	/dev/rawip

FILES /etc/sock2path file containing mappings from sockets to transport providers

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsr

SEE ALSO init(1M), , sock2path(4), attributes(5)
Network Interfaces Programmer's Guide

soladdapp(1M)

NAME	soladdapp – add an application to the Solstice application registry										
SYNOPSIS	/usr/snadm/bin/soladdapp [-r <i>registry</i>] -n <i>name</i> -i <i>icon</i> -e <i>executable</i> [<i>args</i>]										
DESCRIPTION	soladdapp adds an application to the Solstice application registry. After it is added, the application is displayed in the Solstice Launcher main window (see solstice(1M)).										
OPTIONS	<table><tr><td>-r <i>registry</i></td><td>Define the full path name of the Solstice registry file.</td></tr><tr><td>-n <i>name</i></td><td>Define the name of the tool to be registered.</td></tr><tr><td>-i <i>icon</i></td><td>Define the full path name of the tool icon.</td></tr><tr><td>-e <i>executable</i></td><td>Define the full path name of the tool.</td></tr><tr><td><i>args</i></td><td>Specify any arguments to use with the tool.</td></tr></table> When executed without options, soladdapp uses /opt/SUNWadm/etc/.solstice_registry (the default registry path).	-r <i>registry</i>	Define the full path name of the Solstice registry file.	-n <i>name</i>	Define the name of the tool to be registered.	-i <i>icon</i>	Define the full path name of the tool icon.	-e <i>executable</i>	Define the full path name of the tool.	<i>args</i>	Specify any arguments to use with the tool.
-r <i>registry</i>	Define the full path name of the Solstice registry file.										
-n <i>name</i>	Define the name of the tool to be registered.										
-i <i>icon</i>	Define the full path name of the tool icon.										
-e <i>executable</i>	Define the full path name of the tool.										
<i>args</i>	Specify any arguments to use with the tool.										
RETURN VALUES	<table><tr><td>0</td><td>on success</td></tr><tr><td>1</td><td>on failure</td></tr><tr><td>2</td><td>if the registry is locked</td></tr><tr><td>3</td><td>if the entry is a duplicate.</td></tr></table>	0	on success	1	on failure	2	if the registry is locked	3	if the entry is a duplicate.		
0	on success										
1	on failure										
2	if the registry is locked										
3	if the entry is a duplicate.										
EXAMPLES	EXAMPLE 1 A sample display of the soladdapp command. The following adds an application called Disk Manager to the Solstice application registry for display in the Solstice Launcher main window. <pre># soladdapp -r /opt/SUNWadm/etc/.solstice_registry -n "Disk Manager" -i /opt/SUNWdsk/etc/diskmgr.xpm -e /opt/SUNWdsk/bin/diskmgr</pre>										
FILES	/opt/SUNWadm/etc/.solstice_registry The default registry path.										
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:										
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWsadml</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWsadml						
ATTRIBUTE TYPE	ATTRIBUTE VALUE										
Availability	SUNWsadml										
SEE ALSO	soldelapp(1M) , solstice(1M) , attributes(5)										
NOTES	Globally registered applications are used by local and remote users sharing the software in a particular /opt directory. They can be added only using soladdapp.										

NAME	soldelapp – remove an application from the Solstice application registry				
SYNOPSIS	<code>/usr/snadm/bin/soldelapp [-r <i>registry</i>] -n <i>name</i></code>				
DESCRIPTION	soldelapp removes an application from the Solstice application registry. After removal, the application is no longer displayed in the Solstice Launcher main window (see <code>solstice(1M)</code>).				
OPTIONS	<code>-r <i>registry</i></code> Define the full path name of the Solstice registry file. <code>-n <i>name</i></code> Define the name of the tool to be removed. When executed without options, soldelapp uses <code>/opt/SUNWadm/etc/.solstice_registry</code> (the default registry path).				
RETURN VALUES	0 on success 1 on failure 2 if the registry is locked 3 if <i>name</i> is not found in the registry 4 if the named registry or default registry is not found				
EXAMPLES	EXAMPLE 1 A sample display of the soldelapp command. The following removes an application called Disk Manager from the Solstice application registry and the Solstice Launcher main window. <pre># soldelapp -r /opt/SUNWadm/etc/.solstice_registry -n "Disk Manager"</pre>				
FILES	<code>/opt/SUNWadm/etc/.solstice_registry</code> The default registry file.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:				
	<table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWsadml</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWsadml
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWsadml				
SEE ALSO	<code>soladdapp(1M)</code> , <code>solstice(1M)</code> , <code>attributes(5)</code>				
NOTES	Globally registered applications are used by local and remote users sharing the software in a particular <code>/opt</code> directory. They can be removed only using soldelapp.				

solstice(1M)

NAME	solstice – access system administration tools with a graphical user interface				
SYNOPSIS	/bin/solstice				
DESCRIPTION	solstice used on a system presents the Solstice Launcher, a graphical user interface that provides access to the Solstice AdminSuite product family of system administration tools. The tools that appear in the launcher depend on what Solstice products you installed on your system. Help is available by using the Help button.				
USAGE	The Solstice Launcher allows you to do the following tasks: Launch applications Use the Solstice Launcher to launch system administration tools. Register applications Use the Solstice Launcher to add and register applications locally with the launcher. Remove applications Use the Solstice Launcher to remove locally registered applications. Customize application properties Use the Solstice Launcher to show, hide, or remove applications in the launcher, reorder the icons, change the launcher window width, modify applications properties, and add applications.				
FILES	/\$HOME/.solstice_registry Local registry information.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWsadml</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWsadml
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWsadml				
SEE ALSO	soladdapp(1M), soldelapp(1M), attributes(5)				
NOTES	The Solstice Launcher adds or removes local applications that are private to the user (not local to the system) only. The properties of globally registered applications that are used by local and remote users sharing the software from a particular /opt directory cannot be modified from the Solstice Launcher. To register global applications for use by local and remote users, use the soladdapp(1M) command. To remove globally registered applications, use the soldelapp(1M) command.				

NAME	sppptun – PPP tunneling driver utility
SYNOPSIS	sppptun plumb sppptun plumb <i>protocol device</i> sppptun unplumb <i>interface</i> sppptun query
DESCRIPTION	The sppptun utility is used to configure and query the Solaris PPP tunneling device driver, /dev/sppptun. Currently, only PPP over Ethernet (PPPoE) is supported, so the plumb and unplumb arguments are used to specify Ethernet interfaces that are to be used for PPPoE, and the query option lists the plumbed interfaces. The use of sppptun to add interfaces is similar to the use of ifconfig(1M) to add interfaces to IP. The plumbing is done once for each interface, preferably at system start-up time, and is not normally manipulated on a running system. If multiple instances of PPP are run over a single interface, they share the plumbing to that interface. Plumbing for each session is not required (and not possible for PPPoE). The proper way to plumb interfaces for PPPoE is to list the interfaces, one per line, in the /etc/ppp/pppoe.if file.
USAGE	sppptun plumb When specified with no additional arguments, the plumb argument lists the protocols that are supported by the utility. These are the strings that are used as the <i>protocol</i> argument below. sppptun plumb <i>protocol device</i> This plumbs a new interface into the driver. The <i>protocol</i> parameter is pppoe for the PPP-carrying "Session Stage" connection or pppoeD for the PPPoE "Discovery Stage" connection. Both connections must be present for each Ethernet interface that is to be used for PPPoE. The <i>device</i> parameter is the path name of the Ethernet interface to use (use ifconfig(1M) to list available devices). If the path begins with /dev/, then this portion may be omitted. sppptun unplumb <i>interface</i> This removes an existing interface from the driver and terminates any PPP sessions that were using the interface. The <i>interface</i> parameter is the name of the interface as reported when the interface was plumbed. sppptun query Displays the canonical names of all interfaces plumbed into the /dev/sppptun device driver.
EXAMPLES	EXAMPLE 1 Setting up to Use PPPoE on hme0 Plumb the hme0 interface.

sppptun(1M)

EXAMPLE 1 Setting up to Use PPPoE on hme0 (Continued)

```
# sppptun plumb pppoe hme0
hme0:pppoe
# sppptun plumb pppoe hme0
hme0:pppoe
```

Remove the hme0 interface.

```
# sppptun unplumb hme0:pppoe
# sppptun unplumb hme0:pppoe
```

EXAMPLE 2 Script to Remove All Plumbed Interfaces

```
#!/bin/sh
for intf in `sppptun query`
do
    sppptun unplumb $intf
done
```

EXIT STATUS The following exit values are returned:

0 Successful completion.
1 One or more errors occurred.

FILES

/etc/ppp/pppoe.if	list of Ethernet interfaces to be plumbed at boot time
/usr/sbin/sppptun	executable command
/dev/sppptun	Solaris PPP tunneling device driver

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpppdt

SEE ALSO pppd(1M), pppoe(1M), pppoe(1M), sppptun(7M)

RFC 2516, Method for Transmitting PPP Over Ethernet (PPPoE), Mamakos et al, February 1999

NAME	spray – spray packets				
SYNOPSIS	/usr/sbin/spray [-c <i>count</i>] [-d <i>delay</i>] [-l <i>length</i>] [-t <i>nettype</i>] <i>host</i>				
DESCRIPTION	spray sends a one-way stream of packets to <i>host</i> using RPC, and reports how many were received, as well as the transfer rate. The <i>host</i> argument can be either a name or an Internet address. spray is not useful as a networking benchmark, as it uses unreliable connectionless transports, UDP for example. spray can report a large number of packets dropped when the drops were caused by spray sending packets faster than they can be buffered locally, that is, before the packets get to the network medium.				
OPTIONS	-c <i>count</i> Specify how many packets to send. The default value of <i>count</i> is the number of packets required to make the total stream size 100000 bytes. -d <i>delay</i> Specify how many microseconds to pause between sending each packet. The default is 0. -l <i>length</i> The <i>length</i> parameter is the numbers of bytes in the Ethernet packet that holds the RPC call message. Since the data is encoded using XDR, and XDR only deals with 32 bit quantities, not all values of <i>length</i> are possible, and spray rounds up to the nearest possible value. When <i>length</i> is greater than 1514, then the RPC call can no longer be encapsulated in one Ethernet packet, so the <i>length</i> field no longer has a simple correspondence to Ethernet packet size. The default value of <i>length</i> is 86 bytes, the size of the RPC and UDP headers. -t <i>nettype</i> Specify class of transports. Defaults to netpath. See rpc(3NSL) for a description of supported classes.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWrcmdc</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWrcmdc
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWrcmdc				
SEE ALSO	rpc(3NSL), attributes(5)				

h1>ssaadm(1M)

NAME	ssaadm – administration program for SPARCstorage Array and SPARCstorage RSM disk systems
SYNOPSIS	ssaadm [-v] [-e] <i>subcommand</i> [<i>subcommand_option...</i>] <i>pathname...</i>
DESCRIPTION	The ssaadm program is an administrative command that manages the SPARCstorage Array and SPARCstorage RSM disk systems (henceforth called SPARCstorage systems). ssaadm performs a variety of control and query tasks depending on the command line arguments and options used. The luxadm(1M) utility replaces ssaadm and should be used instead. The command line must contain a <i>subcommand</i> (listed under USAGE) and at least one <i>pathname</i>. Commands specific to either a SPARCstorage Array or a SPARCstorage RSM state that fact. It may also contain options and other parameters depending on the subcommand. The subcommand is applied to each of the pathnames on the command line. <i>pathname</i> specifies the SPARCstorage system controller or a disk in the SPARCstorage system. The controller name is specified by its physical name, for example, <pre>/devices/. . . /. . . /SUNW,soc@3,0/SUNW, pln@xxxxxxx,xxxxxxx:ctlr</pre> or by a name of the form <pre>cN</pre> where <i>N</i> is the logical controller number. ssaadm uses the <i>cN</i> name to find an entry in the /dev/rdisk directory of a disk that is attached to the SPARCstorage system controller. The /dev/rdisk entry is then used to determine the physical name of the SPARCstorage system controller. A disk in the SPARCstorage system is specified by its logical or physical device name, for example, <pre>/dev/rdisk/clt0d0s2</pre> or <pre>/devices/. . . /. . . /SUNW,soc@3,0/SUNW, pln@xxxxxxx,xxxxxxx/ssd@0,0:c,raw</pre> See disks(1M) for more information on logical names for disks and controllers. The SPARCstorage Array is obsolete. Support for this device will be removed in a future version of Solaris.
OPTIONS	The following options are supported: -e Expert mode. This is required for the expert mode subcommands listed below.

	-v	Verbose mode.
	Subcommands and their options are described below. Expert mode subcommands are listed separately.	
OPERANDS	The following operands are supported:	
	<i>pathname</i>	The SPARCstorage system controller or a disk in the SPARCstorage system.
USAGE		
Subcommands	<code>display [-p] <i>pathname</i> . . .</code> Display configuration information for the specified units or display performance information for the specified SPARCstorage Array controller. If <i>pathname</i> specifies the controller, the configuration information is displayed for all disks in the SPARCstorage Array. For each drive that has fast write enabled, (FW) are displayed after the drive identification. <code>-p</code> Display performance information for the specified SPARCstorage Array controller. The accumulation of the performance statistics must be enabled using the <code>perf_statistics</code> subcommand before displaying the performance information. If not enabled, all of the I/Os per second are displayed as zeros. The performance display reports the following information: BUSY How busy the controller in the SPARCstorage Array is, expressed as a percentage. IOPS The total I/Os per second for the SPARCstorage Array. entries for each disk The total number of I/Os per second. <code>download -f <i>filename</i> <i>pathname</i></code> <code>download -w <i>wwn</i> <i>pathname</i></code> Download an image to the SPARCstorage Array controller. <code>-f</code> Download the prom image specified by <i>filename</i> to the SPARCstorage Array controller FEPROMs. When the download is complete, the SPARCstorage Array must be reset in order to use the downloaded code. Note that the <code>download</code> subcommand modifies the FEPROM on the SPARCstorage Array and should be used <i>with caution</i>. <code>-w</code> Change the SPARCstorage Array controller's World Wide Name. <i>wwn</i> is a 12 digit hex number, leading zeros required. The new SPARCstorage Array controller's image have the least significant 6 bytes of the 8-byte World Wide Name modified to <i>wwn</i>.	

`fast_write [-s] -c pathname`

`fast_write [-s] -d pathname`

`fast_write [-s] -e pathname`

Enable or disable the use of the NVRAM to enhance the performance of writes in the SPARCstorage Array. *pathname* may refer to the SPARCstorage Array controller or to an individual disk.

-c

Enable fast writes for synchronous writes only.

-d

Disable fast writes.

-e

Enable fast writes.

-s

Save the state that is currently being requested so it persists across power-cycles.

`fc_s_download [-f fcode-file]`

Download the fcode contained in the file *fcode-file* into *all* the FC/S Sbus Cards. This subcommand is interactive and expects user confirmation before downloading the fcode. When invoked without the [-f *fcode-file*] option, the current version of the fcode in each FC/S Sbus card is printed. Note that the `fc_s_download` subcommand should be used *only in single-user mode*; otherwise the FC/S card could be reset.

`insert_device pathname`

Guide user through hot insertion of a disk device.

This subcommand only applies to the RSM. See NOTES for hot plugging limitations.

`perf_statistics -d pathname`

`perf_statistics -e pathname`

Enable or disable the accumulation of performance statistics for the specified SPARCstorage Array controller. The accumulation of performance statistics must be enabled before using the `display -p` subcommand. This subcommand can be issued only to the SPARCstorage Array controller.

-d

Disable the accumulation of performance statistics.

-e

Enable the accumulation of performance statistics.

`purge pathname`

Purge any fast write data from NVRAM for one disk, or all disks if the controller is specified. This option should be used with caution, usually only when a drive has failed.

release *pathname*

Release a reservation held on the specified controllers or disks. When HA (High_Availability) Software is running on a system, do not use this subcommand to release a disk on an SSA. Doing so could cause problems for the HA software.

remove_device *pathname*

Guide user through hot removal of a disk device.

This subcommand only applies to the RSM. See NOTES for hot plugging limitations.

replace_device *pathname*

Guide user through hot replacement of a disk device.

This subcommand only applies to the RSM. See NOTES for hot plugging limitations.

reserve *pathname*

Reserve the specified controllers or disks for exclusive use by the issuing host. When HA (High_Availability) Software is running on a system, do not use this subcommand to reserve a disk on an SSA. Doing so could cause problems for the HA software.

set_boot_dev [-y] *pathname*

Set the boot-device variable in the PROM to the physical device name specified by *pathname* which can be a block special device or the pathname of the directory on which the boot file system is mounted. This subcommand normally runs interactively and requests confirmation for setting the default boot device in the PROM. The -y option can be used to run it in non-interactive mode, in which case no confirmation is requested or required.

start [-t *tray-number*] *pathname*

Spin up the specified disks. If *pathname* specifies the controller, this action applies to all disks in the SPARCstorage Array.

-t

Spin up all disks in the tray specified by *tray-number*. *pathname* must specify the controller.

stop [-t *tray-number*] *pathname*

Spin down the specified disks. If *pathname* specifies the controller, this action applies to all disks in the SPARCstorage Array.

-t

Spin down all disks in the tray specified by *tray-number*. *pathname* must specify the controller.

sync_cache *pathname*

Flush all outstanding writes for the specified disk from NVRAM to the media. If *pathname* specifies the controller, this action applies to all disks in the SPARCstorage Array.

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**SCSI Enclosure
Services (SES)
Subcommands**

The SPARCstorage RSM tray is addressed by the using the logical or physical path of the SES device or specifying the controller followed by the tray number if that controller has multiple trays. The controller is addressed by *cN* or the physical path to the SPARCstorage Array's controller.

See *ses(7D)* for more information about environmental sensor cards and associated devices.

These subcommands also work with RSM trays directly attached to wide differential SCSI controllers.

alarm pathname | controller tray-number

Display the current state of the audible alarm.

alarm_on pathname | controller tray-number

alarm_off pathname | controller tray-number

Enable or disable the audible alarm for this enclosure.

alarm_set pathname | controller tray-number [seconds]

Set the audible alarm setting to seconds.

env_display pathname | controller tray-number

Display the environmental information for the specified unit.

led pathname

Display the current state of the led for the specified disk.

led_on pathname

led_off pathname

Turn on or off the led for this disk.

power_off pathname | controller tray-number

Power down this RSM. The RSM will need to be powered back on manually.

This subcommand does not work with RSMs directly attached to wide differential SCSI controllers.

**Expert Mode
Subcommands**

See NOTES for limitations of these subcommands. Only users that are knowledgeable about the systems they are managing should use the expert mode subcommands.

For the following subcommands that work on a bus if a disk is specified then the bus that disk attached to is used.

bus_getstate pathname

Get and display the state of the specified bus.

bus_quiesce pathname

Quiesce the specified bus.

bus_reset pathname

Reset the specified bus.

bus_resetall pathname

Reset the specified bus and all devices on that bus.

bus_unquiesce pathname

Unquiesce the specified bus.

dev_getstate pathname	Get the state (online or offline) of the specified device.
dev_reset pathname	Reset the specified device.
offline pathname	Turn the specified disk offline.
online pathname	Turn the specified disk online.

EXAMPLES**EXAMPLE 1** Using ssaadm to remove a disk on an SSA

An example of using the expert mode hot plugging subcommands to hot remove a disk on a SSA follows. See NOTES for hot plugging limitations.

The first step reserves the SCSI device so that it can't be accessed via its second SCSI bus:

```
example# ssaadm reserve /dev/dsk/c1t8d0s2
```

The next two steps take the disk to be removed offline then quiesce the bus:

```
example# ssaadm -e offline /dev/dsk/c1t8d0s2
example# ssaadm -e bus_quiesce /dev/dsk/c1t8d0s2
```

The user then removes the disk and continues by unquiescing the bus, putting the disk back online, then releasing it:

```
example# ssaadm -e bus_unquiesce /dev/dsk/c1t8d0s2
example# ssaadm -e online /dev/dsk/c1t8d0s2
example# ssaadm release /dev/dsk/c1t8d0s2
```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
non-zero	An error occurred.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWssaop

SEE ALSO

disks(1M), luxadm(1M), attributes(5), ses(7D)

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NOTES

Currently, only some device drivers support hot plugging. If hot plugging is attempted on a disk or bus where it is not supported, an error message of the form:

```
ssaadm: can't acquire "PATHNAME": No such file or directory
```

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is displayed.

Do not quiesce any bus containing a disk with the `root`, `usr`, or `swap` partitions to avoid possible system deadlock.

NAME	sshd – secure shell daemon
SYNOPSIS	sshd [-diqQ46] [-b <i>bits</i>] [-f <i>config_file</i>] [-g <i>login_grace_time</i>] [-h <i>host_key_file</i>] [-k <i>key_gen_time</i>] [-p <i>port</i>] [-u <i>len</i>] [-v <i>client_protocol_id</i>]
DESCRIPTION	The sshd (Secure Shell daemon) is the daemon program for ssh(1). Together these programs replace rlogin and rsh, and provide secure encrypted communications between two untrusted hosts over an insecure network. The programs are intended to be as easy to install and use as possible. sshd is the daemon that listens for connections from clients. It forks a new daemon for each incoming connection. The forked daemons handle key exchange, encryption, authentication, command execution, and data exchange. This implementation of sshd supports both SSH protocol versions 1 and 2 simultaneously. Because of security weaknesses in the v1 protocol, sites should run only v2, if possible. In the default configuration, only protocol v2 is enabled for the server. To enable v1 and v2 simultaneously, see the instructions in sshd_config(4). Support for v1 is provided to help sites with existing ssh v1 clients and servers to transition to v2. v1 might not be supported in a future release.
SSH Protocol Version 1	Each host has a host-specific RSA key (normally 1024 bits) used to identify the host. Additionally, when the daemon starts, it generates a server RSA key (normally 768 bits). This key is normally regenerated every hour if it has been used, and is never stored on disk. Whenever a client connects the daemon responds with its public host and server keys. The client compares the RSA host key against its own database to verify that it has not changed. The client then generates a 256-bit random number. It encrypts this random number using both the host key and the server key, and sends the encrypted number to the server. Both sides then use this random number as a session key which is used to encrypt all further communications in the session. The rest of the session is encrypted using a conventional cipher, currently Blowfish or 3DES, with 3DES being used by default. The client selects the encryption algorithm to use from those offered by the server. Next, the server and the client enter an authentication dialog. The client tries to authenticate itself using .rhosts authentication, .rhosts authentication combined with RSA host authentication, RSA challenge-response authentication, or password-based authentication. Rhosts authentication is normally disabled because it is fundamentally insecure, but can be enabled in the server configuration file if desired. System security is not improved unless rshd(1M), rlogind(1M), rexecd(1M), and rexed(1M) are disabled (thus completely disabling rlogin(1) and rsh(1) into the machine).

sshd(1M)

SSH Protocol Version 2	Version 2 works similarly to version 1: Each host has a host-specific DSA/RSA key. However, when the daemon starts, it does not generate a server key. Forward security is provided through a Diffie-Hellman key agreement. This key agreement results in a shared session key. The rest of the session is encrypted using a symmetric cipher, currently Blowfish, 3DES, or AES. The client selects the encryption algorithm to use from those offered by the server. Additionally, session integrity is provided through a cryptographic message authentication code (hmac-sha1 or hmac-md5). Protocol version 2 provides a public key based user authentication method (PubKeyAuthentication) and conventional password authentication.
Command Execution and Data Forwarding	If the client successfully authenticates itself, a dialog for preparing the session is entered. At this time the client can request things like allocating a pseudo-tty, forwarding X11 connections, forwarding TCP/IP connections, or forwarding the authentication agent connection over the secure channel. Finally, the client either requests a shell or execution of a command. The sides then enter session mode. In this mode, either side may send data at any time, and such data is forwarded to/from the shell or command on the server side, and the user terminal on the client side. When the user program terminates and all forwarded X11 and other connections have been closed, the server sends command exit status to the client, and both sides exit. sshd can be configured using command-line options or the configuration files /etc/ssh/ssh_config and ~/.ssh/config, both described in ssh_config(4). Command-line options override values specified in the configuration file. sshd rereads its configuration file when it receives a hangup signal, SIGHUP.
Host Access Control	The sshd daemon uses TCP Wrappers to restrict access to hosts. It uses the service name of sshd for hosts_access(). For more information on TCP Wrappers see tcpd(1M) and hosts_access(3) man pages, which are part of the SUNWsfman package (they are not SunOS man pages). TCP wrappers binaries, including libwrap, are in SUNWtcpd, a required package for SUNWsshd, the package containing sshd.
OPTIONS	The options for sshd are as follows: -b <i>bits</i> Specifies the number of bits in the server key (the default is 768). -d Debug mode. The server sends verbose debug output to the system log, and does not put itself in the background. The server also will not fork and will only process one connection. This option is only intended for debugging for the server. Multiple -d options increase the debugging level. Maximum is 3. -f <i>configuration_file</i> Specifies the name of the configuration file. The default is /etc/ssh/sshd_config. sshd refuses to start if there is no configuration file.

- g *login_grace_time*
Gives the grace time for clients to authenticate themselves (the default is 300 seconds). If the client fails to authenticate the user within this number of seconds, the server disconnects and exits. A value of zero indicates no limit.
- h *host_key_file*
Specifies the file from which the host key is read (the default is /etc/ssh/ssh_host_key). This option must be given if sshd is not run as root (as the normal host file is normally not readable by anyone but root).
- i
Specifies that sshd is being run from inetd. sshd is normally not run from inetd because it needs to generate the server key before it can respond to the client, and this may take tens of seconds. Clients would have to wait too long if the key was regenerated every time. However, with small key sizes (for example, 512) using sshd from inetd may be reasonable.
- k *key_gen_time*
Specifies how often the server key is regenerated (the default is 3600 seconds, or one hour). The motivation for regenerating the key fairly often is that the key is not stored anywhere, and after about an hour, it becomes impossible to recover the key for decrypting intercepted communications even if the machine is cracked into or physically seized. A value of zero indicates that the key will never be regenerated.
- p *port*
Specifies the port on which the server listens for connections (the default is 22).
- q
Quiet mode. Nothing is sent to the system log. Normally the beginning, authentication, and termination of each connection is logged.
- u *len*
Used to specify the size of the field in the utmp structure that holds the remote host name. If the resolved host name is longer than *len*, the dotted decimal value will be used instead. This allows hosts with very long host names that overflow this field to still be uniquely identified. Specifying -u0 indicates that only dotted decimal addresses should be put into the utmp file.
- 4
Forces sshd to use IPv4 addresses only.
- 6
Forces sshd to use IPv6 addresses only.

**EXTENDED
DESCRIPTION**
authorized_keys
File Format

The \$HOME/.ssh/authorized_keys file lists the public keys that are permitted for RSA authentication. Each line of the file contains one key (empty lines and lines starting with a hash mark [#] are ignored as comments). Each line consists of the following fields, separated by spaces: options, bits, exponent, modulus, comment. The options field is optional; its presence is determined by whether the line starts with a

number or not (the option field never starts with a number). The bits, exponent, modulus and comment fields give the RSA key; the comment field is not used for anything (but may be convenient for the user to identify the key).

Lines in this file are usually several hundred bytes long (because of the size of the RSA key modulus). You will find it very inconvenient to type them in; instead, copy the `identity.pub` file and edit it.

Permissions of this file must be set so that it is not world or group writable. See the `StrickModes` option of `sshd_config(4)`.

The options (if present) consist of comma-separated option specifications. No spaces are permitted, except within double quotes. The following option specifications are supported:

`from="pattern-list"`

Specifies that in addition to RSA authentication, the canonical name of the remote host must be present in the comma-separated list of patterns (* and ? serve as wildcards). The list can also contain patterns negated by prefixing them with !; if the canonical host name matches a negated pattern, the key is not accepted. The purpose of this option is to optionally increase security: RSA authentication by itself does not trust the network or name servers or anything (but the key); however, if somebody somehow steals the key, the key permits an intruder to log in from anywhere in the world. This additional option makes using a stolen key more difficult (name servers and/or routers would have to be compromised in addition to just the key).

`command="command"`

Specifies that the *command* is executed whenever this key is used for authentication. The command supplied by the user (if any) is ignored. The command is run on a pty if the connection requests a pty; otherwise it is run without a tty. A quote can be included in the command by quoting it with a backslash. This option might be useful to restrict certain RSA keys to perform only a specific operation. An example might be a key that permits remote backups but nothing else. The client might specify TCP/IP and/or X11 forwarding unless they are explicitly prohibited.

`environment="NAME=value"`

Specifies that the string *NAME=value* is to be added to the environment when logging in using this key. Environment variables set this way override other default environment values. Multiple options of this type are permitted.

`no-port-forwarding`

Forbids TCP/IP forwarding when this key is used for authentication. Any port forward requests by the client will return an error. This might be used, for example, in connection with the `command` option.

`no-X11-forwarding`

Forbids X11 forwarding when this key is used for authentication. Any X11 forward requests by the client will return an error.

**ssh_known_hosts
File Format****no-agent-forwarding**

Forbids authentication agent forwarding when this key is used for authentication.

no-pty

Prevents tty allocation (a request to allocate a pty will fail).

The `/etc/ssh/ssh_known_hosts` and `$HOME/.ssh/known_hosts` files contain host public keys for all known hosts. The global file should be prepared by the administrator (optional), and the per-user file is maintained automatically: whenever the user connects from an unknown host its key is added to the per-user file.

Each line in these files contains the following fields: hostnames, bits, exponent, modulus, comment. The fields are separated by spaces.

Hostnames is a comma-separated list of patterns (* and ? act as wildcards); each pattern in turn is matched against the canonical host name (when authenticating a client) or against the user-supplied name (when authenticating a server). A pattern can also be preceded by ! to indicate negation: if the host name matches a negated pattern, it is not accepted (by that line) even if it matched another pattern on the line.

Bits, exponent, and modulus are taken directly from the RSA host key; they can be obtained, for example, from `/etc/ssh/ssh_host_rsa_key.pub`. The optional comment field continues to the end of the line, and is not used.

Lines starting with a hash mark (#) and empty lines are ignored as comments.

When performing host authentication, authentication is accepted if any matching line has the proper key. It is thus permissible (but not recommended) to have several lines or different host keys for the same names. This will inevitably happen when short forms of host names from different domains are put in the file. It is possible that the files contain conflicting information; authentication is accepted if valid information can be found from either file.

The lines in these files are typically hundreds of characters long. You should definitely not type in the host keys by hand. Rather, generate them by a script or by taking `/etc/ssh/ssh_host_rsa_key.pub` and adding the host names at the front.

EXAMPLES**EXAMPLE 1** `authorized_key` File Entries

The following are examples of `authorized_key` file entries.

```
1024 33 12121...312314325 ylo@foo.bar
```

```
from="*.niksula.hut.fi,!pc.niksula.hut.fi" 1024 35 23...2334 ylo@niksula
```

```
command="dump /home",no-pty,no-port-forwarding 1024 33 23...2323
backup.hut.fi
```

EXAMPLE 2 `ssh_known_hosts` File Entries

The following are examples of `ssh_known_hosts` file entries.

```
closenet,closenet.hut.fi,...,130.233.208.41 1024 37 159...93
closenet.hut.fi
```

EXAMPLE 2 `ssh_known_hosts` File Entries (Continued)**EXIT STATUS**

The following exit values are returned:

0 Successful completion.
 >0 An error occurred.

FILES

`/etc/ssh/sshd_config`

Contains configuration data for `sshd`. This file should be writable by root only, but it is recommended (though not necessary) that it be world-readable.

`/etc/ssh/ssh_host_key`

Contains the private part of the host key. This file should only be owned by root, readable only by root, and not accessible to others. `sshd` does not start if this file is group/world-accessible.

`/etc/ssh/ssh_host_key.pub`

Contains the public part of the host key. This file should be world-readable but writable only by root. Its contents should match the private part. This file is not used for encryption; it is provided only for the convenience of the user so its contents can be copied to known hosts files. These two files are created using `ssh-keygen(1)`.

`/var/run/sshd.pid`

Contains the process ID of the `sshd` listening for connections. If there are several daemons running concurrently for different ports, this contains the pid of the one started last. The content of this file is not sensitive; it can be world-readable.

`/etc/ssh/ssh_known_hosts` and `$HOME/.ssh/known_hosts`

These files are consulted when using `rhosts` with RSA host authentication to check the public key of the host. The key must be listed in one of these files to be accepted. The client uses the same files to verify that the remote host is the one it intended to connect. These files should be writable only by root or the owner.

`/etc/ssh/ssh_known_hosts` should be world-readable, and `$HOME/.ssh/known_hosts` can but need not be world-readable.

`/etc/nologin`

If this file exists, `sshd` refuses to let anyone except root log in. The contents of the file are displayed to anyone trying to log in, and non-root connections are refused. The file should be world-readable.

`$HOME/.rhosts`

This file contains host-username pairs, separated by a space, one per line. The given user on the corresponding host is permitted to log in without password. The same file is used by `rlogind` and `rshd`. The file must be writable only by the user; it is recommended that it not be accessible by others. It is also possible to use `netgroups` in the file. Either host or user name may be of the form `+%groupname` to specify all hosts or all users in the group.

`$HOME/.shosts`

For `ssh`, this file is exactly the same as for `.rhosts`. However, this file is not used by `rlogin` and `rshd`, so using this permits access using SSH only.

`/etc/hosts.equiv`

This file is used during `.rhosts` authentication. In its simplest form, this file contains host names, one per line. Users on these hosts are permitted to log in without a password, provided they have the same user name on both machines. The host name can also be followed by a user name; such users are permitted to log in as any user on this machine (except root). Additionally, the syntax `+@group` can be used to specify netgroups. Negated entries start with a hyphen (-).

If the client host/user is successfully matched in this file, login is automatically permitted, provided the client and server user names are the same. Additionally, successful RSA host authentication is normally required. This file must be writable only by root; it is recommended that it be world-readable.

Warning: It is almost never a good idea to use user names in `hosts.equiv`. Beware that it really means that the named user(s) can log in as anybody, which includes `bin`, `daemon`, `adm`, and other accounts that own critical binaries and directories. For practical purposes, using a user name grants the user root access. Probably the only valid use for user names is in negative entries. This warning also applies to `rsh/rlogin`.

`/etc/ssh/shosts.equiv`

This file is processed exactly as `/etc/hosts.equiv`. However, this file might be useful in environments that want to run both `rsh/rlogin` and `ssh`.

`$HOME/.ssh/environment`

This file is read into the environment at login (if it exists). It can contain only empty lines, comment lines (that start with #), and assignment lines of the form `name=value`. The file should be writable only by the user; it need not be readable by anyone else.

`$HOME/.ssh/rc`

If this file exists, it is run with `/bin/sh` after reading the environment files but before starting the user's shell or command. If X11 spoofing is in use, this will receive the "proto cookie" pair in standard input (and `DISPLAY` in environment). This must call `xauth(1)` in that case.

The primary purpose of `$HOME/.ssh/rc` is to run any initialization routines that might be needed before the user's home directory becomes accessible; AFS is a particular example of such an environment.

This file will probably contain some initialization code followed by something similar to:

```
if read proto cookie;
then echo add $DISPLAY $proto $cookie | xauth -q -;
fi
```

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If this file does not exist, `/etc/ssh/sshrc` is run, and if that does not exist, `xauth` is used to store the cookie. `$HOME/.ssh/rc` should be writable only by the user, and need not be readable by anyone else.

`/etc/ssh/sshrc`

Similar to `$HOME/.ssh/rc`. This can be used to specify machine-specific login-time initializations globally. This file should be writable only by root, and should be world-readable.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWsshdu

SEE ALSO

`scp(1)`, `ssh(1)`, `ssh-add(1)`, `ssh-agent(1)`, `ssh-keygen(1)`, `sftp-server(1M)`, `sshd(1M)`, `sshd_config(4)`, `attributes(5)`

To view license terms, attribution, and copyright for OpenSSH, the default path is `/var/sadm/pkg/SUNWsshdr/install/copyright`. If the Solaris operating environment has been installed anywhere other than the default, modify the given path to access the file at the installed location.

AUTHORS

OpenSSH is a derivative of the original and free `ssh 1.2.12` release by Tatu Ylonen. Aaron Campbell, Bob Beck, Markus Friedl, Niels Provos, Theo de Raadt and Dug Song removed many bugs, added newer features and created Open SSH. Markus Friedl contributed the support for SSH protocol versions 1.4 and 2.0.

NAME	statd – network status monitor				
SYNOPSIS	<code>/usr/lib/nfs/statd</code>				
DESCRIPTION	statd is an intermediate version of the status monitor. It interacts with lockd(1M) to provide the crash and recovery functions for the locking services on NFS. statd keeps track of the clients with processes which hold locks on a server. When the server reboots after a crash, statd sends a message to the statd on each client indicating that the server has rebooted. The client statd processes then inform the lockd on the client that the server has rebooted. The client lockd then attempts to reclaim the lock(s) from the server. statd on the client host also informs the statd on the server(s) holding locks for the client when the client has rebooted. In this case, the statd on the server informs its lockd that all locks held by the rebooting client should be released, allowing other processes to lock those files.				
FILES	<code>/var/statmon/sm</code> lists hosts and network addresses to be contacted after a reboot <code>/var/statmon/sm.bak</code> lists hosts and network addresses that could not be contacted after last reboot <code>/var/statmon/state</code> includes a number which changes during a reboot <code>/usr/include/rpcsvc/sm_inter.x</code> contains the rpcgen source code for the interface services provided by the statd daemon.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWnfscu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnfscu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWnfscu				
SEE ALSO	lockd(1M), attributes(5) <i>System Administration Guide: IP Services</i>				
NOTES	The crash of a server is only detected upon its recovery.				

strace(1M)

NAME	strace – print STREAMS trace messages																
SYNOPSIS	strace [<i>mid sid level...</i>]																
DESCRIPTION	strace without arguments writes all STREAMS event trace messages from all drivers and modules to its standard output. These messages are obtained from the STREAMS log driver (see <code>log(7D)</code>). If arguments are provided, they must be in triplets of the form <i>mid, sid, level</i>, where <i>mid</i> is a STREAMS module ID number, <i>sid</i> is a sub-ID number, and <i>level</i> is a tracing priority level. Each triplet indicates that tracing messages are to be received from the given module/driver, sub-ID (usually indicating minor device), and priority level equal to, or less than the given level. The token <code>all</code> may be used for any member to indicate no restriction for that attribute. The format of each trace message output is: <pre><seq> <time> <ticks> <level> <flags> <mid> <sid> <text></pre> <table><tr><td><seq></td><td>trace sequence number</td></tr><tr><td><time></td><td>time of message in <i>hh:mm:ss</i></td></tr><tr><td><ticks></td><td>time of message in machine ticks since boot</td></tr><tr><td><level></td><td>tracing priority level</td></tr><tr><td><flags></td><td>E : message is also in the error log F : indicates a fatal error N : mail was sent to the system administrator (hardcoded as root)</td></tr><tr><td><mid></td><td>module ID number of source</td></tr><tr><td><sid></td><td>sub-ID number of source</td></tr><tr><td><text></td><td>formatted text of the trace message</td></tr></table> Once initiated, <code>strace</code> will continue to execute until terminated by the user.	<seq>	trace sequence number	<time>	time of message in <i>hh:mm:ss</i>	<ticks>	time of message in machine ticks since boot	<level>	tracing priority level	<flags>	E : message is also in the error log F : indicates a fatal error N : mail was sent to the system administrator (hardcoded as root)	<mid>	module ID number of source	<sid>	sub-ID number of source	<text>	formatted text of the trace message
<seq>	trace sequence number																
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<ticks>	time of message in machine ticks since boot																
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<mid>	module ID number of source																
<sid>	sub-ID number of source																
<text>	formatted text of the trace message																
EXAMPLES	EXAMPLE 1 A sample output of the <code>strace</code> command: The following example outputs all trace messages from the module or driver whose module ID is 41: <pre>strace 41 all all</pre> The following example outputs those trace messages from driver or module ID 41 with sub-IDs 0, 1, or 2: <pre>strace 41 0 1 41 1 1 41 2 0</pre> Messages from sub-IDs 0 and 1 must have a tracing level less than or equal to 1. Those from sub-ID 2 must have a tracing level of 0.																

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `attributes(5)`, `log(7D)`

STREAMS Programming Guide

- NOTES**
- There is no restriction to the number of `strace` processes opening the STREAMS log driver at a time.
 - The log-driver records the list of the triplets specified in the command invocation, and compares each potential trace message against this list to decide if it should be formatted and sent up to the `strace` process. Hence, long lists of triplets will have a greater impact on overall STREAMS performance. Running `strace` will have the most impact on the timing of the modules and drivers generating the trace messages that are sent to the `strace` process. If trace messages are generated faster than the `strace` process can handle them, some of the messages will be lost. This last case can be determined by examining the sequence numbers on the trace messages output.

strclean(1M)

NAME	strclean – STREAMS error logger cleanup program				
SYNOPSIS	strclean [-a <i>age</i>] [-d <i>logdir</i>]				
DESCRIPTION	<i>strclean</i> is used to clean up the STREAMS error logger directory on a regular basis (for example, by using <i>cron</i>). By default, all files with names matching <i>error.*</i> in <i>/var/adm/streams</i> that have not been modified in the last three days are removed.				
OPTIONS	The following options are supported: -<i>age</i> The maximum age in days for a log file can be changed using the -a option. -<i>dlogdir</i> A directory other than <i>/var/adm/streams</i> can be specified using the -d option.				
EXAMPLES	EXAMPLE 1 A sample of using the <i>strclean</i> command. This example has the same result as running <i>strclean</i> with no arguments: <pre>example% strclean -d /var/adm/streams -a 3</pre>				
FILES	<i>/var/adm/streams/error.*</i>				
ATTRIBUTES	See <i>attributes(5)</i> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<i>cron(1M)</i> , <i>strerr(1M)</i> , <i>attributes(5)</i> <i>STREAMS Programming Guide</i>				
NOTES	<i>strclean</i> is typically run from <i>cron</i> on a daily or weekly basis.				

NAME	strerr – STREAMS error logger daemon				
SYNOPSIS	strerr				
DESCRIPTION	strerr receives error log messages from the STREAMS log driver (see log(7D)) and appends them to a log file. The resultant error log files reside in the directory <code>/var/adm/streams</code>, and are named <code>error.mm-dd</code>, where <i>mm</i> is the month and <i>dd</i> is the day of the messages contained in each log file. The format of an error log message is: <pre><seq> <time> <ticks> <flags> <mid> <sid> <text></pre> <seq> error sequence number <time> time of message in hh:mm:ss <ticks> time of message in machine ticks since boot priority level <flags> T : the message was also sent to a tracing process F : indicates a fatal error N : send mail to the system administrator (hardcoded as root) <mid> module ID number of source <sid> sub-ID number of source <text> formatted text of the error message Messages that appear in the error log are intended to report exceptional conditions that require the attention of the system administrator. Those messages which indicate the total failure of a STREAMS driver or module should have the F flag set. Those messages requiring the immediate attention of the administrator will have the N flag set, which causes the error logger to send the message to the system administrator using mail. The priority level usually has no meaning in the error log but will have meaning if the message is also sent to a tracer process. Once initiated, strerr continues to execute until terminated by the user. It is commonly executed asynchronously.				
FILES	<code>/var/adm/streams/error.mm-dd</code> error log file.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	attributes(5), log(7D) <i>STREAMS Programming Guide</i>				

strerr(1M)

NOTES | There is no restriction to the number of `strerr` processes opening the STREAMS log driver at a time.

If a module or driver is generating a large number of error messages, running the error logger will cause a degradation in STREAMS performance. If a large burst of messages are generated in a short time, the log driver may not be able to deliver some of the messages. This situation is indicated by gaps in the sequence numbering of the messages in the log files.

NAME	sttydefs – maintain line settings and hunt sequences for TTY ports
SYNOPSIS	<pre> /usr/sbin/sttydefs -a ttylabel [-b] [-f final-flags] [-i initial-flags] [-n nextlabel] /usr/sbin/sttydefs -l [ttylabel] /usr/sbin/sttydefs -r ttylabel </pre>
DESCRIPTION	sttydefs is an administrative command that maintains the line settings and hunt sequences for the system's TTY ports by making entries in, and deleting entries from the <code>/etc/ttydefs</code> file. sttydefs with a <code>-a</code> or <code>-r</code> option may be invoked only by the super-user. sttydefs with <code>-l</code> may be invoked by any user on the system.
OPTIONS	The following options are supported: <code>-a ttylabel</code> Add a record to the <code>ttydefs</code> file, using <i>ttylabel</i> as its label. The following describes the effect of the <code>-b</code>, <code>-n</code>, <code>-i</code>, or <code>-f</code> options when used in conjunction with the <code>-a</code> option: <code>-b</code> Enable autobaud. Autobaud allows the system to set the line speed of a given TTY port to the line speed of the device connected to the port without the user's intervention. <code>-f final-flags</code> Specify the value to be used in the <i>final-flags</i> field in <code>/etc/ttydefs</code>. <i>final-flags</i> must be in a format recognized by the <code>stty</code> command. <i>final-flags</i> are the <code>termio(7I)</code> settings used by <code>ttymon</code> after receiving a successful connection request and immediately before invoking the service on the port. If this option is not specified, sttydefs will set <i>final-flags</i> equal to the <code>termio(7I)</code> flags <code>9600</code> and <code>sane</code>. <code>-i initial-flags</code> Specify the value to be used in the <i>initial-flags</i> field in <code>/etc/ttydefs</code>. <i>initial-flags</i> must be in a format recognized by the <code>stty</code> command. These flags are used by <code>ttymon</code> when searching for the correct baud rate. They are set prior to writing the prompt. If this option is not specified, sttydefs will set <i>initial-flags</i> equal to the <code>termio(7I)</code> flag <code>9600</code>. <code>-n nextlabel</code> Specify the value to be used in the <i>nextlabel</i> field in <code>/etc/ttydefs</code>. If this option is not specified, sttydefs will set <i>nextlabel</i> equal to <i>ttylabel</i>. <code>-l[ttylabel]</code> If a <i>ttylabel</i> is specified, sttydefs displays the record from <code>/etc/ttydefs</code> whose TTY label matches the specified <i>ttylabel</i>. If no <i>ttylabel</i> is specified, sttydefs

sttydefs(1M)

	displays the entire contents of <code>/etc/ttydefs</code>. <code>sttydefs</code> verifies that each entry it displays is correct and that the entry's <i>nextlabel</i> field references an existing <code>-r <i>ttlabel</i></code> Remove any record in the <code>tttydefs</code> file that has <i>ttlabel</i> as its label.				
OUTPUT	If successful, <code>sttydefs</code> will exit with a status of 0. <code>sttydefs -l</code> will generate the requested information and send it to standard output.				
EXAMPLES	EXAMPLE 1 A sample of <code>sttydefs</code> command. The following command lists all the entries in the <code>tttydefs</code> file and prints an error message for each invalid entry that is detected. <pre>example# sttydefs -l</pre> The following shows a command that requests information for a single label and its output: <pre>example# sttydefs -l 9600 ----- 9600:9600 hupcl erase ^h:9600 sane ixany tab3 hupcl erase ^h::4800 ----- ttylabel: 9600 initial flags: 9600 hupcl erase ^h final flags: 9600 sane ixany tab3 hupcl erase ^h autobaud: no nextlabel: 4800</pre> The following sequence of commands will add the labels 1200, 2400, 4800, and 9600 and put them in a circular list: <pre>sttydefs -a 1200 -n 2400 -i 1200 -f "1200 sane" sttydefs -a 2400 -n 4800 -i 2400 -f "2400 sane" sttydefs -a 4800 -n 9600 -i 4800 -f "4800 sane" sttydefs -a 9600 -n 1200 -i 9600 -f "9600 sane"</pre>				
FILES	<code>/etc/ttydefs</code>				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>attributes(5)</code>, <code>termio(7I)</code>				

NAME	su – become super user or another user
SYNOPSIS	su [-] [<i>username</i> [<i>arg...</i>]]
DESCRIPTION	The su command allows one to become another user without logging off or to assume a role. The default user <i>name</i> is root (super user). To use su, the appropriate password must be supplied (unless the invoker is already root). If the password is correct, su creates a new shell process that has the real and effective user ID, group IDs, and supplementary group list set to those of the specified <i>username</i>. Additionally, the new shell's project ID is set to the default project ID of the specified user. See <code>getdefaultproj(3PROJECT)</code>, <code>setproject(3PROJECT)</code>. The new shell will be the shell specified in the shell field of <i>username</i>'s password file entry (see <code>passwd(4)</code>). If no shell is specified, <code>/usr/bin/sh</code> is used (see <code>sh(1)</code>). If superuser privilege is requested and the shell for the superuser cannot be invoked using <code>exec(2)</code>, <code>/sbin/sh</code> is used as a fallback. To return to normal user ID privileges, type an EOF character (CTRL-D) to exit the new shell. Any additional arguments given on the command line are passed to the new shell. When using programs such as sh, an <i>arg</i> of the form <code>-c string</code> executes <i>string</i> using the shell and an <i>arg</i> of <code>-r</code> gives the user a restricted shell. The following statements are true if the login shell is <code>/usr/bin/sh</code> or an empty string (which defaults to <code>/usr/bin/sh</code>) in the specific user's password file entry. If the first argument to su is a dash (-), the environment will be changed to what would be expected if the user actually logged in as the specified user. Otherwise, the environment is passed along, with the exception of <code>\$PATH</code>, which is controlled by <code>PATH</code> and <code>SUPATH</code> in <code>/etc/default/su</code>. All attempts to become another user using su are logged in the log file <code>/var/adm/sulog</code> (see <code>sulog(4)</code>).
SECURITY	su uses <code>pam(3PAM)</code> for authentication, account management, and session management. The PAM configuration policy, listed through <code>/etc/pam.conf</code>, specifies the modules to be used for su. The following example shows a partial <code>pam.conf</code> file with entries for the su command using the authentication, account management, and session management module. <pre> su auth requisite pam_authtok_get.so.1 su auth required pam_dhkeys.so.1 su auth required pam_unix_auth.so.1 su account required pam_unix_roles.so.1 su account required pam_unix_projects.so.1 su account required pam_unix_account.so.1 su session required pam_unix_session.so.1 </pre>

su(1M)

	If there are no entries for the <code>su</code> service, then the entries for the other service will be used. If multiple authentication modules are listed, then the user may be prompted for multiple passwords.	
EXAMPLES	EXAMPLE 1 Becoming User <code>bin</code> While Retaining Your Previously Exported Environment	
	To become user <code>bin</code> while retaining your previously exported environment, execute:	
	<pre>example% su bin</pre>	
	EXAMPLE 2 Becoming User <code>bin</code> and Changing to <code>bin</code> 's Login Environment	
	To become user <code>bin</code> but change the environment to what would be expected if <code>bin</code> had originally logged in, execute:	
	<pre>example% su - bin</pre>	
	EXAMPLE 3 Executing command with user <code>bin</code> 's Environment and Permissions	
	To execute command with the temporary environment and permissions of user <code>bin</code> , type:	
	<pre>example% su - bin -c "command args"</pre>	
ENVIRONMENT VARIABLES	Variables with <code>LD_</code> prefix are removed for security reasons. Thus, <code>su bin</code> will not retain previously exported variables with <code>LD_</code> prefix while becoming user <code>bin</code> .	
	If any of the <code>LC_*</code> variables (<code>LC_CTYPE</code> , <code>LC_MESSAGES</code> , <code>LC_TIME</code> , <code>LC_COLLATE</code> , <code>LC_NUMERIC</code> , and <code>LC_MONETARY</code>) (see <code>environ(5)</code>) are not set in the environment, the operational behavior of <code>su</code> for each corresponding locale category is determined by the value of the <code>LANG</code> environment variable. If <code>LC_ALL</code> is set, its contents are used to override both the <code>LANG</code> and the other <code>LC_*</code> variables. If none of the above variables are set in the environment, the "C" (U.S. style) locale determines how <code>su</code> behaves.	
	<code>LC_CTYPE</code>	Determines how <code>su</code> handles characters. When <code>LC_CTYPE</code> is set to a valid value, <code>su</code> can display and handle text and filenames containing valid characters for that locale. <code>su</code> can display and handle Extended Unix Code (EUC) characters where any individual character can be 1, 2, or 3 bytes wide. <code>su</code> can also handle EUC characters of 1, 2, or more column widths. In the "C" locale, only characters from ISO 8859-1 are valid.
	<code>LC_MESSAGES</code>	Determines how diagnostic and informative messages are presented. This includes the language and style of the messages, and the correct form of affirmative and negative responses. In the "C" locale, the messages are presented in the default form found in the program itself (in most cases, U.S. English).
	FILES	<code>\$HOME/.profile</code> user's login commands for <code>sh</code> and <code>ksh</code>
		<code>/etc/passwd</code> system's password file
		<code>/etc/profile</code> system-wide <code>sh</code> and <code>ksh</code> login commands

/var/adm/sulog	log file
/etc/default/su	the default parameters in this file are:
SULOG	If defined, all attempts to su to another user are logged in the indicated file.
CONSOLE	If defined, all attempts to su to root are logged on the console.
PATH	Default path. (/usr/bin:)
SUPATH	Default path for a user invoking su to root. (/usr/sbin:/usr/bin)
SYSLOG	Determines whether the syslog(3C) LOG_AUTH facility should be used to log all su attempts. LOG_NOTICE messages are generated for su's to root, LOG_INFO messages are generated for su's to other users, and LOG_CRIT messages are generated for failed su attempts.
SLEEPTIME	If present, sets the number of seconds to wait before login failure is printed to the screen and another login attempt is allowed. Default is 4 seconds. Minimum is 0 seconds. Maximum is 5 seconds.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO csh(1), env(1), ksh(1), login(1), roles(1), sh(1), syslogd(1M), exec(2), getdefaultproj(3PROJECT), setproject(3PROJECT), pam(3PAM), syslog(3C), pam.conf(4), passwd(4), profile(4), sulog(4), attributes(5), environ(5), pam_authtok_check(5), pam_authtok_get(5), pam_authtok_store(5), pam_dhkeys(5), pam_passwd_auth(5), pam_unix(5), pam_unix_account(5), pam_unix_auth(5), pam_unix_session(5)

NOTES The pam_unix(5) module might not be supported in a future release. Similar functionality is provided by pam_authtok_check(5), pam_authtok_get(5), pam_authtok_store(5), pam_dhkeys(5), pam_passwd_auth(5), pam_unix_account(5), pam_unix_auth(5), and pam_unix_session(5).

sulogin(1M)

NAME	sulogin – access single-user mode						
SYNOPSIS	sulogin						
DESCRIPTION	The sulogin utility is automatically invoked by init when the system is first started. It prompts the user to type the root password to enter system maintenance mode (single-user mode) or to type EOF (typically CTRL-D) for normal startup (multi-user mode). The user should never directly invoke sulogin. The sulogin utility can prompt the user to enter the root password on a variable number of serial console devices, in addition to the traditional console device. See consadm(1M) and msglog(7D) for a description of how to configure a serial device to display the single-user login prompt.						
FILES	/etc/default/sulogin	Default value can be set for the following flag:					
		PASSREQ	Determines if login requires a password. Default is PASSREQ=YES .				
	/etc/default/login	Default value can be set for the following flag:					
		SLEEPTIME	If present, sets the number of seconds to wait before login failure is printed to the screen and another login attempt is allowed. Default is 4 seconds. Minimum is 0 seconds. Maximum is 5 seconds.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:						
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsr</td></tr></table>			ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsr
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWcsr						
SEE ALSO	consadm(1M),init(1M), attributes(5),msglog(7D)						

NAME	suninstall – install the Solaris environment				
SYNOPSIS	suninstall				
DESCRIPTION	suninstall is a forms-based subsystem for installing the operating system. suninstall only exists on the Solaris CD-ROM and should only be invoked from there. Refer to the installation manual for more details. suninstall allows installation of the operating system onto any stand-alone system. suninstall loads the software available on the CD-ROM. Refer to the installation manual for disk space requirements. To abort the installation procedure, use the interrupt character (typically, CTRL-C).				
USAGE	Refer to the installation manual for more information on the various menus and selections.				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcdrom (Solaris CD)</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcdrom (Solaris CD)
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcdrom (Solaris CD)				
SEE ALSO	pkginfo(1), install(1M), pkgadd(1M), attributes(5) <i>Solaris 9 12/03 Installation Guide</i>				
NOTES	It is advisable to exit suninstall through the exit options from the suninstall menus.				

SUNWgfb_config(1M)

NAME	SUNWgfb_config – fbconfig module for configuring Sun XVR-1000 Graphics Accelerator
SYNOPSIS	<pre> fbconfig [-dev <i>device-filename</i>] [-active a b both auto] [-res <i>video-mode</i> [now try] [noconfirm]] [-file machine system] [-doublewide enable disable reverse] [-doublehigh enable disable reverse] [-multisample enable disable auto [static dynamic]] [-samples <i>samples-per-pixel</i>] [-g <i>gamma-correction-value</i>] [-master a b input] [-buffer-size [width height] auto] [-clearpixel0 255] fbconfig [-dev <i>device-filename</i>] -stream a b [-port hd15 dvid svideo auto] [-res <i>video-mode</i> [now try] [noconfirm]] [-file machine system] [-offset <i>xoff-value</i> [<i>yoff-value</i>]] [-slave [enable disable] [internal external]] fbconfig [-dev <i>device-filename</i>] -defaults fbconfig [-dev <i>device-filename</i>] [-propt -prconf -res \?] fbconfig [-help -list] </pre>
DESCRIPTION	SUNWgfb_config is the Sun XVR-1000 Graphics Accelerator device dependent layer for fbconfig(1M). It configures the Sun XVR-1000 Graphics Accelerator and some of the X11 window system defaults. The device can drive two monitors, each with a unique video stream (called stream a and stream b). The first form of SUNWgfb_config shown in the synopsis above sets card options, which are options common to both stream a and stream b, and apply to the entire card. The second form is used to set stream options, which are options specific to either stream a or stream b. The second form usage requires the -stream option to define which stream is affected. Both the first form and the second form store the specified options in the OWconfig file. These options will be used to initialize the device the next time the window system is run on that device. Updating options in the OWconfig file provides persistence of these options across window system sessions and system reboots. For -res now, -try, -slave, -master, -port, and -g, the device will be immediately programmed. The third form, which invokes the -defaults option, sets all card options and all stream options to their default values. The fourth form, which invokes the -prconf, -propt, and -res \? options, queries the device for status that is card-specific. The fifth form, which invokes the -help, and -list options, provides instruction on using SUNWgfb_config and a list of available devices. Additionally for the fifth form, all other options are ignored.

**GENERAL
OPTIONS**

You can specify options for only one device at a time. Specifying options for multiple devices requires multiple invocations of `SUNWgfb_config`.

Only Sun XVR-1000 Graphics Accelerator-specific options can be specified through `SUNWgfb_config`. The normal window system options for specifying default depth, default visual class, and so forth are still specified as device modifiers on the command line when the X server is started.

You can also specify the `OWconfig` file that is to be updated. By default, the machine-specific file in the `/etc/openwin` directory tree is updated. You can use the `-file` option to specify an alternate file. For example, the system-global `OWconfig` file in the `/usr/openwin` directory tree can be updated instead.

`-dev device-filename`

Specifies the device's special file. The default is `/dev/fb`.

`-file machine | system`

Specifies which `OWconfig` file to update. If `machine`, the machine-specific `OWconfig` file in the `/etc/openwin` directory tree is used. If `system`, the global `OWconfig` file in the `/usr/openwin` directory tree is used. If the file does not exist, it is created.

`-res video-mode [ now | try [ noconfirm ] ]`

Specifies the video mode used to drive the monitor connected to the specified device. If `-res` is invoked with `now` or `try`, you must specify a `-stream` option or a device, such as `/dev/fbs/gfb0a`. If `-active` is set to `both` or `auto`, then both stream `video-mode` values will be modified.

The `video-mode` argument specifies resolution and timing information for the display (for example, `SUNW_STD_1280x1024x76`). The naming convention for the `video-mode` specifier is:

origin_type_widthheightxrate

The elements of the specifier are described as follows:

origin

This can be one of:

- SUNW, Sun derived resolution
- VESA, Video Electronics Standards Association-derived resolution
- other, other source

type

This can be one of:

- STD, normal resolution, usable by most display devices
- DIG, resolution tuned only for LCD flat panels
- INT, interlaced
- STEREO, stereo

width

screen width in pixels

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height
screen height in pixels

rate
vertical frequency of the screen refresh

Note that some video-modes supported by the device, might not be supported by the monitor. The list of video-modes supported by the device and the monitor can be obtained by running `SUNWgfb_config` with the `-res \?` option (the fourth form shown in the command synopsis above).

The `-res` option also accepts additional, optional arguments, listed below, immediately following the video mode specification. Either `now` or `try` (`try` subsumes `now`) and `noconfirm` can be present.

now
If present, not only is the video mode updated in the `OWconfig` file, but the device is immediately programmed to display this video mode. This is useful for changing the video mode before starting the window system.

Note – It is recommended that you not use this suboption with `SUNWgfb_config` while the configured device is being used (for example, while running the window system). Unpredictable results can occur. To run `SUNWgfb_config` with the `now` suboption, first bring the window system down. If the `now` suboption is used within a window system session, the video mode is changed immediately, but the width and height of the affected screen do not change until the window system is exited and reentered. In addition, the system might not recognize changes in stereo mode.

noconfirm
Using the `-res` option, the user can put the system into an unusable state, with no video output. To reduce the chance of this, the default behavior of `SUNWgfb_config` is to display a warning message and to ask the user whether to continue. The `noconfirm` bypasses this confirmation. This option is useful when `SUNWgfb_config` is being run from a shell script.

try
If present, the specified video mode will be programmed on a trial basis. The user is asked to confirm the video mode by typing **y** within 10 seconds. Alternatively, the user can terminate the trial before 10 seconds elapse by typing any character other than **y** or carriage return. Such input is considered a no and the previous video mode is restored. With a negative response, `SUNWgfb_config` does not change the video mode in the `OWconfig` file; other options specified still take effect. If a carriage return is typed, the user is asked (**y** or **n**) whether to keep the new video mode. The `try` suboption implies the `now` suboption. See the warning note in the description of the `now` suboption, above.

-defaults
Resets all option values to their default values. Writes these values to the `OWconfig` file.

-propt

Displays the current values of all options in the OWconfig file specified by the -file option for the device specified by the -dev option. Displays the values of options as they will be in the OWconfig file after the call to SUNWgfb_config completes. The following is an example display:

```
--- OpenWindows Configuration for /dev/fbs/gfb0 ---
OWconfig: machine
Active Streams: both
Samples Per Pixel: 2
Multisample Allocation Model: static
Multisample Mode: auto
Doublewide: disable
Gamma Correction Value: 2.22

--- OpenWindows Configuration for Stream a ---
Video Mode: SUNW_STD_1280x1024x76

--- OpenWindows Configuration for Stream b ---
Video Mode: VESA_STD_640x480x60
```

-prconf

Displays the XVR-1000 hardware configuration. The following is an example display:

```
--- Hardware Configuration for /dev/fb (SUNWgfb0) ---
Type:   Sun Graphics Accelerator
Part:   501-5865
Memory:
        MAJC:           32MB
        Texture:        256MB total
        3DRAM64:        5.0M pixels

Versions:  FCode 1.14  MCode 0.19  MAJC 2.1  FBC3 3.0  XChip 2.0

Video Streams:
  Stream a
    Current resolution Setting: SUNW_STD_1280x1024x76
    Monitor/EDID data (13W3)
      Monitor Manufacturer: SUN
      Monitor Name:   GDM-5410
      EDID:   Version 1, Revision 2
  Stream b
    Current resolution Setting: VESA_STD_640x480x60
    Port: svideo
```

-help

Displays a list of the SUNWgfb_config command line options, along with a brief explanation of each.

-res \?

Displays list of defined *video-mode* names.

CARD OPTIONS**-active a | b | both | auto**

Specifies which streams are enabled. both select both streams. The default is auto, which means whichever stream is chosen by the console.

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-multisample enable | disable | auto

[static | dynamic]

The suboptions for -multisample are described as follows:

disable

No multisample is possible.

enable

Multisample is possible but is selected on a per-application basis.

auto

All Sun OpenGL applications are rendered using multisampling.

static

Multisample allocation occurs at X startup/config load time. The config *samples-per-pixel* or max parameter specifies the depth that is pre-allocated.

dynamic

OpenGL tasks allocate buffers themselves.

-samples *samples-per-pixel*

Specifies the number of samples/pixel to pre-allocate in static mode. Provides a hint to OpenGL in dynamic mode. The allowable choices for *samples-per-pixel* are 2, 3, 4, 5, 6, 8, 10, 16, and max. The default is max, which means to use the maximum number of samples that can be supported with the amount of memory available.

-doublewide enable | disable | reverse

This option makes it easy for you to combine both streams into one side-by-side virtual display. If you specify enable, stream a is to the left of stream b. If reverse is specified, stream b is to the left of stream a. Both will be the same resolution defined with the -res option. If you specify disable, only one stream will be enabled. -doublewide precludes -doublehigh.

-doublehigh enable | disable | reverse

This option makes it easy for you to combine both streams into one virtual display, with one monitor on a shelf above the other. If you specify enable, stream a is above stream b. If reverse is specified, stream b is above stream a. Both will be the same resolution defined with the -res option. If you specify disable, only one stream will be enabled. -doublehigh precludes -doublewide.

-g *gamma-correction value*

This option changes the gamma correction value. By default the gamma correction value is 2.22. Any value less than zero is illegal. This option can be used while the window system is running. Changing the gamma correction value will affect all the windows being displayed using gamma-corrected visuals. The gamma correction value is also saved in the OWconfig file for the next time the window system starts.

-master a | b | input

This option controls the setting frame pins on the stereo/sync connector on the device. It also controls which stream drives stereo glasses, which attach to the same connector.

**STREAM
OPTIONS**

If a (the default) or b is selected, the card is setup to be a sync master, and the frame sync signal from the corresponding stream will be sent out this connector.

If you select input, the card is setup to take its frame sync from another card through this connector. This sync can then be used to sync either or both streams by setting the stream-specific `-slave` option(s) to `external`.

If stereo glasses are used, the a or b options select which stream is used for the sync signal to the glasses.

`-bufferize [ width height ] | auto`

Explicitly allows you to specify size of managed area, which occupies all or a portion of the device's 3D RAM. The default is `auto`, that is, to automatically size the buffer based on the current stream resolutions. This should be sufficient for most users.

`-clearpixel 0 | 255`

Selects the overlay transparent color. This is the pixel value (color index) used by the transparent overlay visual to display the underlay (RGB) pixel contents. The default is 255 (all bits 1), but some applications require 0. All other color indices display a colormap color.

`-stream a | b`

Specifies for which stream options will be set. It is a required option for each of the other options in this section. It is optional for `-res`. Only one `-stream` option can be specified.

`-port hd15 | dvid | svideo | auto`

Directs stream b to the appropriate output connector: `hd-15`, `dvid`, or `svideo`. If `auto`, then the output connector for stream b is selected by the console. Stream a is always output through the 13W3 connector.

`-offset xoff-value [yoff-value]`

Offsets display of child stream (specified by `-stream`) relative to parent and child alignment edges.

xoff-value

Number of pixels offset in horizontal direction. Positive direction is right; negative is left. Default is 0, which means the two edges touch.

yoff-value

Number of pixels offset in vertical direction. Positive direction is down; negative is up. Default is 0, which means the two edges touch.

`-slave [ enable | disable ] [ internal | external ]`

This option allows you to specify the sync source for the specified stream.

`internal` indicates that the sync source is the other stream of this device.

`external` indicates the sync is taken from a source outside the device. If you use `external`, you also need to use the card option `-master input`.

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DEFAULTS

For a given invocation of `SUNWgfb_config`, if an option does not appear on the command line, the corresponding `OWconfig` option is not updated. It retains its previous value.

When the window system is run, if an option has never been specified through `SUNWgfb_config`, a default value is used. The option defaults are as follows:

Option	Default
-dev	/dev/fb
-file	machine
-res	none
-samples	max
-multisample	enable/dynamic
-clearpixel	255
-master	a
-slave	disable/external
-doublewide	not set
-g	2.22
-active	auto
-port	auto
-offset	0/0

The default for the `-res` option of `none` means that, when the window system is run, the screen resolution will be the video mode that is currently programmed in the device. This provides compatibility for users who are used to specifying the device resolution through the PROM.

EXAMPLES

EXAMPLE 1 Switching Resolution of a Monitor

The following example switches to the resolution of 1280 by 1024 at 76 Hz:

```
example% fbconfig -stream a -res -SUNW_STD_1280x1024x76
```

FILES

/usr/lib/fbconfig/SUNWgfb_config
device special file

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ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWgfbcf

SEE ALSO `fbconfig(1M)`, `attributes(5)`

See the `dtlogin(1)` man page in the CDE man page collection. Also useful is the `Xsun(1)` man page in the OpenWindows man page collection.

SUNWifb_config(1M)

NAME	SUNWifb_config – configure the Sun Expert3D Graphics Accelerator
SYNOPSIS	<pre> /usr/lib/fbconfig/SUNWifb_config [-dev <i>device-filename</i>] [-res <i>video-mode</i> [now try] [noconfirm nocheck]] [-file machine system] [-deflinear true false] [-defoverlay true false] [-linearorder first last] [-overlayorder first last] [-expvis enable disable] [-slave enable disable] [-accum enable disable] [-g <i>gamma-correction-value</i>] [-gfile <i>gamma-correction-file</i>] [-propt] [-prconf] [-defaults] [-slave] [] [-samples 1 2 4 8 16] [-multisample enable disable auto] /usr/lib/fbconfig/SUNWifb_config [-propt] [prconf] /usr/lib/fbconfig/SUNWifb_config [-help] [-res \?] </pre>
DESCRIPTION	SUNWifb_config configures the Sun Expert3D Graphics Accelerator, Sun Expert3D-Lite, and Sun XVR-500 Graphics Accelerators, and some of the X11 window system defaults for the graphics accelerator. The first form of SUNWifb_config shown in the synopsis above stores the specified options in the OWconfig file. These options will be used to initialize the Sun Expert3D device the next time the window system is run on that device. Updating options in the OWconfig file provides persistence of these options across window system sessions and system reboots. The second and third forms of SUNWifb_config, which invoke only the -prconf, -propt, -help, and -res \? options, do not update the OWconfig file. Additionally, for the third form of the command, all other options are ignored. Options may be specified for only one Sun Expert3D device at a time. Specifying options for multiple Sun Expert3D devices requires multiple invocations of SUNWifb_config. Only options specific to the Sun Expert3D device can be specified through SUNWifb_config. The normal window system options for specifying default depth, default visual class and so forth are still specified as device modifiers on the openwin command line (see the Xsun(1) manual page in the OpenWindows Desktop Reference Manual).
OPTIONS	The following options are supported: -dev <i>device-filename</i> Specifies the Sun Expert3D special file. The default is /dev/fbs/ifb0. -file machine system Specifies which OWconfig file to update. If machine, the machine-specific OWconfig file in the /etc/openwin directory tree is used. If system, the global OWconfig file in the /usr/openwin directory tree is used. If the file does not exist, it is created.

-res *video-mode*

Specifies the video mode used to drive the monitor connected to the specified Sun Expert3D device.

The format of these built-in video modes is:

widthxheightxrate

where *width* is the screen width in pixels, *height* is the screen height in pixels, and *rate* is the vertical frequency of the screen refresh. The *s* suffix of 960x680x112*s* and 960x680x108*s* means that these are stereo video modes. The *i* suffix of 640x480x60*i* and 768x575x50*i* designates interlaced video timing. If absent, non-interlaced timing will be used. As a convenience, -res also accepts formats with @ (at sign) in front of the refresh rate instead of x. For example: 1280x1024@76. Note that some video-modes supported by the Sun Expert3D device might not be supported by the monitor. The list of video-modes supported by the Sun Expert3D device and the monitor can be obtained by running SUNWifb_config with the -res \? option (shown in the command synopsis above). The following is a list of all possible video-modes supported on the Sun Expert3D device:

```
1024x768x60
1024x768x70
1024x768x75
1024x768x75
1024x768x77
1024x800x84
1152x900x66
1152x900x76
1280x800x76
1280x1024x60
1280x1024x67
1280x1024x76
1280x1024x85
1280x1024x112s (Stereo)
960x680x112s (Stereo)
960x680x108s (Stereo)
640x480x60
640x480x60i (Interlaced)
768x575x50i (Interlaced)
1440x900x76
1600x1000x66
1600x1000x76
```

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1600x1280x76
 1792x1344x75
 1920x1080x72
 1920x1200x70
 1920x1200x75

Symbolic names

For convenience, some of the above video modes have symbolic names defined for them. Instead of the form *width x height x rate*, one of these names may be supplied as the argument to *-res*. The meaning of the symbolic name *none* is that when the window system is run the screen resolution will be the video mode that is currently programmed in the device.

Name	Corresponding Video Mode
svga	1024x768x60
1152	1152x900x76
1280	1280x1024x76
stereo	960x680x112s
ntsc	640x480x60i
pal	768x575x50i
none	(see text above)

The *res* option also accepts additional, optional arguments immediately following the video mode specification. Any or all of the following might be present.

now

If present, not only will the video mode be updated in the *OWconfig* file, but the Sun Expert3D device will be immediately programmed to display this video mode. (This is useful for changing the video mode before starting the window system).

Note that it is inadvisable to use this suboption with *SUNWifb_config* while the configured device is being used (for example, while running the window system); unpredictable results might occur. To run *SUNWifb_config* with the *now* suboption, first bring the window system down. If the *now* suboption is used within a window system session, the video mode will be changed immediately, but the width and height of the affected screen will not change until the window system is exited and reentered again. In addition, the system may not recognize changes in stereo mode. Consequently, this usage is strongly discouraged.

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noconfirm	Using the <code>-res</code> option, the user could potentially put the system into an unusable state, a state where there is no video output. This can happen if there is ambiguity in the monitor sense codes for the particular code read. To reduce the chance of this, the default behavior of <code>SUNWifb_config</code> is to print a warning message to this effect and to prompt the user to find out if it is okay to continue. The <code>noconfirm</code> option instructs <code>SUNWifb_config</code> to bypass this confirmation and to program the requested video mode anyway. This option is useful when <code>SUNWifb_config</code> is being run from a shell script.
nocheck	If present, the normal error checking based on the monitor sense code (described above) will be suspended. The video mode specified by the user will be accepted regardless of whether it is appropriate for the currently attached monitor. (This option is useful if a different monitor is to be connected to the Sun Expert3D device). Use of this option implies <code>noconfirm</code> as well.
try	If present, the specified video mode will be programmed on a trial basis. The user will be asked to confirm the video mode by typing <code>y</code> within 10 seconds. Or the user may terminate the trial before 10 seconds are up by typing any character. Any character other than <code>y</code> or carriage return is considered a "no" and the previous video mode will be restored and <code>SUNWifb_config</code> will not change the video mode in the <code>OWconfig</code> file (other options specified will still take effect). If a carriage return is typed, the user is prompted for a yes or no answer on whether to keep the new video mode. This option implies the <code>now</code> suboption (see the warning paragraph under the <code>now</code> suboption).
<code>-deflinear true false</code> The Sun Expert3D device possesses two types of visuals: linear and nonlinear. Linear visuals are gamma corrected and nonlinear visuals are not. There are two visuals that have both linear and nonlinear versions: 24-bit TrueColor and 8-bit StaticGray. If <code>true</code> , the default visual is set to the linear visual that satisfies other specified default visual selection options (specifically, the <code>Xsun(1) -defdepth</code> and <code>-defclass</code> options described in the OpenWindows Desktop Reference Manual). If <code>false</code> , or if there is no linear visual that satisfies the other default visual selection options, the non-linear visual specified by these other options will be chosen to be the default. This option cannot be used when the <code>-defoverlay</code> option is present, because the Sun Expert3D does not possess a linear overlay visual.	

SUNWifb_config(1M)

`-defoverlay true | false`

The Sun Expert3D device provides an 8-bit PseudoColor visual whose pixels are disjoint from the rest of the Sun Expert3D visuals. This is called the overlay visual. Windows created in this visual will not damage windows created in other visuals. The converse, however, is not true. Windows created in other visuals will damage overlay windows. If the value of this option is `true`, the overlay visual will be made the default visual. If `false`, the nonoverlay visual that satisfies the other default visual selection options, such as `-defdepth` and `-defclass`, will be chosen as the default visual. See the `Xsun(1)` manual page in the OpenWindows Desktop Reference Manual. Whenever `-defoverlay true` is used, the default depth and class chosen on the `openwin` command line must be 8-bit PseudoColor. If not, a warning message will be printed and the `-defoverlay` option will be treated as `false`. This option cannot be used when the `-deflinear` option is present, because the Sun Expert3D device does not possess a linear overlay visual.

`-linearorder first | last`

If `first`, linear visuals will come before their non-linear counterparts on the X11 screen visual list for the Sun Expert3D screen. If `last`, the nonlinear visuals will come before the linear ones.

`-overlayorder first | last`

If `-first`, the depth 8 PseudoColor Overlay visual will come before the non-overlay visual on the X11 screen visual list for the Sun Expert3D screen. If `last`, the non-overlay visual will come before the overlay one.

`-expvis enable | disable`

If enabled, OpenGL Visual Expansion will be activated. Multiple instances of selected visual groups (8-bit PseudoColor, 24-bit TrueColor, and so forth) can be found in the screen visual list.

`-slave enable | disable`

If enabled, the video for this frame buffer will be synced with the video of the display which is connected to it. For applications which support it buffers will also be swapped synchronously.

`-accum enable | disable`

If enabled, frame buffer memory is allocated for accelerated accumulation buffer for windows. If disabled, software accumulation buffering will be done for windows. Accelerated accumulation buffers for pBuffers are always available as memory allows.

`-g gamma-correction_value`

This option allows changing the gamma correction value. All linear visuals provide gamma correction. By default the gamma correction value is 2.22. Any value less than zero is illegal. The gamma correction value is applied to the linear visual, which then has an effective gamma value of 1.0, which is the value returned by `XSolarisGetVisualGamma()`. See `XSolarisGetVisualGamma(3)` for a description of that function. This option can be used while the window system is running. Changing the gamma correction value will affect all the windows being displayed using the linear visuals.

-gfile *gamma-correction_file*

This option loads gamma correction table from the specified file. This file should be formatted to provide the gamma correction values for R, G and B channels on each line. Each of these values should be in hexadecimal format and separated from each other by at least one space. Also, this file should provide 1024 such triplets. An example of this file is as follows.

```
0x00 0x00 0x000
0x01 0x01 0x001
0x02 0x02 0x002
...
...
0x3ff 0x3ff 0x3ff
```

Using this option, the gamma correction table can be loaded while the window system is running. The new gamma correction will affect all the windows being displayed using the linear visuals. Note that, when gamma correction is being done using a user-specified table, the gamma correction value is undefined. By default, the window system assumes a gamma correction value of 2.22 and loads the gamma table it creates corresponding to this value.

-defaults

Resets all option values to their default values.

-propt

Prints the current values of all Sun Expert3D options in the OWconfig file specified by the -file option for the device specified by the -dev option. Prints the values of options as they will be in the OWconfig file after the call to SUNWifb_config completes. This is a typical display:

```
--- OpenWindows Configuration for /dev/fbs/ifb0 ---
OWconfig: machine
Video Mode: 1280x1024x76
Accum: Disabled (do not allocate an accumulation buffer)
Default Visual: Non-Linear Normal Visual
Visual Ordering: Linear Visuals are last
                  Overlay Visuals are last
OpenGL Visual Expansion: enabled
Gamma Correction Value: 2.22
Gamma Correction Table: Available
```

-prconf

Prints the Sun Expert3D hardware configuration. This is a typical display:

```
--- Hardware Configuration for /dev/fbs/ifb0 ---
PROM Information: @(#)ifb.fth 1.25 99/10/12 SMI
EDID Data: Available - EDID version 1 revision 1
Monitor possible resolutions: 1024x768x60, 1024x768x70, 1024x768x75,
1152x900x66, 1152x900x76, 1280x1024x67, 1280x1024x76, 960x680x112s,
640x480x60
Current resolution setting: 1280x1024x76
```

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-help

Prints a list of the `SUNWifb_config` command-line options, along with a brief explanation of each.

-samples 1 | 2 | 4 | 8 | 16

Requested number of samples to compute per display pixel. The requested number of samples per pixel will be used if `-multisample` is not disabled and resources exist for the request.

Query the number of samples used with `-propt` (see above) or the `xglnfo` utility. The `xglnfo` utility can return the number of multisamples after you specify the option `-multisample enable`.

The default is 16.

-multisample enable | disable | auto

If set to `disable`, no multisample is possible. If set to `enable`, multisample is possible but is selected on a per-window basis using a library interface. If set to `auto`, all Sun OpenGL windows are rendered using multisampling.

Query the number of samples used with `-propt` (see above) or the `xglnfo` utility. The `xglnfo` utility can return the number of multisamples if `-multisample` is set to `enable`.

The default is `disable`.

The `xglnfo` utility is shipped with the Sun OpenGL package, `SUNWglrt`. The man page for `xglnfo` is part of another Sun OpenGL package, `SUNWgldoc`.

DEFAULTS

For a given invocation of `SUNWifb_config` command line if an option does not appear on the command line, the corresponding `OWconfig` option is not updated; it retains its previous value. When the window system is run, if an Sun Expert3D option has never been specified via `SUNWifb_config`, a default value is used. The option defaults are as follows:

Option	Default
<code>-dev</code>	<code>/dev/fbs/ifb0</code>
<code>-file</code>	<code>machine</code>
<code>-res</code>	<code>none</code>
<code>-deflinear</code>	<code>false</code>
<code>-defoverlay</code>	<code>false</code>
<code>-linearorder</code>	<code>last</code>
<code>-overlayorder</code>	<code>last</code>
<code>-expvis</code>	<code>enable</code>
<code>-slave</code>	<code>disable</code>
<code>-accum</code>	<code>enable</code>
<code>-g</code>	<code>2.22</code>
<code>-samples</code>	<code>16</code>
<code>-multisample</code>	<code>disable</code>

SUNWifb_config(1M)

The default for the `-res` option of none means that, when the window system is run, the screen resolution will be the video mode that is currently programmed in the device. This design choice provides compatibility for users who are used to specifying the device resolution through the PROM. On some devices (for example, GX), this is the only way of specifying the video mode. This means that the PROM ultimately determines the default Sun Expert3D video mode.

EXAMPLES **EXAMPLE 1** Changing Monitor Resolution

The following example switches the monitor type to the resolution of 1280 x 1024 at 76 Hz:

```
example% /usr/lib/fbconfig/SUNWifb_config -res 1280x1024x76
```

FILES /dev/fbs/ifb0 device special file

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWifbcf

SEE ALSO `attributes(5)`, `mmap(2)`, `ifb(7D)`, `fbio(7I)`

SUNWpfb_config(1M)

NAME	SUNWpfb_config – fbconfig module for configuring Sun XVR-100 Graphics Accelerator
SYNOPSIS	<pre> /usr/lib/fbconfig/SUNWpfb_config [-dev <i>device-filename</i>] [-res <i>video-mode</i> [now try] [noconfirm nocheck]] [-file machine system] [-fake8 enable disable] [-doublewide enable disable] [-doublehigh enable disable] [-outputs swapped direct] [-depth 8 24] [-offset <i>xval yval</i>] [-defaults] /usr/lib/fbconfig/SUNWpfb_config [-propt] [-prconf] /usr/lib/fbconfig/SUNWpfb_config [-help] [-res \?]</pre>
DESCRIPTION	SUNWpfb_config is the Sun XVR-100 device dependent layer for fbconfig(1M). It configures the Sun XVR-100 Graphics Accelerator and some of the X11 window system defaults for Sun XVR-100. The Sun XVR-100 provides the capability to drive two monitors, each with a unique video stream (Stream #1 and Stream #2). The first form of SUNWpfb_config shown in the SYNOPSIS section sets options for the Sun XVR-100. It stores the specified options in the OWconfig file. These options initialize the Sun XVR-100 device the next time the window system is run on that device. Updating options in the OWconfig file provides persistence of these options across window system sessions and system reboots. The Sun XVR-100 device is immediately programmed if you specify the -res now. The second form, which invokes the only the -prconf and -propt options, queries the Sun XVR-100 for status. The third form, which invokes the -help, and -res and \? options, provides instruction on using SUNWpfb_config. Additionally, for the third form all other options are ignored. You can only specify options for only one Sun XVR-100 device at a time. If you want to specify options for multiple Sun XVR-100 devices, you must requires multiple invocations of SUNWpfb_config. You can only use SUNWpfb_config to specify Sun XVR-100-specific options. You can use the normal window system options to specify the default depth, default visual class and so forth as device modifiers on the command line when the X Server is started. See dtlogin(1) for information regarding the Xservers File. You can also specify the OWconfig file to update. The machine-specific file in the /etc/openwin directory tree is updated by default. You can used the -file option to specify an alternate file. For example, you can update the system-global OWconfig file in the /usr/openwin directory tree instead.
OPTIONS	The following options are supported: -defaults Reset all option values to their default values.

```

-depth 8 | 24
    Set the depth (bits per pixel) for the window system. Possible values for the
    -depth option are 8 or 24. You must log out of the current window system session
    and log back in again for the change to take effect. Any depth setting in the Xserver
    command line takes precedence over what is set using fbconfig. The default is 8.

-dev device-filename
    Specify the Sun XVR-100 special file. The default is /dev/fb.

-doublehigh enable | disable
    Configure the two outputs of the Sun XVR-100 into one vertical virtual display. The
    default is disable.

-doublewide enable | disable
    Configure the two outputs of the Sun XVR-100 into one horizontal virtual display.
    The default is disable.

-fake8 enable | disable
    Enable or disable simple 8 bit X windows to be rendered without a hardware
    colormap to reduce colormap flashing. You might notice performance reductions.
    The default is disable.

-file machine | system
    Specify which OWconfig file to update. If you specify machine, SUNWpfb_config
    updates the machine-specific OWconfig file in the /etc/openwin directory tree. If
    you specify system, SUNWpfb_config updates the global OWconfig file in the
    /usr/openwin directory tree. If either file does not exist, it is created.

-help
    Print a list of the SUNWpfb_config command line options, along with a brief
    explanation of each.

-offset xval yval
    Adjust the position of the specified stream by the value specified. This option is
    only implemented in -doublewide and -doublehigh modes. For
    -doublewide, use the xval to position the rightmost stream. Negative is left
    (overlaps with the left stream). For -doublehigh, use the yval to position the
    bottom stream. Negative is up (overlaps with top stream). The default is [0, 0].

-outputs swapped | direct
    Reverse or not reverse the positions of the -doublewide or -doublehigh outputs
    relative to each other. The default is direct.

-propt
    Print the current values of all Sun XVR-100 options in the OWconfig file specified
    by the -file option for the device specified by the -dev option. Print the values of
    options as they will be in the OWconfig file after the call to SUNWpfb_config
    completes.

    This is a typical display:

    --- OpenWindows Configuration for /dev/fbs/pfb0 ---

```

SUNWpfb_config(1M)

```
OWconfig: machine
Video Mode: NONE
Depth: not set

Screen Information:
    Doublewide: Disable
    Doublehigh: Disable
    Output Configuration: Direct
```

-prconf

Print the Sun XVR-100 hardware configuration.

This is a typical display:

```
--- Hardware Configuration for /dev/fbs/pfb0 ---
```

```
Type: XVR-100
ASIC: version 0x5159
REV : version 0x3000000
PROM: version 0
```

```
Monitor/Resolution Information:
    EDID Data: Not Available
    Current resolution setting: 1280x1024x75
```

```
Depth Information:
    Possible depths:  8, 24
    Current depth: 8
```

-res *video-mode* [now | try [noconfirm | nocheck]]

Specify the video mode that drives the monitor connected to the specified Sun XVR-100 device.

Video modes are built-in. The `-res` option requires you to specify the video-mode. You can specify *video-mode* in the format of *widthxheightxrate* or as a symbolic name.

widthxheightxrate

Specify *video-mode* in the format of *widthxheightxrate*, where *width* is the screen width in pixels, *height* is the screen height in pixels, and *rate* is the the vertical frequency of the screen refresh. An example video mode specified in this format is 1280x1024x76.

The `-res` option also accepts formats with @ preceding the refresh rate instead of x, (1280x1024@76).

Symbolic Names

Some video modes have symbolic names defined for them. Instead of the form *widthxheightxrate* format, you can specify one of the symbolic names as the argument to the `-res`. The meaning of the symbolic name none is that when the window system is run the screen resolution is the video mode that is currently programmed in the device.

The following symbolic names and their corresponding video modes are supported:

svga	1024x768x60
1152	1152x900x76
1280	1280x1024x75
none	Programmed video mode

Some video-modes, supported by Sun XVR-100, might not be supported by the monitor. Use the `-res \?` option to obtain the list of video-modes supported by the Sun XVR-100 device and the monitor.

The `-res` option also accepts additional, optional arguments immediately following the video mode specification. The following additional, optional arguments are supported:

<code>nocheck</code>	If present, the normal error checking based on the monitor sense code is suspended. The video mode specified by the user is accepted regardless of whether it is appropriate for the currently attached monitor. This option is useful if a different monitor is to be connected to the Sun XVR-100 device. Use of this option implies <code>noconfirm</code> as well.
<code>noconfirm</code>	You could put the system into an unusable state using the <code>-res</code> option, which has no video output. To reduce the chance of this, the default behavior of <code>SUNWpfb_config</code> is to print a warning message and to ask the user whether to continue. The <code>noconfirm</code> option bypasses this confirmation. This option is useful when you are running <code>SUNWpfb_config</code> from a shell script.
<code>now</code>	If present, updates the video mode in the <code>OWconfig</code> file and immediately programs the Sun XVR-100 device to display this video mode. This is useful for changing the video mode before starting the window system. Do not use this suboption with <code>SUNWpfb_config</code> while the configured device is being used, for example, while running the window system. Unpredictable results can occur. If you want to run <code>SUNWpfb_config</code> with the <code>now</code> suboption, first bring the window system down. If you use the <code>now</code> within a window system session, the video mode is changed immediately. The width and height of the affected screen will not change until the window system is exited and re-entered again. Additionally, the system might not recognize changes in stereo mode. This usage is discouraged.
<code>try</code>	If present, programs the specified video mode on a trial basis. You are asked to confirm the video mode by entering a <code>y</code> within 10 seconds. You can terminate the trial before 10 seconds by entering any character but <code>y</code> or RETURN. If you want to run <code>SUNWpfb_config</code> with the <code>now</code> suboption, first bring the

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window system down. If you use the `now` suboption within a window system session, the video mode is changed immediately. The width and height of the affected screen won't change until the window system is exited and re-entered again. Additionally, the system might not recognize changes in stereo mode. This usage is strongly discouraged.

`-res \?`

Print a list of defined *video-mode* names.

DEFAULTS

For a given invocation of `SUNWpfb_config` command line if an option does not appear on the command line, the corresponding `OWconfig` option is not updated; it retains its previous value.

When the window system is run, if an Sun XVR-100 option has never been specified by `SUNWpfb_config`, a default value is used. The options and their corresponding defaults are as follows:

Option	Default
<code>-dev</code>	<code>/dev/fb</code>
<code>-file</code>	<code>machine</code>
<code>-res</code>	<code>none</code>
<code>-fake8</code>	<code>disable</code>
<code>-depth</code>	<code>8</code>
<code>-doublewide</code>	<code>disable</code>
<code>-doublehigh</code>	<code>disable</code>
<code>-outputs</code>	<code>direct</code>
<code>-offset</code>	<code>[0,0]</code>

The default for the `-res` option `none` means that when the window system is run the screen resolution will be the video mode that is currently programmed in the Sun XVR-100 PROM.

This provides compatibility for users who are used to specifying the device resolution through the Sun XVR-100 PROM. On some devices (e.g. GX) this is the only way of specifying the video mode. This means that the PROM ultimately determines the default Sun XVR-100 video mode.

EXAMPLES

EXAMPLE 1 Switching the Monitor Type

The following example switches the monitor type to the resolution of 1280 × 1024 at 76 Hz:

EXAMPLE 1 Switching the Monitor Type *(Continued)*

```
example% fbconfig -res 1280x1024x76
```

FILES

/dev/fbs/pfbn

Device special file for Sun XVR-100 single screen

/dev/fbs/pfbna

Device special file for the Sun XVR-100 first video out

/dev/fbs/pfbnb

Device special file for the Sun XVR-100 second video out

/usr/lib/fbconfig/SUNWpfb_config

Device special file

ATTRIBUTES

See [attributes\(5\)](#) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWpfbcf

SEE ALSO

[fbconfig\(1M\)](#), [attributes\(5\)](#), [pfb\(7D\)](#)

[xSun\(1\)](#), [dtlogin\(1\)](#)

SUNWzulu_config(1M)

NAME	SUNWzulu_config – fbconfig module for configuring SunXVR-4000 Graphics Accelerator
SYNOPSIS	<pre> fbconfig [-dev <i>device-filename</i>] [-file machine system] [<i>options...</i> -defaults] fbconfig [-dev <i>device-filename</i>] [-propt] [-prconf] fbconfig [-dev <i>device-filename</i>] [-list -help -res \?] fbconfig [-dev <i>device-filename</i>] [-doublewide enable disable] [-doublehigh enable disable] [-outputs direct swapped streamA streamB] [-master a b] [-clearpixel 0 255] fbconfig [-dev <i>device-filename</i>] [-res <i>video_mode</i> [now try] [noconfirm]] [-multisample available disable forceon] [-samples <i>samples-per-pixel</i>] [-jitter regular random permuted auto] fbconfig [-dev <i>device-filename</i>] [-stream a b] [-filter cylinder gaussian mitchell catmull] -filter_file <i>filter_filename</i> [-offset <i>xoff-value yoff-value</i>] [-g <i>gamma-correction-value</i>] [-slave [enable disable] [framelock [internal external] genlock bothlock]] [-genlock [defaults] [hphase <i>±hphs</i>] [vphase <i>±vphs</i>] [sync [auto tip tri slice]] [pol [auto pos neg]]] </pre>
DESCRIPTION	SUNWzulu_config is the Sun XVR-4000 Graphics Accelerator device-dependent layer for fbconfig(1M). It configures the Sun XVR-4000 Graphics Accelerator and some of the X11 window system defaults and some interactions with 3D-accelerated graphics (through OpenGL). The first through third synopses, above, show the general form of a SUNWzulu_config command. The fourth synopsis (with -res as the first option) shows card options. The fifth synopsis is for managed-area options. The sixth and last synopsis shows stream options. These option categories—card, managed-area, and streams—are used mainly to explain the SUNWzulu_config functions. Where appropriate, you can use options of different types on the same command line. The Sun XVR-4000 device can support one or two unique video streams (called stream a and stream b), each of which can drive a display device.
Option Classes	The many options that fbconfig can select on the Sun XVR-4000 Graphics Accelerator are divided into the following categories: general options Shared among different invocation forms or used for query without selecting device settings.

Device Usage and Invocation Forms**card options**

Of the entire XVR-4000 Graphics Accelerator, shared between up to two video streams.

managed area options

Pertain to an area of the frame buffer managed by X and possibly shared between two video streams.

stream options

Specific to a video stream.

To use the device to provide a single X managed area with one video stream, use a stream-independent device argument (for example, `-dev zulu0`) without a trailing `a` or `b`. The device name (for example, `/dev/fb` or `/dev/fbs/zulu0`), without any trailing stream indicator should appear on the `Xsun` command line. Stream options will control `stream a` (the only stream used).

To enable two streams from a single X managed area (without needing X's `+xinerama` option), use the device name (for example, `-dev zulu0`) without any trailing `a` or `b`. Enable card option `-doublewide` or `-doublehigh`. Without using the `-stream` option, any stream options you specify are applied to both streams. Stream options can differ between the video streams if `fbconfig` is be run separately for each stream, using the `-stream a | b` option, as shown in EXAMPLES (second example), below.

To use the device's two streams as independent X screens, run `fbconfig` separately for each stream (`-dev zulu0a` and `-dev zulu0b`), as shown in EXAMPLES (third example). Card options `-doublehigh` and `-doublewide` are not available. The device names with trailing stream indicators (for example, `/dev/fbs/zulu0a` and `/dev/fbs/zulu0b`) must be added to the `Xsun` command line to use these independent X screens. The `-stream` option is not needed; the stream is implied by the stream-specific device name.

The `fbconfig` utility checks settings for the two stream devices to assure X can use them simultaneously. Therefore, you might need to use `fbconfig` to reduce resource consumption (for example, `-samples`) used by one stream's device (for example, `zulu0a`) before you can use `fbconfig` to increase consumption by the other stream's device (for example, `zulu0b`).

The first form of `SUNWzulu_config` shown in SYNOPSIS, above, stores the specified options in the `OWconfig` file associated with the device and (for stream options) the stream. These options are used to initialize the device the next time the window system is started on that device-filename. Updating options in the `OWconfig` file provides persistence of these options across window system sessions and system reboots. You can select the `OWconfig` file that is to be updated using the `-file` option. For `-jitter`, `-res now`, `-res try`, and all stream options, the device will also be immediately programmed.

The second form, which invokes any of the `-prconf` and `-propt` options, queries the device for status that is card-specific.

SUNWzulu_config(1M)

The third form, which invokes the `-help`, `-list`, or `-res \?` options, provides instruction on using `SUNWzulu_config`, a list of available devices, or a list of available resolutions. When using this form, all other options are ignored.

You can specify options for only one device at a time. Specifying options for multiple devices (or multiple independent X managed areas or streams) requires multiple invocations of `fbconfig`.

Only Sun XVR-4000 Graphics Accelerator-specific options can be specified through `SUNWzulu_config`. Window system options for specifying default depth, default visual class, `-nobanner`, and so forth are still specified as device modifiers on the `Xsun` command line when the X server is started, probably in CDE's `Xservers` file. See the `Xsun(1)` man page in the OpenWindows man page collection and `/usr/dt/config/Xservers`.

OPTIONS

This section is subdivided into general, card, managed area, and stream options.

General Options

`-dev device-filename`

Specifies the device's special file, such as `/dev/fbs/zulu0` or the basename such as `zulu0` as a shorthand. The default is `/dev/fb`. See "Device Usage and Invocation Forms," above.

`-file machine | system`

Selects which `OWconfig` file to update. If `machine`, the machine-specific `OWconfig` file in the `/etc/openwin` directory tree is used. (This is the default.) If `system`, the global `OWconfig` file in the `/usr/openwin` directory tree is used. If the file does not exist, it is created.

`-defaults`

Resets all option values to their default values, listed in the DEFAULTS section, below. For example, invoking `-defaults` on `zulu0`, `zulu0a`, or `zulu0b` will reset all card, managed area, and stream options for all these `zulu0` subdevices.

`-propt`

Displays the current values of all options in the `OWconfig` file specified by the `-file` option for the device specified by the `-dev` option. Displays the values of options as they will be in the `OWconfig` file after the call to `SUNWzulu_config` completes. The following is an example display:

```
--- OpenWindows Configuration for /dev/fbs/zulu0 ---
```

```
OWconfig File: machine
```

```
Card:
```

```
Double(wide/high):      disable
Stream to Port Mapping:  direct (Stream A to Port A; B to B)
Clearpixel Value:        255
```

```
Managed Area:
```

```
Resolution:              SUNW_STD_1280x1024x76
Samples Per Pixel:        max
Multisample Mode:         forceon
Jitter Table:             auto
```

```

Video Streams:
  Stream A:
    Offset (x,y):      (0, 0)
    Gamma Correction Value: 2.22
    Filter Type:       mitchell

  Stream B:
    Offset (x,y):      (0, 0)
    Gamma Correction Value: 2.22
    Filter Type:       mitchell

Framelock:
  Framelock/Stereo Port: Output from Stream A
  Stream A Sync:         Free Run (no frame sync)
  Stream B Sync:         Free Run (no frame sync)

```

-prconf

Displays the current XVR-4000 hardware configuration, including version numbers of each class of chip. The following is an example display:

```

--- Hardware Configuration for /dev/fbs/zulu0 ---
Type:  XVR-4000 Graphics Accelerator
Part:  501-5588

Memory:
  MAJC:      128MB
  Texture:   1GB total
  3DRAM64:   10.0M samples

Versions:
  Fcode 1.19   MCode 1.4   MAJC 2.1
  FBC3 3.0     Master 1.0   Convolve 0.0
  Sched 1.0    I/O 1.0     FPGA 0.0

Power Level:
  Monitor Power: On
  Board Power:   On

Video Streams:
  Stream A:
    Current resolution setting: SUNW_STD_1280x1024x76
    Flags: Allocated Default Primary
    Samples per pixel: 6
    Port: 13W3a
    Monitor/EDID data (13W3)
      Monitor Manufacturer: SUN
      Monitor Name: GDM-5410
      EDID: Version 1, Revision 2

  Stream B:
    Current resolution setting: SUNW_STD_1280x1024x76
    Flags: Allocated
    Samples per pixel: 2
    Port: 13W3b
    Monitor/EDID data (13W3)
      Monitor Manufacturer: SUN
      EDID: Version 1, Revision 3

```

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Card Options

- help
Displays a list of the `SUNWzulu_config` command line options, along with a brief explanation of each.
 - res \?
Displays list of defined video mode names supported by the XVR-4000 Graphics Accelerator and the display device.
 - doublewide enable | disable
This option makes it easy for you to combine both streams into one side-by-side virtual display. When enabled with `-outputs direct`, stream a is to the left of stream b. Both streams will use the same video mode defined with the `-res` option. If you specify `disable`, only stream a will be enabled. Enabling `-doublewide` disables `-doublehigh`.
 - doublehigh enable | disable
This option makes it easy for you to combine both streams into one virtual display with one display device above the other. When enabled with `-outputs direct`, stream a is above stream b. Both streams will use the same video mode defined with the `-res` option. If you specify `disable`, only stream a will be enabled. Enabling `-doublehigh` disables `-doublewide`.
 - outputs direct | swapped | streamA | streamB
Controls the internal routing of video streams to output ports (that is, backplane 13W3 connectors). The choices are:
 - direct
Stream a to output port a, stream b to output port b
 - swapped
Stream a to output port b, stream b to output port a
 - streamA
Stream a to both output ports
 - streamB
Stream b to both output ports

The default is `direct`. `swapped` can be used to reverse the connectors when `-doublewide` or `-doublehigh` is enabled. The `streamA` and `streamB` arguments are incompatible with stream-specific device names (for example, `zulu0a` or `zulu0b`). When the `-res` option selects an S-video (NTSC or PAL composite) video mode, the svideo output port is automatically selected, sometimes overriding `-outputs` selection.
 - master a | b
This option controls which stream drives the `FIELD` and `FRAME_OUT` pins on the device's stereo/sync connector. This pin can drive stereo shutter glasses, and allow another device to framelock to this device's output. The default is `a`.
- Independent of this option, the `-slave external` option allows a stream to sync to another card by means of this connector's `FIELD_IN` pin.

**Managed Area
Options**

`-clearpixel 0 | 255`

Selects the overlay transparent color. This is the pixel value (color index) used by the transparent overlay visual to display the underlay (RGB) pixel contents. The default is 255 (all bits 1), but some applications require 0. All other color indices display a colormap color.

`-res video_mode [ now | try [ noconfirm ] ]`

The *video_mode* argument specifies resolution and timing information for the display (for example, SUNW_STD_1280x1024x76). The naming convention for the video mode specifier is:

origin_type_widthxheightxrate

The elements of the specifier are described as follows:

origin

This can be one of:

SUNW

Sun-derived resolution

VESA

Video Electronics Standards Association-derived resolution

other

other source

type

This can be one or more of:

STD

normal resolution, usable by most display devices

DIG

resolution tuned only for LCD flat panels

INT

interlaced

STEREO

stereo

width

screen width in pixels

height

screen height in pixels

rate

vertical frequency of the screen refresh (in hertz, that is, video frames per second)

Note that some video modes supported by the XVR-4000 might not be supported by the display device. The list of video modes supported by the device and the display device can be obtained by running `SUNWzulu_config` with the `-res \?` option.

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The `-res` option also implicitly specifies the resolution of the X screen's managed area. It is the same as the video mode resolution, or twice the width or height in the case of `-doublewide` or `-doublehigh`, respectively.

The `-res` option also accepts additional, optional arguments, listed below, immediately following the video mode specification. Either `now` or `try` (`try` subsumes `now`) and `noconfirm` can be present.

`now`

If present, not only is the video mode updated in the `OWconfig` file, but the device is immediately programmed to display this video mode. This is useful for testing the video mode before starting the window system.

It is recommended that you not use the `try` or `now` suboptions while the configured device is being used (for example, while running the window system). The best practice is to exit the window system beforehand. If these suboptions are used within a window system session, the video mode is changed immediately, but the width and height of the affected X window system's screen do not change until the window system restarts. (The buffer may be scaled or cropped if the resolution is lowered; a black border may surround the buffer if it is increased. In addition, the system might not recognize changes in stereo mode.)

`noconfirm`

Using the `-res` option, the user can put the system into an unusable state, with no video output. To reduce the chance of this, the default behavior of `SUNWzulu_config` is to display a warning message and ask the user whether to continue. The `noconfirm` argument bypasses this confirmation. This option is useful when `SUNWzulu_config` is being run from a shell script.

`try`

If present, the specified video mode will be programmed on a trial basis. The user is asked to confirm the video mode by typing `y` within 10 seconds. Alternatively, the user can terminate the trial before 10 seconds elapse by typing any character other than `y` or return. Such input is considered a `no` and the previous video mode is restored. With a negative response, `SUNWzulu_config` does not change the video mode in the `OWconfig` file; other options specified still take effect. If a carriage return is typed, the user is asked (`y` or `n`) whether to keep the new video mode.

The `try` suboption implies the `now` suboption. See the warning note in the description of the `now` suboption, above. The `try` option can be used to test a video mode. Best practice is to then restart the window system or to reject the video mode and then set it again without the `try` or `now` suboptions (for the next time the window system starts).

`-multisample available | disable | forceon`

The `-multisample` option controls whether a multisample buffer is allocated by the window system and used by OpenGL applications. The suboptions are:

disable

No multisample rendering is possible. Only one sample per pixel is allocated, despite the `-samples` option value. Furthermore, display filtering is disabled.

available

Multisample is possible but is selected on a per-application basis. (Each process may choose whether to multisample at the density allocated when the window system started, or not to multisample at all. Intermediate densities are not possible.)

forceon

Sun OpenGL will use multisample rendering for all applications. There may be a minor performance penalty for rendering at higher sample densities.

Multisample allocation occurs when the window system starts up. This is the only allocation mode supported on the Sun XVR-4000 Graphics Accelerator.

-samples samples-per-pixel

Specifies the number of samples per pixel to allocate when multisample is not `disable`. Allowable choices are 1 to 16 or `max`, but a very high sample density can be allocated only at low resolution. Setting sample density to 1 is not equivalent to disabling multisampling; samples will still be subject to filtering and jitter. Sample resolutions (without frame rates) and their maximum sample densities follow.

Resolution	Maximum Density	Maximum Balanced Density
width by height	(single stream)	(one stream + another)
1920 by 1200	4 samples	2 + 2 samples
1600 by 1200	5 samples	3 + 2 samples
1600 by 1024	6 samples	3 + 3 samples
1280 by 1024	8 samples	4 + 4 samples
1152 by 900	9 samples	5 + 4 samples
1024 by 800	11 samples	5 + 5 samples
800 by 600	15 samples	7 + 7 samples
768 by 575	15 samples	7 + 7 samples
640 by 480	16 samples	9 + 9 samples

The default is `max`, which means to use the maximum number of samples that can be supported with the amount of memory available, possibly dependent on the video timing (horizontal frequency).

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For dual independent streams, if the first stream used by the window system (typically, the first in the `Xservers` file) chooses `max`, it takes most of the memory and video resources. The second stream can then use only a low sample density. If it also chooses `max`, X automatically finds the highest sample density remaining, such as 1 or 2 samples per pixel. To assign sample density more evenly, set each stream's density explicitly. `SUNWzulu_config` allows a combination of resolutions and sample densities only if they will coexist successfully. You might have to reduce one stream's sample density (or choose `max`) before you can increase the other stream's.

`-jitter regular | random | permuted | auto`

Indirectly determines the subpixel (X,Y) locations of the samples stored in the sample buffer. (The sample density also affects the sample locations.) Choices are:

`regular`

Samples are regularly-spaced both vertically and horizontally. The sample locations repeat every pixel or two in X and Y.

`random`

Samples are pseudo-randomly (irregularly) spaced within the pixel. The sample locations repeat every 2 pixels in X and Y.

`permuted`

Samples are pseudo-randomly spaced within the pixel, and also permuted (stirred) in hardware so that the sample locations repeat every 128 pixels in X and Y. At moderate to high sample density, this choice can improve visual quality. At low sample density, straight lines or edges can appear jagged.

`auto`

Automatically selects the best jitter option for the current sample density. This is the default.

The same jitter selection must be used by OpenGL when rendering and by the display subsystem when refreshing the display from the sample buffer. The jitter value is changed immediately in hardware, but any multisamples already in the sample buffer were rendered using the prior jitter selection; that will look incorrect (for example, unstraight lines or edges) if the jitter selection is changed.

When a new OpenGL application starts up, it will render using the new jitter selection. (The window system need not be restarted.) The jitter value is also saved in the `OWconfig` file for the next time the window system starts.

Stream Options

`-stream a | b`

Determines whether stream options will be set for stream a or stream b. The "Device Usage and Invocation Forms" section, above, describes the usage and the default. The `-stream` option is required only to set different stream options for the two video streams enabled using card option `-doublewide` or `-doublehigh`.

`-filter cylinder | gaussian | mitchell | catmull`

`-filter_file filter_filename`

There are two ways to configure filtering. The `-filter` option is the simpler. It selects from these predefined filters:

cylinder

Poorest visual quality, most like a box filter.

gaussian

Blurriest; suitable for users who want to forgo detail to avoid all visible sampling artifacts.

mitchell

The best photo-realistic compromise between sharp detail and noticeable blurriness. This filter is the default.

catmull

The Catmull-Rom filter produces images a little sharper than Mitchell, but are more likely to have visible sampling artifacts, widely known as "jaggies".

The `-filter_file` option allows a user to provide his own filter by producing a filter file and copying or linking it into the directory

`/etc/openwin/server/etc/filters` or

`/usr/openwin/server/etc/filters`. (Both directories are writable by super-user by default.) The *filter_filename* must not start with `/` or `./` nor contain the substring `./`, but can contain subdirectory components.

`fbconfig` and `X` search the directories above in the order listed. If the *filter_filename* is present and valid, the file takes precedence over a predefined filter.

The format of the file is a sequence of floating-point radius and weight values, each value separated by whitespace. Radius values must be monotonically increasing from 0. Weight values must be between -1.0 and +1.0, inclusive. Though more values can be present in the file, only values through radius 2.0 are used. Whitespace and comment lines prefixed with a hash mark (#) are ignored.

Example files contain the (irregular) radius values for which the device uses weight values. The file reader interpolates between existing values if the required radius is not present.

A valid filter option is changed immediately in hardware and saved in the `OWconfig` file for the next time the window system starts. However, when `multisample` is disabled, no filtering occurs.

-offset *xoff-value* *yoff-value*

Offsets the display of the stream (specified by `-stream`) relative to the adjoining edge of the other stream when `doublewide` or `doublehigh` is enabled. This can be used to cause an overlap.

xoff-value

Number of pixels offset in horizontal direction for the righthand stream when `doublewide` is enabled. Positive direction is to the right (create a gap); negative is to the left (overlap the streams). Default is 0, which means the two edges abut.

yoff-value

Number of pixels offset in vertical direction for the bottom stream when `doublehigh` is enabled. Positive direction is down (create a gap); negative is up

(overlap the streams). Default is 0, which means the two edges touch.

-g *gamma-correction-value*

This option changes the gamma correction value. By default the gamma correction value is 2.22. Any value less than zero is illegal. This option can be used while the window system is running. Changing the gamma correction value will affect all the windows being displayed using gamma-corrected visuals. The gamma correction value is also saved in the `OWconfig` file for the next time the window system starts.

-slave [enable | disable]

[framelock [internal | external] | genlock | bothlock]

This option allows you to enable a synchronization technique for the specified stream. Available techniques:

framelock [internal | external]

This provides "asynchronous frame reset": multiple streams all start a frame at roughly the same time. This allows stereo shutters to view the same eye's image from all the synchronized display devices. Using `framelock` requires the incoming synchronization signal have the same frame rate as the stream's video format.

When using `framelock` (or `bothlock`), you can also specify the synchronization source:

internal

Indicates that the sync source is the other stream of this device.

external

Indicates the sync is taken from a source outside the device. Using `external` requires a Frame Lock Cable (part number 530-2754) to be connected. If `-slave enable` is used without specifying a technique, `framelock external` is used.

genlock

This provides pixel-accurate horizontal synchronization, which is important in some video mixing situations. Use of `genlock` requires a genlock cable. Use of `bothlock` is recommended, when possible. Certain video formats are incompatible with `genlock`.

bothlock

This enables both `framelock` and `genlock` techniques, and requires both `framelock` (if `external`) and `genlock` cables.

-genlock [defaults] [hphase *±hphs*][vphase *±vphs*]

[sync [auto|tip|tri|slice]] [pol [auto|pos|neg]]

When `-slave` is enabled and the `genlock` technique is selected, the selections chosen with the `-genlock` option determine `genlock` details. These details are used immediately by the hardware, and saved in the `OWconfig` file for future use. Note that they may no longer be desired after changing to a different video format.

defaults

Reset all genlock details to their defaults.

hphase $\pm hphs$

The horizontal phase allows a pixel offset between the external video format and the stream's output. It may be specified as an absolute integer ranging from 0 to the total number of pixel clocks in a horizontal period (active video plus blanked pixels). Or, if the *hphs* starts with a + or -, the value will be added to the current horizontal phase and saved, modulo the valid range. Small deltas can be used repeatedly until the desired effect is observed.

vphase $\pm vphs$

The vertical phase allows a scanline offset between the the external video format and the stream's output. It can be specified as an absolute integer ranging from 0 to the total number of scanlines in a frame (active video plus blanked scanlines). Or, if the *vphs* starts with a + or -, the value will be added to the current vertical phase and saved, modulo the valid range. Small deltas can be used repeatedly until the desired effect is observed.

sync [auto | tip | slice | tri]

This option controls the details of input sync signal sampling, if necessary:

auto

Sample the genlock input pulses as most appropriate for the (Sun) video format. This is the default, and should be used whenever the sync master is also a Sun video format.

tip

Consider the sync to have occurred at the minimum signal value. This can be used with RS-170 (NTSC or PAL) or with TTL signals.

slice

Consider the frame sync to have occurred halfway between the minimum and maximum value (sync tip and back porch "blank" levels). This can be used with RS-170 (NTSC or PAL) or with TTL signals.

tri

Synchronize to a tri-level signal, used by HDTV analog formats.

pol [auto | pos | neg]

When the sync master is not a Sun video format, it might be necessary to choose which edge of the genlock input sync pulse should be used for genlock.

auto

Choose rising or falling edge for sync pulse, whichever is most appropriate for the video format. This is the default, and should be used whenever the sync master is also a Sun video format.

pos

Synchronize with a rising edge of a sync pulse.

neg

Synchronize with a falling edge of a sync pulse.

SUNWzulu_config(1M)

DEFAULTS

For a given invocation of `SUNWzulu_config`, if an option does not appear on the command line, the corresponding `OWconfig` option is not updated. It retains its previous value.

When the window system starts, if an option has never been specified through `SUNWzulu_config`, a default value is used. The option defaults are as follows:

<i>Option Class</i>	<i>Option</i>	<i>Default</i>
General	-dev	/dev/fb
General	-file	machine (/etc/openwin/server/etc/OWconfig)
Card	-doublewide	disable
Card	-doublehigh	disable
Card	-master	a
Card	-outputs	direct
Card	-clearpixel	255
Managed Area	-res	SUNW_STD_1280x1024x76
Managed Area	-multisample	forceon
Managed Area	-samples	max
Managed Area	-jitter	auto
Stream	-offset	0,0
Stream	-filter	mitchell
Stream	-slave	disable/external/framelock
Stream	-genlock	hphase 0/vphase 0/auto/auto
Stream	-g	2.22

EXAMPLES

EXAMPLE 1 Switching Resolution of a Monitor

The following example switches to the resolution of 1280 by 1024 at 76 hertz:

```
% fbconfig -dev zulu0 -res SUNW_STD_1280x1024x76
```

EXAMPLE 2 Using Two Side-by-side Monitors with One Large X Screen

The following example enables use of two side-by-side monitors to display together a single large shared X window system "screen" (frame buffer managed area):

```
% fbconfig -dev zulu0 -doublewide enable
```

If the wrong monitor is on the left, they can be swapped in software:

```
% fbconfig -dev zulu0 -outputs swapped
```

A stream option selects a Gaussian (blurry) filter for video stream b:

```
% fbconfig -dev zulu0 -stream b -filter gaussian
```

For the two examples above, the factory-installed `/usr/dt/config/Xservers` file is sufficient (if `/dev/fb` is a link to the Sun XVR-4000 Graphics Accelerator device). If an `/etc/dt/config/Xservers` file exists, for Example 1 or 2, the file would refer to device `zulu0` (not `zulu0a` or `zulu0b`):

```
:0 Local local_uid@console root /usr/openwin/bin/Xsun -dev /dev/fbs/zulu0
```


EXAMPLE 2 Using Two Side-by-side Monitors with One Large X Screen (Continued)

EXAMPLE 3 Using Two Displays as Independent X Screens

The following example enables use of two displays, each with their own X window system managed frame buffer area and resolution. The larger resolution is not multisampled or filtered, so the smaller resolution will have more samples available to it.

```
% fbconfig -dev zulu0a -res SUNW_STD_1920x1200x75 -multisample disable
% fbconfig -dev zulu0b -res SUNW_STD_1280x1024x76 -samples max
```

In this example, and assuming the display device for stream b is to the right of that for stream a, the `/etc/dt/config/Xservers` file might contain (as one long line):

```
:0 Local local_uid@console root /usr/openwin/bin/Xsun -nobanner
    -dev /dev/fbs/zulu0a -dev /dev/fbs/zulu0b right
```

FILES

`/dev/fb`
default device file

`/usr/lib/fbconfig/SUNWzulu_config`
device configuration program

`/etc/openwin/server/etc/filters/`
root file system directory for filter files

`/usr/openwin/server/etc/filters/`
`/usr` file system directory for filter files

An administrator might also have to edit `/etc/dt/config/Xservers`.

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWzuluc

SEE ALSO

`fbconfig(1M)`, `attributes(5)`

See the `dtlogin(1)` man page in the CDE man page collection. Also useful is the `Xsun(1)` man page in the OpenWindows man page collection.

swap(1M)

NAME	swap – swap administrative interface
SYNOPSIS	<pre>/usr/sbin/swap -a swapname [swaplow] [swaplen] /usr/sbin/swap -d swapname [swaplow] /usr/sbin/swap -l /usr/sbin/swap -s</pre>
DESCRIPTION	The swap utility provides a method of adding, deleting, and monitoring the system swap areas used by the memory manager.
OPTIONS	The following options are supported: <i>-a swapname</i> Add the specified swap area. This option can only be used by the super-user. <i>swapname</i> is the name of the swap file: for example, <i>/dev/dsk/c0t0d0s1</i> or a regular file. <i>swaplow</i> is the offset in 512-byte blocks into the file where the swap area should begin. <i>swaplen</i> is the desired length of the swap area in 512-byte blocks. The value of <i>swaplen</i> can not be less than 16. For example, if <i>n</i> blocks are specified, then <i>(n-1)</i> blocks would be the actual swap length. <i>swaplen</i> must be at least one page in length. The size of a page of memory can be determined by using the <i>pagesize</i> command. See <i>pagesize(1)</i>. Since the first page of a swap file is automatically skipped, and a swap file needs to be at least one page in length, the minimum size should be a multiple of 2 <i>pagesize</i> bytes. The size of a page of memory is machine dependent. <i>swaplow + swaplen</i> must be less than or equal to the size of the swap file. If <i>swaplen</i> is not specified, an area will be added starting at <i>swaplow</i> and extending to the end of the designated file. If neither <i>swaplow</i> nor <i>swaplen</i> are specified, the whole file will be used except for the first page. Swap areas are normally added automatically during system startup by the <i>/sbin/swapadd</i> script. This script adds all swap areas which have been specified in the <i>/etc/vfstab</i> file; for the syntax of these specifications, see <i>vfstab(4)</i>. To use an NFS or local file-system <i>swapname</i>, you should first create a file using <i>mkfile(1M)</i>. A local file-system swap file can now be added to the running system by just running the <i>swap -a</i> command. For NFS mounted swap files, the server needs to export the file. Do this by performing the following steps: 1. Add the following line to <i>/etc/dfs/dfstab</i>: <pre>share -F nfs -o rw=clientname , root=clientname path-to-swap-file</pre>

2. Run `shareall(1M)`.
3. Have the client add the following lines to `/etc/vfstab`:

```
server:path-to-swap-file - local-path-to-swap-file fs - - -
local-path-to-swap-file - - swap - - -
```

4. Have the client run `mount`:

```
# mount local-path-to-swap-file
```

5. The client can then run `swap -a` to add the swap space:

```
# swap -a local-path-to-swap-file
```

`-d swapname`

Delete the specified swap area. This option can only be used by the super-user. *swapname* is the name of the swap file: for example, `/dev/dsk/c0t0d0s1` or a regular file. *swaplow* is the offset in 512-byte blocks into the swap area to be deleted. If *swaplow* is not specified, the area will be deleted starting at the second page. When the command completes, swap blocks can no longer be allocated from this area and all swap blocks previously in use in this swap area have been moved to other swap areas.

`-l`

List the status of all the swap areas. The output has five columns:

<code>path</code>	The path name for the swap area.
<code>dev</code>	The major/minor device number in decimal if it is a block special device; zeroes otherwise.
<code>swaplo</code>	The <i>swaplow</i> value for the area in 512-byte blocks.
<code>blocks</code>	The <i>swapplen</i> value for the area in 512-byte blocks.
<code>free</code>	The number of 512-byte blocks in this area that are not currently allocated.

The list does not include swap space in the form of physical memory because this space is not associated with a particular swap area.

If `swap -l` is run while *swapname* is in the process of being deleted (by `swap -d`), the string `INDEL` will appear in a sixth column of the swap stats.

`-s`

Print summary information about total swap space usage and availability:

<code>allocated</code>	The total amount of swap space in bytes currently allocated for use as backing store.

swap(1M)

	reserved used available These numbers include swap space from all configured swap areas as listed by the -l option, as well swap space in the form of physical memory.	The total amount of swap space in bytes not currently allocated, but claimed by memory mappings for possible future use. The total amount of swap space in bytes that is either allocated or reserved. The total swap space in bytes that is currently available for future reservation and allocation.				
USAGE	Only the first 2 Gbyte of a block device larger than 2 Gbyte in size can be used for swap in swapfs on a 32-bit operating system. With a 64-bit operating system, a block device larger than 2 Gbyte can be fully utilized for swap up to 2 ⁶³ –1 bytes.					
ENVIRONMENT VARIABLES	See environ(5) for descriptions of the following environment variables that affect the execution of swap: LC_CTYPE and LC_MESSAGE.					
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:					
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE					
Availability	SUNWcsu					
SEE ALSO	pagesize(1), mkfile(1M), shareall(1M), getpagesize(3C), vfstab(4), attributes(5), largefile(5)					
WARNINGS	No check is done to determine if a swap area being added overlaps with an existing file system.					

NAME	swmtool – install, upgrade, and remove software packages				
SYNOPSIS	swmtool [-d directory]				
DESCRIPTION	The swmtool command invokes the admintool(1M) application, which is preselected to add or remove software. Using the swmtool command, you can add software from a product CD or hard disk to an installed system, or you can remove software from an installed system. Once logged in, you may run swmtool to examine the packages on your local system. Membership in the sysadmin group (gid 14) is used to restrict access to administrative tasks. Members of the sysadmin group can use swmtool to add or remove software packages. Non-members have read-only permissions (where applicable). Help is available by using the Help button.				
OPTIONS	-d <i>directory</i> Specify the directory containing the software to be installed.				
EXAMPLES	EXAMPLE 1 A sample display of using swmtool command. The following example starts the admintool() application and tells it to look for software packages in the local directory /cdrom/cdrom0/s0 (the default directory for a CD when running Volume Manager). <pre>example% /usr/sbin/swmtool -d /cdrom/cdrom0/s0</pre>				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWadmap</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWadmap
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWadmap				
SEE ALSO	admintool(1M), pkgadd(1M), pkgrm(1M), attributes(5) <i>Solaris Advanced User's Guide</i>				

sxconfig(1M)

NAME	sxconfig – configure contiguous memory for the SX video subsystem
SYNOPSIS	<pre> /usr/platform/platform-name/sbin/sxconfig -c /usr/platform/platform-name/sbin/sxconfig -d /usr/platform/ platform-name /sbin/sxconfig [-f -n] [-l limit] [-s size] </pre>
DESCRIPTION	The <code>sxconfig</code> command configures contiguous memory parameters for exclusive use by the SX video system on the Desktop SPARCsystems with graphics option. <i>platform-name</i> can be found using the <code>-i</code> option of <code>uname(1)</code>. After configuring the physically contiguous memory, using the various options described below, the system must be rebooted for the changes to take effect. If this command is being used to configure physically contiguous memory for the first time after the system software has been installed, then the system must be rebooted using the reconfiguration option (<code>-r</code>) of <code>boot(1M)</code>. The amount of memory to be reserved depends upon the type of application. Applications that benefit from the availability of contiguous memory are those that are written to the XGL and XIL graphics and imaging foundation library APIs. The <i>Platform Notes: SPARCstation 10SX System Configuration Guide</i> provides more detailed information regarding how much memory to reserve for various types of graphics and imaging applications. <code>sxconfig</code> is supported only on Desktop SPARCsystems with SX graphics option. The interface, output, and command location are uncommitted and subject to change in future releases.
OPTIONS	The following options are supported: -c Display the current configuration parameters in the driver configuration file. If the system was not rebooted after previously changing the configuration parameters, then the displayed values do not reflect the actual system setup. -d Restore all configuration parameters to the default values. By default, 0 megabytes of physically contiguous memory are reserved, fragmentation is not allowed, and 32 megabytes of memory are reserved for system use. -f Allow fragmentation. If no single chunk of memory of at least the requested size is found, allow the request to span multiple chunks. This flag also specifies that less than <i>size</i> megabytes of data may be reserved if there are not enough contiguous chunks available. If this flag is not specified, then the memory reserved must be exactly one chunk of the requested size for the request to succeed. -n Specify that fragmentation is not allowed.

-l <i>limit</i>	Specify that at least <i>limit</i> megabytes of total memory must remain for system use after the contiguous memory has been reserved.
-s <i>size</i>	Reserve <i>size</i> megabytes of contiguous memory for exclusive use by the SX video subsystem.

EXAMPLES

EXAMPLE 1 Using sxconfig

The following example reserves 16 megabytes of contiguous memory without fragmentation and indicates 32 megabytes of memory should remain for system use after reserving the contiguous memory:

```

example# sxconfig -s 16 -l 32

```

EXAMPLE 2 Using sxconfig with Fragmentation

The following example reserves 16 megabytes of contiguous memory with fragmentation allowed and indicates 32 megabytes of memory should remain for system use after reserving the contiguous memory:

```

example# sxconfig -s 16 -f -l 32

```

EXAMPLE 3 Reporting Current Configuration Parameters

The following example reports current configuration parameters in the driver configuration file:

```

example# sxconfig -c

```

EXAMPLE 4 Restoring Configuration Parameters to Default Values

The following example restores all configuration parameters to the default values:

```

example# sxconfig -d

```

EXAMPLE 5 Disabling Fragmentation

The following example disables fragmentation:

```

example# sxconfig -n

```

EXIT STATUS

sxconfig returns 0 on success, and a positive integer on failure.

1	Permission denied. Only root can run this command.
2	Configuration file <code>sx_cmem.conf</code> does not exist.
3	Illegal option.
4	Illegal combination of options.

sxconfig(1M)

5 Illegal argument for -s option. Should be an integer.

6 Illegal argument for -l option. Should be an integer.

FILES

/platform/*platform-name*/kernel/drv/sx_cmem

Contiguous memory device driver

/platform/*platform-name*/kernel/drv/sx_cmem.conf

Configuration file for contiguous memory driver

/etc/init.d/sxcmem

Contiguous memory startup script

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWkvm

SEE ALSO

uname(1), boot(1M), init(1M), attributes(5)

Platform Notes: SPARCstation 10SX System Configuration Guide

NAME	sync – update the super block
SYNOPSIS	sync
DESCRIPTION	<i>sync</i> executes the <i>sync</i> system primitive. If the system is to be stopped, <i>sync</i> must be called to insure file system integrity. It will flush all previously unwritten system buffers out to disk, thus assuring that all file modifications up to that point will be saved. See <i>sync(2)</i> for details.
ATTRIBUTES	See <i>attributes(5)</i> for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO *sync(2)*, *attributes(5)*

syncinit(1M)

NAME	syncinit – set serial line interface operating parameters																							
SYNOPSIS	<code>/usr/sbin/syncinit device [[baud_rate] [keyword=value,...] [single-word option]]</code>																							
DESCRIPTION	The syncinit utility allows the user to modify some of the hardware operating modes common to synchronous serial lines. This can be useful in troubleshooting a link, or necessary to the operation of a communications package. If run without options, syncinit reports the options as presently set on the port. If options are specified, the new settings are reported after they have been made.																							
OPTIONS	Options to syncinit normally take the form of a keyword, followed by an equal sign and a value. The exception is that a baud rate may be specified as a decimal integer by itself. Keywords must begin with the value shown in the options table, but may contain additional letters up to the equal sign. For example, loop= and loopback= are equivalent. The following options are supported: <table><tr><th>Keyword</th><th>Value</th><th>Effect</th></tr><tr><td rowspan="2">loop</td><td>yes</td><td>Set the port to operate in internal loopback mode. The receiver is electrically disconnected from the DCE receive data input and tied to the outgoing transmit data line. Transmit data is available to the DCE. The Digital Phase-Locked Loop (DPLL) may not be used as a clock source in this mode. If no other clocking options have been specified, perform the equivalent of txc=baud and rxc=baud.</td></tr><tr><td>no</td><td>Disable internal loopback mode. If no other clocking options have been specified, perform the equivalent of txc=txc and rxc=rxc.</td></tr><tr><td rowspan="2">echo</td><td>yes</td><td>Set the port to operate in auto-echo mode. The transmit data output is electrically disconnected from the transmitter and tied to the receive data input. Incoming receive data is still visible. Use of this mode in combination with local loopback mode has no value, and should be rejected by the device driver. The auto-echo mode is useful to make a system become the endpoint of a remote loopback test.</td></tr><tr><td>no</td><td>Disable auto-echo mode.</td></tr><tr><td rowspan="2">nrzi</td><td>yes</td><td>Set the port to operate with NRZI data encoding.</td></tr><tr><td>no</td><td>Set the port to operate with NRZ data encoding.</td></tr><tr><td rowspan="2">txc</td><td>txc</td><td>Transmit clock source will be the TxC signal (pin 15).</td></tr><tr><td>rxc</td><td>Transmit clock source will be the RxC signal (pin 17).</td></tr></table>	Keyword	Value	Effect	loop	yes	Set the port to operate in internal loopback mode. The receiver is electrically disconnected from the DCE receive data input and tied to the outgoing transmit data line. Transmit data is available to the DCE. The Digital Phase-Locked Loop (DPLL) may not be used as a clock source in this mode. If no other clocking options have been specified, perform the equivalent of txc=baud and rxc=baud.	no	Disable internal loopback mode. If no other clocking options have been specified, perform the equivalent of txc=txc and rxc=rxc.	echo	yes	Set the port to operate in auto-echo mode. The transmit data output is electrically disconnected from the transmitter and tied to the receive data input. Incoming receive data is still visible. Use of this mode in combination with local loopback mode has no value, and should be rejected by the device driver. The auto-echo mode is useful to make a system become the endpoint of a remote loopback test.	no	Disable auto-echo mode.	nrzi	yes	Set the port to operate with NRZI data encoding.	no	Set the port to operate with NRZ data encoding.	txc	txc	Transmit clock source will be the TxC signal (pin 15).	rxc	Transmit clock source will be the RxC signal (pin 17).
Keyword	Value	Effect																						
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txc	txc	Transmit clock source will be the TxC signal (pin 15).																						
	rxc	Transmit clock source will be the RxC signal (pin 17).																						

	baud	Transmit clock source will be the internal baud rate generator.
	pll	Transmit clock source will be the output of the DPLL circuit.
rx	rx	Receive clock source will be the Rx signal (pin 17).
	tx	Receive clock source will be the Tx signal (pin 15).
	baud	Receive clock source will be the internal baud rate generator.
	pll	Receive clock source will be the output of the DPLL circuit.
speed	<i>integer</i>	Set the baud rate to <i>integer</i> bits per second.

There are also several single-word options that set one or more parameters at a time:

Keyword	Equivalent to Options:
external	tx=tx rx=rx loop=no
sender	tx=baud rx=rx loop=no
internal	tx=pll rx=pll loop=no
stop	speed=0

EXAMPLES

EXAMPLE 1 Using syncinit

The following command sets the first CPU port to loop internally, using internal clocking and operating at 38400 baud:

```
example# syncinit zsh0 38400 loop=yes
device: /dev/zsh ppa: 0
speed=38400, loopback=yes, echo=no, nrzi=no, tx=baud, rx=baud
```

The following command sets the same port's clocking, local loopback and baud rate settings to their default values:

```
example# syncinit zsh0 stop loop=no
device: /dev/zsh ppa: 0
speed=0, loopback=no, echo=no, nrzi=no, tx=tx, rx=rx
```

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

syncloop(1M), syncstat(1M), intro(2), ioctl(2), attributes(5), zsh(7D)

syncinit(1M)

DIAGNOSTICS

device missing minor device number

The name *device* does not end in a decimal number that can be used as a minor device number.

bad speed: *arg*

The string *arg* that accompanied the speed= option could not be interpreted as a decimal integer.

Bad arg: *arg*

The string *arg* did not make sense as an option.

ioctl failure code = *errno*

An ioctl(2) system call failed. The meaning of the value of *errno* may be found in intro(2).

WARNINGS

Do not use syncinit on an active serial link, unless needed to resolve an error condition. Do not use this command casually or without being aware of the consequences.

NAME	syncloop – synchronous serial loopback test program
SYNOPSIS	/usr/sbin/syncloop [-cdlstv] <i>device</i>
DESCRIPTION	The <code>syncloop</code> command performs several loopback tests that are useful in exercising the various components of a serial communications link. Before running a test, <code>syncloop</code> opens the designated port and configures it according to command line options and the specified test type. It announces the names of the devices being used to control the hardware channel, the channel number (ppa) corresponding to the <i>device</i> argument, and the parameters it has set for that channel. It then runs the loopback test in three phases. The first phase is to listen on the port for any activity. If no activity is seen for at least four seconds, <code>syncloop</code> proceeds to the next phase. Otherwise, the user is informed that the line is active and that the test cannot proceed, and the program exits. In the second phase, called the "first-packet" phase, <code>syncloop</code> attempts to send and receive one packet. The program will wait for up to four seconds for the returned packet. If no packets are seen after five attempts, the test fails with an excoriating message. If a packet is returned, the result is compared with the original. If the length and content do not match exactly, the test fails. The final phase, known as the "multiple-packet" phase, attempts to send many packets through the loop. Because the program has verified the integrity of the link in the first-packet phase, the test will not fail after a particular number of timeouts. If a packet is not seen after four seconds, a message is displayed. Otherwise, a count of the number of packets received is updated on the display once per second. If it becomes obvious that the test is not receiving packets during this phase, the user may wish to stop the program manually. The number and size of the packets sent during this phase is determined by default values, or by command line options. Each returned packet is compared with its original for length and content. If a mismatch is detected, the test fails. The test completes when the required number of packets have been sent, regardless of errors. After the multiple-packet phase has completed, the program displays a summary of the hardware event statistics for the channel that was tested. The display takes the following form: <pre> CRC errors Aborts Overruns Underruns In<-Drops-> Out 0 0 0 0 0 </pre> This is followed by an estimated line speed, which is an approximation of the bit rate of the line, based on the number of bytes sent and the actual time that it took to send them.
OPTIONS	The options for <code>syncloop</code> are described in the following table:

syncloop(1M)

Option	Parameter	Default	Description
-c	<i>packet_count</i>	100	Specifies the number of packets to be sent in the multiple-packet phase.
-d	<i>hex_data_byte</i>	<i>random</i>	Specifies that each packet will be filled with bytes with the value of <i>hex_data_byte</i> .
-l	<i>packet_length</i>	100	Specifies the length of each packet in bytes.
-s	<i>line_speed</i>	9600	Bit rate in bits per second.
-v			Sets verbose mode. If data errors occur, the expected and received data is displayed.
-t	<i>test_type</i>	<i>none</i>	A number, from 1 to 4, that specifies which test to perform. The values for <i>test_type</i> are as follows: 1: Internal loopback test. Port loopback is on. Transmit and receive clock sources are internal (baud rate generator). 2: External loopback test. Port loopback is off. Transmit and receive clock sources are internal. Requires a loopback plug suitable to the port under test. 3: External loopback test. Port loopback is off. Transmit and receive clock sources are external (modem). Requires that one of the local modem, the remote modem, or the remote system be set in a loopback configuration. 4: Test using predefined parameters. User defines hardware configuration and may select port parameters using the <code>syncinit(1M)</code> command.

All numeric options except -d are entered as decimal numbers (for example, -s 19200). If you do not provide the -t *test_type* option, syncloop prompts for it.

EXAMPLES

EXAMPLE 1 A sample display of using the syncloop command.

In the following command syncloop uses a packet length of 512 bytes over the first CPU port:

```
example# syncloop -l 512 zsh0
```

In response to the above command, syncloop prompts you for the test option you want.

The following command performs an internal loopback test on the first CPU port, using 5000 packets and a bit rate of 56Kbps:

```
example# syncloop -t 1 -s 56000 -c 5000 zsh0
```

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO syncinit(1M), syncstat(1M), attributes(5), zsh(7D)

DIAGNOSTICS

device missing minor device number
 The name *device* does not end in a decimal number that can be used as a minor device number.

invalid packet length: *nnn*
 The packet length was specified to be less than zero or greater than 4096.

poll: nothing to read

poll: nothing to read or write.
 The poll(2) system call indicates that there is no input pending and/or that output would be blocked if attempted.

len *xxx* should be *yyy*
 The packet that was sent had a length of *yyy*, but was received with a length of *xxx*.

nnn packets lost in outbound queueing

nnn packets lost in inbound queueing
 A discrepancy has been found between the number of packets sent by syncloop and the number of packets the driver counted as transmitted, or between the number counted as received and the number read by the program.

WARNINGS To allow its tests to run properly, as well as prevent disturbance of normal operations, syncloop should only be run on a port that is not being used for any other purpose at that time.

syncstat(1M)

NAME	syncstat – report driver statistics from a synchronous serial link																		
SYNOPSIS	<code>/usr/sbin/syncstat [-c] device [interval]</code>																		
DESCRIPTION	The <code>syncstat</code> command reports the event statistics maintained by a synchronous serial device driver. The report may be a single snapshot of the accumulated totals, or a series of samples showing incremental changes. Prior to these it prints the device name being used to query a particular device driver, along with a number indicating the channel number (ppa) under control of that driver. Event statistics are maintained by a driver for each physical channel that it supports. They are initialized to zero at the time the driver module is loaded into the system, which may be either at boot time or when one of the driver's entry points is first called. The <i>device</i> argument is the name of the serial device as it appears in the <code>/dev</code> directory. For example, <code>zsh0</code> specifies the first on-board serial device. The following is a breakdown of <code>syncstat</code> output: <table> <tr> <td>speed</td><td>The line speed the device has been set to operate at. It is the user's responsibility to make this value correspond to the modem clocking speed when clocking is provided by the modem.</td></tr> <tr> <td>ipkts</td><td>The total number of input packets.</td></tr> <tr> <td>opkts</td><td>The total number of output packets.</td></tr> <tr> <td>undrun</td><td>The number of transmitter underrun errors.</td></tr> <tr> <td>ovrrun</td><td>The number of receiver overrun errors.</td></tr> <tr> <td>abort</td><td>The number of aborted received frames.</td></tr> <tr> <td>crc</td><td>The number of received frames with CRC errors.</td></tr> <tr> <td>isize</td><td>The average size (in bytes) of input packets.</td></tr> <tr> <td>osize</td><td>The average size (in bytes) of output packets.</td></tr> </table>	speed	The line speed the device has been set to operate at. It is the user's responsibility to make this value correspond to the modem clocking speed when clocking is provided by the modem.	ipkts	The total number of input packets.	opkts	The total number of output packets.	undrun	The number of transmitter underrun errors.	ovrrun	The number of receiver overrun errors.	abort	The number of aborted received frames.	crc	The number of received frames with CRC errors.	isize	The average size (in bytes) of input packets.	osize	The average size (in bytes) of output packets.
speed	The line speed the device has been set to operate at. It is the user's responsibility to make this value correspond to the modem clocking speed when clocking is provided by the modem.																		
ipkts	The total number of input packets.																		
opkts	The total number of output packets.																		
undrun	The number of transmitter underrun errors.																		
ovrrun	The number of receiver overrun errors.																		
abort	The number of aborted received frames.																		
crc	The number of received frames with CRC errors.																		
isize	The average size (in bytes) of input packets.																		
osize	The average size (in bytes) of output packets.																		
OPTIONS	<code>-c</code> Clear the accumulated statistics for the device specified. This may be useful when it is not desirable to unload a particular driver, or when the driver is not capable of being unloaded. <i>interval</i> <code>syncstat</code> samples the statistics every <i>interval</i> seconds and reports incremental changes. The output reports line utilization for input and output in place of average packet sizes. These are the relationships between bytes transferred and the baud rate, expressed as percentages. The loop repeats indefinitely, with a column heading printed every twenty lines for convenience.																		

EXAMPLES**EXAMPLE 1** Sample output from the syncstat command:

```
example# syncstat zsh0
speed ipkts opkts undrun ovrrun abort crc isize osize
9600 15716 17121 0 0 1 3 98 89

example# syncstat -c zsh0
speed ipkts opkts undrun ovrrun abort crc isize osize
9600 0 0 0 0 0 0 0 0
```

In the following sample output a new line of output is generated every five seconds:

```
example# syncstat zsh0 5
ipkts opkts undrun ovrrun abort crc iutil outil
12 10 0 0 0 0 5% 4%
22 60 0 0 0 0 3% 90%
36 14 0 0 0 1 51% 2%
```

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO
DIAGNOSTICS

syncinit(1M), syncloop(1M), attributes(5), zsh(7D)

bad interval: *arg*

The argument *arg* is expected to be an interval and could not be understood.

device missing minor device number

The name *device* does not end in a decimal number that can be used as a minor device number.

baud rate not set

The *interval* option is being used and the baud rate on the device is zero. This would cause a divide-by-zero error when computing the line utilization statistics.

WARNINGS

Underrun, overrun, frame-abort, and CRC errors have a variety of causes.

Communication protocols are typically able to handle such errors and initiate recovery of the transmission in which the error occurred. Small numbers of such errors are not a significant problem for most protocols. However, because the overhead involved in recovering from a link error can be much greater than that of normal operation, high error rates can greatly degrade overall link throughput. High error rates are often caused by problems in the link hardware, such as cables, connectors, interface electronics or telephone lines. They may also be related to excessive load on the link or the supporting system.

The percentages for input and output line utilization reported when using the *interval* option may occasionally be reported as slightly greater than 100% because of inexact sampling times and differences in the accuracy between the system clock and the modem clock. If the percentage of use greatly exceeds 100%, or never exceeds 50%, then the baud rate set for the device probably does not reflect the speed of the modem.

sysdef(1M)

NAME	sysdef – output system definition
SYNOPSIS	<pre>/usr/sbin/sysdef [-n <i>namelist</i>]</pre> <pre>/usr/sbin/sysdef [-h] [-d] [-D]</pre>
DESCRIPTION	The <i>sysdef</i> utility outputs the current system definition in tabular form. It lists all hardware devices, as well as pseudo devices, system devices, loadable modules, and the values of selected kernel tunable parameters. It generates the output by analyzing the named bootable operating system file (<i>namelist</i>) and extracting the configuration information from it. The default system <i>namelist</i> is <i>/dev/kmem</i>.
OPTIONS	-n <i>namelist</i> Specifies a <i>namelist</i> other than the default (<i>/dev/kmem</i>). The <i>namelist</i> specified must be a valid bootable operating system. -h Prints the identifier of the current host in hexadecimal. This numeric value is unique across all Sun hosts. -d The output includes the configuration of system peripherals formatted as a device tree. -D For each system peripheral in the device tree, display the name of the device driver used to manage the peripheral.
EXAMPLES	EXAMPLE 1 Sample output format The following example displays the format of the <i>sysdef -d</i> output: <pre>example% sysdef -d Node 'Sun 4/60', unit #0 (no driver) Node 'options', unit #0 (no driver) Node 'zs', unit #0 Node 'zs', unit #1 Node 'fd', unit #0 Node 'audio', unit #0 Node 'sbus', unit #0 Node 'dma', unit #0 Node 'esp', unit #0 Node 'st', unit #1 (no driver) Node 'st', unit #0 Node 'sd', unit #2 Node 'sd', unit #1 Node 'sd', unit #0 Node 'le', unit #0 Node 'bwtwo', unit #0 Node 'auxiliary-io', unit #0 Node 'interrupt-enable', unit #0 Node 'memory-error', unit #0 Node 'counter-timer', unit #0 Node 'eeprom', unit #0</pre>
FILES	<i>/dev/kmem</i> default operating system image

sysdef(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu (32-bit) SUNWcsxu (64-bit)

SEE ALSO `hostid(1)`, `prtconf(1M)`, `nlist(3ELF)`, `attributes(5)`

syseventadm(1M)

NAME	syseventadm – sysevent event specification administration
SYNOPSIS	syseventadm add [-R <i>rootdir</i>] [-v <i>vendor</i>] [-p <i>publisher</i>] [-c <i>class</i>] [-s <i>subclass</i>] [-u <i>username</i>] <i>path</i> [<i>args</i>] syseventadm remove [-R <i>rootdir</i>] [-v <i>vendor</i>] [-p <i>publisher</i>] [-c <i>class</i>] [-s <i>subclass</i>] [-u <i>username</i>] [<i>path</i> [<i>args</i>]] syseventadm list [-R <i>rootdir</i>] [-v <i>vendor</i>] [-p <i>publisher</i>] [-c <i>class</i>] [-s <i>subclass</i>] [-u <i>username</i>] [<i>path</i> [<i>args</i>]] syseventadm restart
DESCRIPTION	The syseventadm command is an administrative front-end to add, remove and list sysevent event handlers. syseventadm can only be run by root. The syseventadm add command adds a handler for a sysevent event specified by at least one of vendor, publisher or class. If <i>class</i> is specified, it may be qualified with a <i>sub-class</i>. Only the values specified for <i>vendor</i>, <i>publisher</i>, <i>class</i> and <i>sub-class</i> when adding the handler are matched against sysevent events to determine if the specification matches the event and the handler should be run. <i>path</i> is the full pathname of the command to be run in response to matching events, with optional arguments (<i>args</i>). If <i>username</i> is specified, the command is invoked as user <i>username</i>, otherwise as root. The syseventadm remove command removes handlers for matching sysevent event specifications. Event specifications may be matched by specifying at least one of <i>vendor</i>, <i>publisher</i>, <i>class</i>, <i>username</i> or <i>path</i>. If <i>class</i> is specified, it may be qualified with a <i>sub-class</i>. Any of <i>vendor</i>, <i>publisher</i>, <i>class</i>, <i>sub-class</i>, <i>username</i>, <i>path</i> or <i>args</i> not specified match the corresponding fields of all events. Handlers for all matching specifications are removed. The syseventadm list command lists the handlers for matching sysevent event specifications using the same match criteria as the remove command but without the requirement that at least one of <i>vendor</i>, <i>publisher</i>, <i>class</i>, <i>username</i> or <i>path</i> be specified. With no match criteria, all specifications are listed. The list command output format is: [<i>vendor=vendor</i>] [<i>publisher=publisher</i>] [<i>class=class</i>] [<i>subclass=subclass</i>] [<i>username=username</i>] <i>path</i> [<i>args</i>] where each of <i>class</i>, <i>sub-class</i>, <i>vendor</i>, <i>publisher</i> and <i>username</i> is listed only if part of the match criteria for the listed specification. The syseventadm restart command informs the syseventd daemon to reread the sysevent registry after a change has been made by adding or removing one or more sysevent handler specifications.
Argument Macro Substitution	The sysevent handling facility provides extensive macro capability for constructing the command line arguments to be executed in response to an event. Macro expansion applies only to the command line <i>args</i> specified for an event handler, with macros expanded with data from the event itself. Pre-defined macros are provided for the

event *class*, *subclass*, *publisher* and *vendor* information. Macros not matching one of the pre-defined macro names cause the attribute list attached to the event to be searched for an attribute of that name, with the value of the matching attribute substituted on the command line.

Macros are introduced by the `$` character, with the macro name being the following token separated by a SPACE or TAB character. If the macro name is embedded in text, it may be delineated by `${` and `}`. A `\` before the `$` causes macro expansion not to occur.

\$class

The class string defining the event

\$publisher

The publisher string defining the event

\$sequence

The sequence number of the event.

\$subclass

The subclass string defining the event

\$timestamp

The timestamp of the event.

\$vendor

The vendor string defining the event

Macro names other than those pre-defined are compared against the attribute list provided with the event. An attribute with name matching the macro name causes the value of the attribute to be substituted as ASCII text on the generated command line.

Use of a macro for which no attribute with that name is defined, or for which multiple attributes with that name are provided, cause an error and the command is not invoked.

Attributes with signed data types (`DATA_TYPE_INT16`, `DATA_TYPE_INT32` and `DATA_TYPE_INT64`) are expanded as decimal digits.

Attributes with unsigned data types (`DATA_TYPE_BYTE`, `DATA_TYPE_UINT16`, `DATA_TYPE_UINT32`, `DATA_TYPE_UINT64` and `DATA_TYPE_HTTIME`) are expanded as hexadecimal digits with a `0x` prefix.

Attributes with string data type (`DATA_TYPE_STRING`) are expanded with the string data. The data is not quoted. If it is desired that the quoted strings be generated on the command line, put quotes around the macro call in the arguments.

Array types are expanded with each element expanded as defined for that scalar type, with a space separating each element substitution.

OPTIONS

The following options are supported:

`-c class` The string specifying the event class.

syseventadm(1M)

	-p <i>publisher</i> The string specifying the event publisher. -R <i>rootdir</i> Cause syseventadm to use an alternate root path <i>rootdir</i>. -s <i>subclass</i> The string specifying the event subclass. -u <i>username</i> The user under which the command is to be invoked. -v <i>vendor</i> The string specifying the vendor defining the event. Events defined by third-party software should use the company's stock symbol. Sun-defined events use SUNW.
OPERANDS	The following operands are supported: <i>args</i> Command arguments <i>path</i> Full path of command to be run in response to event
EXAMPLES	EXAMPLE 1 Adding an Event Handler The following example adds an event handler for an event defined by vendor SUNW, class EC_ENV and sub-class ESC_ENV_TEMP. The command to be run is /opt/SUNWenv/bin/ec_env_temp, with arguments being the class name, sub-class name and pathname derived from the event attributes. The \$ characters are preceded by a backslash to circumvent shell interpretation. There is no need to restart the service after the change since the registry is maintained on \$ALTROOT. <pre># syseventadm add -R \\${ALTROOT} -v SUNW -c EC_ENV -s ESC_ENV_TEMP /opt/SUNWenv/bin/ec_env_temp \\${class} \\${subclass} \\${pathname}</pre> EXAMPLE 2 Removing an Event Handler The following example removes the event handler added in Example 1. <pre># syseventadm remove -R \\${ALTROOT} -v SUNW -c EC_ENV -s ESC_ENV_TEMP /opt/SUNWenv/bin/ec_env_temp \\${class} \\${subclass} \\${pathname}</pre> EXAMPLE 3 Listing Event Handlers The following example lists all event handlers for events of class EC_ENV, subclass ESC_ENV_TEMP, as defined by vendor SUNW: <pre># syseventadm list -v SUNW -c EC_ENV -s ESC_ENV_TEMP vendor=SUNW class=EC_ENV subclass=ESC_ENV_TEMP /opt/SUNWenv/bin/ec_env_temp \\${class} \\${subclass} \\${pathname}</pre> EXAMPLE 4 Listing Event Handlers The following example lists all event handlers defined by vendor VRTS. <pre># syseventadm list -v VRTS</pre>

EXAMPLE 5 Removing Event Handlers

The following example removes all event handlers defined by vendor VRTS, and restarts service.

```
# syseventadm remove -v VRTS
# syseventadm restart
```

EXAMPLE 6 Listing All Event Handlers Specified to Run a Command

The following example lists all event handlers specified to run the command `/opt/SUNWenv/bin/ec_env_temp`:

```
# syseventadm list /opt/SUNWenv/bin/ec_env_temp
```

EXAMPLE 7 Removing Event Handlers and Restarting Service

The following example removes all event handlers specified to run the command `/opt/SUNWenv/bin/ec_env_temp`, and restarts service:

```
# syseventadm remove /opt/SUNWenv/bin/ec_env_temp
# syseventadm restart
```

EXIT STATUS

The following exit values are returned:

0	Successful completion.
1	No matching event specification found (remove or list commands only)
2	Incorrect command usage.
3	Permission denied.
4	Command failed.
5	Out of memory

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

`syseventd(1M)`, `attributes(5)`

NOTES

To avoid upgrade problems, packages delivering a sysevent event handler should install the event handler by running `syseventadm` from the package's postinstall script. The event handler can then be removed by running `syseventadm` from the package's preremove script using the same arguments as when added.

syseventconfd(1M)

NAME	syseventconfd – kernel system event command invocation daemon				
SYNOPSIS	/usr/lib/sysevent/syseventconfd [-r <i>rootdir</i>]				
DESCRIPTION	<i>syseventconfd</i> is the user-level daemon that invokes user-level commands in response to kernel system events received from <i>syseventd</i> (1M).				
OPTIONS	The following options are supported: -r <i>rootdir</i> Cause <i>syseventconfd</i> to use an alternate root path when creating its door. The root path must match the root path used to invoke <i>syseventd</i>.				
FILES	/etc/init.d/devfsadm daemon start and stop script /etc/rcS.d/S50devfsadm link to <i>init.d</i> script /etc/rc0.d/K83devfsadm link to <i>init.d</i> script /etc/sysevent/syseventconfd_event_service <i>syseventconfd</i> event service door file /usr/lib/sysevent/modules/sysevent_conf_mod.so <i>syseventd</i> loadable module (SLM) managing <i>sysevent.conf</i> files				
ATTRIBUTES	See <i>attributes</i>(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<i>syseventd</i> (1M), <i>attributes</i> (5)				

NAME	syseventd – kernel system event notification daemon
SYNOPSIS	<code>/usr/lib/sysevent/syseventd [-d <i>debug_level</i>] [-r <i>rootdir</i>]</code>
DESCRIPTION	syseventd is a user-level daemon that accepts delivery of system event buffers from the kernel. Once an event buffer has been delivered to syseventd, it, in turn, attempts to propagate the event to all interested end event subscribers. Event subscribers take the form of a syseventd loadable module (SLM). syseventd passes the event buffer to each of its subscribers and in return expects a notification as to the successful or unsuccessful delivery attempt. Upon successful delivery of the event buffer to all interested event subscribers, syseventd frees the event buffer from the kernel event queue.
OPTIONS	The following options are supported: <code>-d <i>debug_level</i></code> Enable debug mode. Messages are printed to the invoking user's terminal. <code>-r <i>rootdir</i></code> Cause syseventd to use an alternate root path when creating its door and lock files. Modules continue to be loaded from the standard module directories.
EXIT STATUS	The following exit values are returned: 0 Successful completion. non-zero An error occurred.
FILES	<code>/etc/init.d/devfsadm</code> daemon start and stop script <code>/etc/rcS.d/S50devfsadm</code> link to <code>init.d</code> script <code>/etc/rc0.d/K83devfsadm</code> link to <code>init.d</code> script <code>/etc/sysevent/syseventd_daemon.lock</code> daemon lock file <code>/etc/sysevent/sysevent_door</code> kernel to syseventd door file <code>/usr/lib/sysevent/modules</code> SLM directory repository <code>/usr/platform/`uname -i`/lib/sysevent/modules</code> SLM directory repository <code>/usr/platform/`uname -m`/lib/sysevent/modules</code> SLM directory repository

syseventd(1M)

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO syseventconfd(1M), attributes(5)

NAME	sysidconfig – execute system configuration applications, or define set of system configuration applications
SYNOPSIS	sysidconfig [-lv] [-a <i>application</i>] [-b <i>basedir</i>] [-r <i>application</i>]
DESCRIPTION	Invoked without any options, the <code>sysidconfig</code> program executes a list of applications. An application on this list is referred to as a "system configuration application." Every application on this list will be passed one command-line argument, <code>-c</code>. This flag will cause the system configuration application to perform its configuration function. Without options, <code>sysidconfig</code> should only be invoked by startup scripts, which occurs during the initial installation and during a reconfigure reboot. All applications on the list will be executed, if possible. All activity taken by the <code>sysidconfig</code> program is logged in the <code>sysidconfig</code> log file, <code>/var/log/sysidconfig.log</code>. If one or more of the applications on the list are either not present at execution time, are not executable, or execute but return a failure code upon completion, then that information will be logged as well. Successful completion of the program can be assumed if no error message is present in the log file. Programs are executed sequentially, with only one configuration application active at a time. Executed with the <code>-l</code>, <code>-a</code>, or <code>-r</code> options, the <code>sysidconfig</code> program allows the super-user to list the defined configuration applications, and to add items to or remove items from that list. Running <code>sysidconfig</code> with options is the only way to view or manipulate the list. Only the super-user can execute the <code>sysidconfig</code> program with options. The <code>-b</code> and <code>-v</code> options change the behavior of <code>sysidconfig</code>, and can be used with or without the list manipulation options discussed above. The <code>-b basedir</code> option is used to specify a reference root directory other than the default, <code>/</code>. The <code>-v</code> option duplicates the log file output on <code>stdout</code>. By default, no SPARC based applications exist on this list. However, the x86 based systems are delivered with one application, <code>kdmconfig(1M)</code>, on the list. <code>kdmconfig</code> is not delivered on SPARC based systems. This application is an extension of the <code>sysidtool(1M)</code> suite of programs. It is executed during initial installation and during a reconfigure reboot, before the window system has been started. Graphical User Interface (GUI) applications will not execute successfully if they are added to the list of configuration applications via <code>sysidconfig -a</code>. This program is referenced, but not fully described, in the <code>sysidtool(1M)</code> manual page.
OPTIONS	The valid options are: <code>-a application</code> Add the named application to the list of defined applications. When next invoked without arguments, <code>sysidconfig</code> will run

sysidconfig(1M)

	this newly added application after all previously defined applications. <i>application</i> must be a fully qualified path name that is not currently on the list of applications to execute.
-b <i>basedir</i>	Specify an alternate base directory (/ is defined as the default base directory if no other is specified). The specified directory is used as the root directory when adding, listing, removing, or executing configuration applications. The log file where information is recorded is in /var/log, relative to the specified <i>basedir</i> . In the log file, the <i>basedir</i> is not noted. This means, for example, that if the super-user on a diskless client's server executes: <pre>sysidconfig -b /export/root/client -a /sbin/someapp</pre> then the diskless client <i>client</i> would have /sbin/someapp executed upon reconfigure reboot. The diskless client's log file would note that /sbin/someapp was added, not /export/root/client/sbin/someapp.
-l	List defined configuration applications. Applications will be executed one at a time, in the order shown in the list.
-r <i>application</i>	Remove the named application from the list of defined applications. <i>application</i> must be a fully qualified path name and it must be on the existing list of applications to execute.
-v	Verbose mode. This option echoes all information sent to the log file to stdout. Such information includes timestamp information about when the program was executed, the names of applications being executed, and results of those executions.

RETURN VALUES The sysidconfig program will return 0 if it completes successfully.

When executed with the -r or -a options, error conditions or warnings will be reported on stderr. If the requested action completes successfully, an exit code of 0 will be returned.

ERRORS	EPERM	The program was executed by a user other than the super-user.
	EINVAL	Option -l, -a, or -r was passed and the action could not be completed successfully.

FILES /var/log/sysidconfig.log sysidconfig log file

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWadmap

SEE ALSO sys-unconfig(1M), sysidtool(1M), attributes(5)

sysidconfig(1M)

x86 Only | kdmconfig(1M)

DIAGNOSTICS When run without options, a log of the `sysidconfig` program's activity can be found in `/var/log/sysidconfig.log`. This file contains a timestamp log of each program executed, its resulting `stderr` output, and its exit code. If an application in the list was not found or is not executable, that will also be noted.

sysidtool(1M)

NAME	sysidtool, sysidnet, sysidns, sysidsys, sysidroot, sysidpm – system configuration	
SYNOPSIS	/usr/sbin/sysidnet	
	/usr/sbin/sysidns	
	/usr/sbin/sysidsys	
	/usr/sbin/sysidroot	
	/usr/sbin/sysidpm	
DESCRIPTION	sysidtool is a suite of five programs that configure a new system, or one that has been unconfigured with sys-unconfig(1M). The sysidtool programs run automatically at system installation, or during the first boot after a machine has been successfully unconfigured.	
	These programs have no effect except at such times, and should never be run manually.	
	The sysidtool programs set up the appropriate information in the machine's configuration files, in the kernel, and on the machine's network interface. The following list shows the available commands and the information for which each of the commands lists.	
	sysidnet: network configuration	Machine's default locale. Machine's console type. Machine's host name. Machine's IP address.
	sysidns: Name Service configuration	Name service choice: NIS, NIS+, DNS, LDAP, or none. Machine's IP subnet mask (if no NIS/NIS+ server can automatically be located on the machine's sub-network. Domain name for chosen name service. Hostname and IP address of name server(s). DNS search list (DNS name service only)
	sysidsys: miscellaneous system configuration	Machine's IP subnet mask (if an NIS/NIS+ server was automatically located on the machine's sub-network). Machine's time zone. Date and time.
	sysidroot: control superuser information	Machine's root password.
	sysidpm: Power Management configuration	Auto-shutdown confirmation if the system is Energystar-V2 compliant, that is, a new system model shipped after October 1, 1995.
	sysidconfig: host or platform-specific configuration	This command controls specification and execution of custom configuration applications that may be specified for a particular host or a particular platform. See sysidconfig(1M).

The `sysidtool` programs attempt to obtain system configuration information from various name service databases, for example, NIS, or from the `sysidcfg(4)` file, and you are prompted to provide the information if it cannot be found. However, you can avoid one or more of the prompts by preconfiguring the appropriate configuration information in the name service databases or in the `sysidcfg(4)` file.

To preconfigure the information in the name service databases, you must use the name service commands or the Solstice AdminSuite tools. See *Solaris 9 12/03 Installation Guide* for more details about how to preconfigure the system configuration information.

The machine's configuration information is set up in its `/etc` and `/var` files.

If a system has more than one network interface, you can use `sysidtool` to configure only the primary interface on the system. All other interfaces on the system must be configured manually.

You cannot use the name service databases or the `sysidcfg(4)` file to suppress the Power Management configuration prompt. However, you can suppress it by creating either the `/autoshtutdown` or `/noautoshtutdown` file before installation reboot. Accordingly, the auto-shutdown feature is silently configured. The `/autoshtutdown` or `/noautoshtutdown` files are removed by `sysidpm` before it exits.

FILES

<code>/etc/.UNCONFIGURED</code>	
<code>/etc/nodename</code>	
<code>/etc/hostname.?? [0-9]</code>	
<code>/etc/default/init</code>	
<code>/etc/defaultdomain</code>	
<code>/etc/passwd</code>	password file. See <code>passwd(4)</code> .
<code>/etc/shadow</code>	shadow password file. See <code>shadow(4)</code> .
<code>/etc/inet/hosts</code>	
<code>/etc/inet/netmasks</code>	
<code>/etc/net/*/hosts</code>	
<code>/var/nis/NIS_COLD_START</code>	
<code>/var/yp/aliases</code>	
<code>/var/yp/binding/*/ypservers</code>	
<code>/etc/.sysIDtool.state</code>	
<code>/etc/power.conf</code>	Power Management configuration file. See <code>power.conf(4)</code> .

sysidtool(1M)

/etc/.PM_RECONFIGURE

If this file is present during system reboot, the `sysidpm` program will be run. This file will be removed by `sysidpm`.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWadmap
	SUNWpmu

SEE ALSO `powerd(1M)`, `sys-unconfig(1M)`, `sysidconfig(1M)`, `passwd(4)`, `power.conf(4)`, `shadow(4)`, `sysidcfg(4)`, `attributes(5)`

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NOTES NIS+ might not be supported in future releases of the Solaris™ Operating Environment. Tools to aid the migration from NIS+ to LDAP are available in the Solaris 9 operating environment. For more information, visit <http://www.sun.com/directory/nisplus/transition.html>.

NAME	syslogd – log system messages
SYNOPSIS	/usr/sbin/syslogd [-d] [-f <i>configfile</i>] [-m <i>markinterval</i>] [-p <i>path</i>] [-t -T]
DESCRIPTION	syslogd reads and forwards system messages to the appropriate log files or users, depending upon the priority of a message and the system facility from which it originates. The configuration file <code>/etc/syslog.conf</code> (see <code>syslog.conf(4)</code>) controls where messages are forwarded. syslogd logs a mark (timestamp) message every <i>markinterval</i> minutes (default 20) at priority LOG_INFO to the facility whose name is given as mark in the <code>syslog.conf</code> file. A system message consists of a single line of text, which may be prefixed with a priority code number enclosed in angle-brackets (< >); priorities are defined in <code><sys/syslog.h></code>. syslogd reads from the STREAMS log driver, <code>/dev/log</code>, and from any transport provider specified in <code>/etc/netconfig</code>, <code>/etc/net/transport/hosts</code>, and <code>/etc/net/transport/services</code>. syslogd reads the configuration file when it starts up, and again whenever it receives a HUP signal (see <code>signal(3HEAD)</code>), at which time it also closes all files it has open, re-reads its configuration file, and then opens only the log files that are listed in that file. syslogd exits when it receives a TERM signal. As it starts up, syslogd creates the file <code>/etc/syslog.pid</code>, if possible, containing its process identifier (PID). If message ID generation is enabled (see <code>log(7D)</code>), each message will be preceded by an identifier in the following format: <code>[ID msgid facility . priority]</code>. <i>msgid</i> is the message's numeric identifier described in <code>msgid(1M)</code>. <i>facility</i> and <i>priority</i> are described in <code>syslog.conf(4)</code>. <code>[ID 123456 kern.notice]</code> is an example of an identifier when message ID generation is enabled. If the message originated in a loadable kernel module or driver, the kernel module's name (for example, <code>ufs</code>) will be displayed instead of <code>unix</code>. See EXAMPLES for sample output from syslogd with and without message ID generation enabled. In an effort to reduce visual clutter, message IDs are not displayed when writing to the console; message IDs are only written to the log file. See EXAMPLES. The <code>/etc/default/syslogd</code> file contains the following default parameter settings. See FILES. LOG_FROM_REMOTE Specifies whether remote messages are logged. LOG_FROM_REMOTE=NO is equivalent to the -t command-line option. The default value for LOG_FROM_REMOTE is YES.
OPTIONS	The following options are supported:

syslogd(1M)

-d	Turn on debugging. This option should only be used interactively in a root shell once the system is in multi-user mode. It should <i>not</i> be used in the system start-up scripts, as this will cause the system to hang at the point where <code>syslogd</code> is started.
-f <i>configfile</i>	Specify an alternate configuration file.
-m <i>markinterval</i>	Specify an interval, in minutes, between mark messages.
-p <i>path</i>	Specify an alternative log device name. The default is <code>/dev/log</code> .
-T	Enable the <code>syslogd</code> UDP port to turn on logging of remote messages. This is the default behavior. See FILES.
-t	Disable the <code>syslogd</code> UDP port to turn off logging of remote messages. See FILES.

EXAMPLES

EXAMPLE 1 syslogd Output Without Message ID Generation Enabled

The following example shows the output from `syslogd` when message ID generation *is not* enabled:

```
Sep 29 21:41:18 cathy unix: alloc /: file system full
```

EXAMPLE 2 syslogd Output with ID generation Enabled

The following example shows the output from `syslogd` when message ID generation *is* enabled. The message ID is displayed when writing to log file `/var/adm/messages`.

```
Sep 29 21:41:18 cathy ufs: [ID 845546 kern.notice]
                                alloc /: file system full
```

EXAMPLE 3 syslogd Output with ID Generation Enabled

The following example shows the output from `syslogd` when message ID generation *is* enabled when writing to the console. Even though message ID is enabled, the message ID is not displayed at the console.

```
Sep 29 21:41:18 cathy ufs: alloc /: file system full
```

FILES

<code>/etc/syslog.conf</code>	Configuration file
<code>/etc/syslog.pid</code>	Process ID

syslogd(1M)

/etc/default/syslogd	Contains default settings. You can override some of the settings by command-line options.
/dev/log	STREAMS log driver
/etc/netconfig	Transport providers available on the system
/etc/net/transport/hosts	Network hosts for each transport
/etc/net/transport/services	Network services for each transport

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO logger(1), msgid(1M), syslog(3C), syslog.conf(4), attributes(5), signal(3HEAD), log(7D)

NOTES The mark message is a system time stamp, and so it is only defined for the system on which syslogd is running. It can not be forwarded to other systems.

When syslogd receives a HUP signal, it attempts to complete outputting pending messages, and close all log files to which it is currently logging messages. If, for some reason, one (or more) of these files does not close within a generous grace period, syslogd discards the pending messages, forcibly closes these files, and starts reconfiguration. If this shutdown procedure is disturbed by an unexpected error and syslogd cannot complete reconfiguration, syslogd sends a mail message to the superuser on the current system stating that it has shut down, and exits.

Care should be taken to ensure that each window displaying messages forwarded by syslogd (especially console windows) is run in the system default locale (which is syslogd's locale). If this advice is not followed, it is possible for a syslog message to alter the terminal settings for that window, possibly even allowing remote execution of arbitrary commands from that window.

sys-unconfig(1M)

NAME	sys-unconfig – undo a system’s configuration
SYNOPSIS	/usr/sbin/sys-unconfig
DESCRIPTION	The <code>sys-unconfig</code> command is used to restore a system’s configuration to an “as-manufactured” state, ready to be reconfigured again. The system’s configuration consists of hostname, Network Information Service (NIS) domain name, timezone, IP address, IP subnet mask, and root password. This operation is the inverse of those performed by the <code>sysidnet(1M)</code>, <code>sysidns(1M)</code>, and <code>sysidsys(1M)</code> programs run at boot. See <code>sysidtool(1M)</code>. <code>sys-unconfig</code> does the following: ■ Saves current <code>/etc/inet/hosts</code> file information in <code>/etc/inet/hosts.saved</code>. ■ If the current <code>/etc/vfstab</code> file contains NFS mount entries, saves the <code>/etc/vfstab</code> file to <code>/etc/vfstab.orig</code>. ■ Restores the default <code>/etc/inet/hosts</code> file. ■ Removes the default hostname in <code>/etc/hostname.interface</code> files for all interfaces configured when this command is run. To determine which interfaces are configured, run the command <code>'ifconfig-a'</code>. The <code>/etc/hostname.interface</code> files corresponding to all of the interfaces listed in the resulting output, with the exception of the loopback interface (lo0), will be removed. ■ Removes the default domainname in <code>/etc/defaultdomain</code>. ■ Restores the timezone to PST8PDT in <code>/etc/TIMEZONE</code>. ■ Disables the Network Information Service (NIS) and Network Information Service Plus (NIS+) if either NIS or NIS+ was configured. ■ Removes the entries for this host in <code>/etc/net/*/hosts</code>. ■ Removes the file <code>/etc/inet/netmasks</code>. ■ Removes the file <code>/etc/defaultrouter</code>. ■ Removes the password set for root in <code>/etc/shadow</code>. ■ Removes the file <code>/etc/.rootkey</code>. ■ Executes all system configuration applications. These applications are defined by prior executions of a <code>sysidconfig -a application</code>. (See <code>sysidconfig(1M)</code>). When <code>sys-unconfig</code> is run, all system configuration applications are passed one argument, <code>-u</code>. ■ Removes the file <code>/etc/resolv.conf</code>. ■ Disables LDAP by removing <code>/var/ldap/ldap_client_cache</code>, <code>/var/ldap/ldap_client_file</code>, <code>/var/ldap/ldap_client_cred</code>, and <code>/var/ldap/cachemgr.log</code>. When <code>sys-unconfig</code> is finished, it performs a system shutdown. <code>sys-unconfig</code> is a potentially dangerous utility and can only be run by the super user.
FILES	<code>/etc/default/init</code> process control initialization

/etc/defaultdomain	
/etc/defaultrouter	
/etc/hostname. <i>interface</i>	
/etc/inet/hosts	host name database
/etc/inet/netmasks	network mask database
/etc/net/*/hosts	
/etc/nodename	
/etc/.rootkey	super-user's secret key
/etc/shadow	shadow password file
/etc/vfstab	virtual file system table
/var/nis/NIS_COLD_START	
/var/yp/binding/*/ypservers	

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWadmap

SEE ALSO init(1M), kdmconfig(1M), sysidconfig(1M), sysidtool(1M), hosts(4), netmasks(4), shadow(4), attributes(5)

NOTES sys-unconfig is not available on diskless clients.

tapes(1M)

NAME	tapes – creates /dev entries for tape drives attached to the system
SYNOPSIS	/usr/sbin/tapes [-r <i>root_dir</i>]
DESCRIPTION	devfsadm(1M) is now the preferred command for /dev and /devices and should be used instead of tapes. tapes creates symbolic links in the /dev/rmt directory to the actual tape device special files under the /devices directory tree. tapes searches the kernel device tree to see what tape devices are attached to the system. For each equipped tape drive, the following steps are performed: 1. The /dev/rmt directory is searched for a /dev/rmt/<i>n</i> entry that is a symbolic link to the /devices special node of the current tape drive. If one is found, this determines the logical controller number of the tape drive. 2. The rest of the special devices associated with the drive are checked, and incorrect symbolic links are removed and necessary ones added. 3. If none are found, a new logical controller number is assigned (the lowest-unused number), and new symbolic links are created for all the special devices associated with the drive. tapes does not remove links to non-existent devices; these must be removed by hand. tapes is run each time a reconfiguration-boot is performed, or when add_drv(1M) is executed.
Notice to Driver Writers	tapes(1M) considers all devices with the node type DDI_NT_TAPE to be tape devices; these devices must have their minor name created with a specific format. The minor name encodes operational modes for the tape device and consists of an ASCII string of the form [<i>l,m,h,c,u</i>][<i>b</i>][<i>n</i>]. The first character set is used to specify the tape density of the device, and are named low (<i>l</i>), medium (<i>m</i>), high (<i>h</i>), compressed (<i>c</i>), and ultra (<i>u</i>). These specifiers only express a relative density; it is up to the driver to assign specific meanings as needed. For example, 9 track tape devices interpret these as actual bits-per-inch densities, where <i>l</i> means 800 BPI, <i>m</i> means 1600 BPI, and <i>h</i> means 6250 BPI, whereas 4mm DAT tapes defines <i>l</i> as standard format, and <i>m</i>, <i>h</i>, <i>c</i> and <i>u</i> as compressed format. Drivers may choose to implement any or all of these format types. During normal tape operation (non-BSD behavior), once an EOF mark has been reached, subsequent reads from the tape device return an error. An explicit IOCTL must be issued to space over the EOF mark before the next file can be read. <i>b</i> instructs the device to observe BSD behavior, where reading at EOF will cause the tape device to automatically space over the EOF mark and begin reading from the next file. <i>n</i> or no-rewind-on-close instructs the driver to not rewind to the beginning of tape when the device is closed. Normal behavior for tape devices is to reposition to BOT when closing. See mtio(7I).

The minor number for tape devices should be created by encoding the device's instance number using the tape macro `MTMINOR` and `ORing` in the proper combination of density, BSD behavior, and no-rewind flags. See `mtio(7I)`.

To prevent tapes from attempting to automatically generate links for a device, drivers must specify a private node type and refrain from using the node type string `DDI_NT_TAPE` when calling `ddi_create_minor_node(9F)`.

OPTIONS The following options are supported:

`-r root_dir` Causes tapes to presume that the `/dev/rmt` directory tree is found under `root_dir`, not directly under `/`.

ERRORS If tapes finds entries of a particular logical controller linked to different physical controllers, it prints an error message and exits without making any changes to the `/dev` directory, since it cannot determine which of the two alternative logical to physical mappings is correct. The links should be manually corrected or removed before another reconfiguration boot is performed.

EXAMPLES **EXAMPLE 1** Creating Tape Device Nodes From Within the Driver's `attach()` Function

This example demonstrates creating tape device nodes from within the `xktape` driver's `attach(9E)` function.

```
#include <sys/mtio.h>
struct tape_minor_info {
    char *minor_name;
    int   minor_mode;
};
/*
 * create all combinations of logical tapes
 */
static struct tape_minor_info example_tape[] = {
    {"", 0}, /* default tape */
    {"1", MT_DENSITY1},
    {"1b", MT_DENSITY1 | MT_BSD},
    {"1bn", MT_DENSITY1 | MT_BSD | MT_NOREWIND},
    {"m", MT_DENSITY2},
    {"mb", MT_DENSITY2 | MT_BSD},
    {"mbn", MT_DENSITY2 | MT_BSD | MT_NOREWIND},
    {"h", MT_DENSITY3},
    {"hb", MT_DENSITY3 | MT_BSD},
    {"hbn", MT_DENSITY3 | MT_BSD | MT_NOREWIND},
    {"c", MT_DENSITY4},
    {"cb", MT_DENSITY4 | MT_BSD},
    {"cbn", MT_DENSITY4 | MT_BSD | MT_NOREWIND},
    {NULL, 0},
};

int
xktapeattach(dev_info_t *dip, ddi_attach_cmd_t cmd)
{
    int instance;
    struct tape_minor_info *mdp;
```

EXAMPLE 1 Creating Tape Device Nodes From Within the Driver's `attach()` Function
(Continued)

```

/* other stuff in attach... */
instance = ddi_get_instance(dip);

for (mdp = example_tape; mdp->minor_name != NULL; mdp++) {
    ddi_create_minor_node(dip, mdp->minor_name, S_IFCHR,
        (MTMINOR(instance) | mdp->minor_mode), DDI_NT_TAPE, 0);
}

```

Installing the `xktape` driver on a Sun Fire 4800, with the driver controlling a SCSI tape (target 4 attached to an `isp(7D)` SCSI HBA) and performing a reconfiguration-boot creates the following special files in `/devices`.

```

# ls -l /devices/ssm@0,0/pci@18,700000/pci@1/SUNW,isp@0,0
crw-rw-rw-  1 root sys  33,136 Aug 29 00:02  xktape@4,0:
crw-rw-rw-  1 root sys  33,200 Aug 29 00:02  xktape@4,0:b
crw-rw-rw-  1 root sys  33,204 Aug 29 00:02  xktape@4,0:bn
crw-rw-rw-  1 root sys  33,152 Aug 29 00:02  xktape@4,0:c
crw-rw-rw-  1 root sys  33,216 Aug 29 00:02  xktape@4,0:cb
crw-rw-rw-  1 root sys  33,220 Aug 29 00:02  xktape@4,0:cbn
crw-rw-rw-  1 root sys  33,156 Aug 29 00:02  xktape@4,0:cn
crw-rw-rw-  1 root sys  33,144 Aug 29 00:02  xktape@4,0:h
crw-rw-rw-  1 root sys  33,208 Aug 29 00:02  xktape@4,0:hb
crw-rw-rw-  1 root sys  33,212 Aug 29 00:02  xktape@4,0:hbn
crw-rw-rw-  1 root sys  33,148 Aug 29 00:02  xktape@4,0:hn
crw-rw-rw-  1 root sys  33,128 Aug 29 00:02  xktape@4,0:l
crw-rw-rw-  1 root sys  33,192 Aug 29 00:02  xktape@4,0:lb
crw-rw-rw-  1 root sys  33,196 Aug 29 00:02  xktape@4,0:lbn
crw-rw-rw-  1 root sys  33,132 Aug 29 00:02  xktape@4,0:ln
crw-rw-rw-  1 root sys  33,136 Aug 29 00:02  xktape@4,0:m
crw-rw-rw-  1 root sys  33,200 Aug 29 00:02  xktape@4,0:mb
crw-rw-rw-  1 root sys  33,204 Aug 29 00:02  xktape@4,0:mnb
crw-rw-rw-  1 root sys  33,140 Aug 29 00:02  xktape@4,0:mn
crw-rw-rw-  1 root sys  33,140 Aug 29 00:02  xktape@4,0:n

```

`/dev/rmt` will contain the logical tape devices (symbolic links to tape devices in `/devices`).

```

# ls -l /dev/rmt
/dev/rmt/0 -> ../../devices/[...]/xktape@4,0:
/dev/rmt/0b -> ../../devices/[...]/xktape@4,0:b
/dev/rmt/0bn -> ../../devices/[...]/xktape@4,0:bn
/dev/rmt/0c -> ../../devices/[...]/xktape@4,0:c
/dev/rmt/0cb -> ../../devices/[...]/xktape@4,0:cb
/dev/rmt/0cbn -> ../../devices/[...]/xktape@4,0:cbn
/dev/rmt/0cn -> ../../devices/[...]/xktape@4,0:cn
/dev/rmt/0h -> ../../devices/[...]/xktape@4,0:h
/dev/rmt/0hb -> ../../devices/[...]/xktape@4,0:hb
/dev/rmt/0hbn -> ../../devices/[...]/xktape@4,0:hbn
/dev/rmt/0hn -> ../../devices/[...]/xktape@4,0:hn
/dev/rmt/0l -> ../../devices/[...]/xktape@4,0:l
/dev/rmt/0lb -> ../../devices/[...]/xktape@4,0:lb
/dev/rmt/0lbn -> ../../devices/[...]/xktape@4,0:lbn
/dev/rmt/0ln -> ../../devices/[...]/xktape@4,0:ln

```


EXAMPLE 1 Creating Tape Device Nodes From Within the Driver's `attach()` Function
(Continued)

```
/dev/rmt/0m -> ../../devices/[...]/xktape@4,0:m
/dev/rmt/0mb -> ../../devices/[...]/xktape@4,0:mb
/dev/rmt/0mbn -> ../../devices/[...]/xktape@4,0:mbn
/dev/rmt/0mn -> ../../devices/[...]/xktape@4,0:mn
/dev/rmt/0n -> ../../devices/[...]/xktape@4,0:n
```

FILES `/dev/rmt/*` logical tape devices
 `/devices/*` tape device nodes

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `add_drv(1M)`, `devfsadm(1M)`, `attributes(5)`, `isp(7D)`, `devfs(7FS)`, `mtio(7I)`,
`attach(9E)`, `ddi_create_minor_node(9F)`

Writing Device Drivers

BUGS `tapes` silently ignores malformed minor device names.

taskstat(1M)

NAME	taskstat – prints ASET tasks status				
SYNOPSIS	/usr/aset/util/taskstat [-d <i>aset_dir</i>]				
DESCRIPTION	taskstat is located in the <code>/usr/aset/util</code> directory. <code>/usr/aset</code> is the default operating directory of the Automated Security Enhancement Tool (ASET). An alternative working directory can be specified by the administrators through the <code>aset -d</code> command or the <code>ASETDIR</code> environment variable. See <code>aset(1M)</code>. Because <code>aset</code> dispatches its tasks to run in the background, when it returns, these tasks may or may not have completed. <code>taskstat</code> prints the status of the tasks, listing those that are completed and those that are still executing. The ASET reports, which are located in the <code>/usr/aset/reports</code> directory (see the <code>-d</code> option), are not complete until all the tasks finish executing.				
OPTIONS	<table><tr><td><code>-d <i>aset_dir</i></code></td><td>Specify the working directory for ASET. By default, this directory is <code>/usr/aset</code>. With this option, the <code>reports</code> directory will be located under <i>aset_dir</i>.</td></tr></table>	<code>-d <i>aset_dir</i></code>	Specify the working directory for ASET. By default, this directory is <code>/usr/aset</code> . With this option, the <code>reports</code> directory will be located under <i>aset_dir</i> .		
<code>-d <i>aset_dir</i></code>	Specify the working directory for ASET. By default, this directory is <code>/usr/aset</code> . With this option, the <code>reports</code> directory will be located under <i>aset_dir</i> .				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWast</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWast
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWast				
SEE ALSO	<code>aset(1M)</code>, <code>attributes(5)</code> <i>System Administration Guide: Basic Administration</i>				

NAME	tcxconfig – configure the default linearity of the 24-bit TrueColor Visual for OpenWindows on a system with an S24 frame buffer (TCX)				
SYNOPSIS	/usr/sbin/tcxconfig [linear nonlinear]				
DESCRIPTION	The <code>tcxconfig</code> script changes the default linearity of a 24-bit TrueColor Visual for OpenWindows on a system with an S24 frame buffer. When the S24 graphics driver for OpenWindows is installed, the default 24-bit TrueColor Visual is nonlinear. You can run <code>tcxconfig</code> with an argument that specifies the setting you want. OpenWindows should not be running when you execute the <code>tcxconfig</code> script with an option. Start OpenWindows after <code>tcxconfig</code> has set the linearity you desire.				
OPTIONS	If you specify no option, <code>tcxconfig</code> displays the current default setting. You must become superuser before you can execute <code>tcxconfig</code> with one of the following options. <table> <tr> <td><code>linear</code></td><td>Set linear visual to be the default 24-bit TrueColor Visual. This means colors will be gamma-corrected.</td></tr> <tr> <td><code>nonlinear</code></td><td>Set nonlinear visual to be the default 24-bit TrueColor Visual.</td></tr> </table>	<code>linear</code>	Set linear visual to be the default 24-bit TrueColor Visual. This means colors will be gamma-corrected.	<code>nonlinear</code>	Set nonlinear visual to be the default 24-bit TrueColor Visual.
<code>linear</code>	Set linear visual to be the default 24-bit TrueColor Visual. This means colors will be gamma-corrected.				
<code>nonlinear</code>	Set nonlinear visual to be the default 24-bit TrueColor Visual.				
EXIT STATUS	The following exit values are returned: <table> <tr> <td>0</td><td>success</td></tr> <tr> <td>1</td><td>an error has occurred.</td></tr> </table>	0	success	1	an error has occurred.
0	success				
1	an error has occurred.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWtcxow</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWtcxow
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWtcxow				
SEE ALSO	<code>attributes(5)</code>				

th_define(1M)

NAME	th_define – create fault injection test harness error specifications
SYNOPSIS	<pre>th_define [-n name -i instance -P path] [-a acc_types] [-r reg_number] [-l offset [length]] [-c count [failcount]] [-o operator [operand]] [-f acc_chk] [-w max_wait_period [report_interval]] or th_define [-n name -i instance -P path] [-a log [acc_types] [-r reg_number] [-l offset [length]]] [-c count [failcount]] [-s collect_time] [-p policy] [-x flags] [-C comment_string] [-e fixup_script [args]] or th_define [-h]</pre>
DESCRIPTION	The <code>th_define</code> utility provides an interface to the <code>bus_ops</code> fault injection <code>bofi</code> device driver for defining error injection specifications (referred to as <code>errdefs</code>). An <code>errdef</code> corresponds to a specification of how to corrupt a device driver's accesses to its hardware. The command line arguments determine the precise nature of the fault to be injected. If the supplied arguments define a consistent <code>errdef</code>, the <code>th_define</code> process will store the <code>errdef</code> with the <code>bofi</code> driver and suspend itself until the criteria given by the <code>errdef</code> become satisfied (in practice, this will occur when the access counts go to zero). You use the <code>th_manage(1M)</code> command with the <code>start</code> option to activate the resulting <code>errdef</code>. The effect of <code>th_manage</code> with the <code>start</code> option is that the <code>bofi</code> driver acts upon the <code>errdef</code> by matching the number of hardware accesses—specified in <i>count</i>, that are of the type specified in <i>acc_types</i>, made by instance number <i>instance</i>—of the driver whose name is <i>name</i>, (or by the driver instance specified by <i>path</i>) to the register set (or DMA handle) specified by <i>reg_number</i>, that lie within the range <i>offset</i> to <i>offset</i> + <i>length</i> from the beginning of the register set or DMA handle. It then applies <i>operator</i> and <i>operand</i> to the next <i>failcount</i> matching accesses. If <i>acc_types</i> includes <code>log</code>, <code>th_define</code> runs in automatic test script generation mode, and a set of test scripts (written in the Korn shell) is created and placed in a sub-directory of the current directory with the name <code><driver>.test.<id></code> (for example, <code>glm.test.978177106</code>). A separate, executable script is generated for each access handle that matches the logging criteria. The log of accesses is placed at the top of each script as a record of the session. If the current directory is not writable, file output is written to standard output. The base name of each test file is the driver name, and the extension is a number that discriminates between different access handles. A control script (with the same name as the created test directory) is generated that will run all the test scripts sequentially. Executing the scripts will install, and then activate, the resulting error definitions. Error definitions are activated sequentially and the driver instance under test is taken offline and brought back online before each test (refer to the <code>-e</code> option for more information). By default, logging applies to all PIO accesses, all interrupts, and all

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DMA accesses to and from areas mapped for both reading and writing. You can constrain logging by specifying additional *acc_types*, *reg_number*, *offset* and *length*. Logging will continue for *count* matching accesses, with an optional time limit of *collect_time* seconds.

Either the *-n* or *-P* option must be provided. The other options are optional. If an option (other than *-a*) is specified multiple times, only the final value for the option is used. If an option is not specified, its associated value is set to an appropriate default, which will provide maximal error coverage as described below.

OPTIONS

The following options are available:

-n name

Specify the name of the driver to test. (String)

-i instance

Test only the specified driver instance (-1 matches all instances of driver). (Numeric)

-P path

Specify the full device path of the driver to test. (String)

-r reg_number

Test only the given register set or DMA handle (-1 matches all register sets and DMA handles). (Numeric)

-a acc_types

Only the specified access types will be matched. Valid values for the *acc_types* argument are *log*, *pio*, *pio_r*, *pio_w*, *dma*, *dma_r*, *dma_w* and *intr*. Multiple access types, separated by spaces, can be specified. The default is to match all hardware accesses.

If *acc_types* is set to *log*, logging will match all *PIO* accesses, interrupts and *DMA* accesses to and from areas mapped for both reading and writing. *log* can be combined with other *acc_types*, in which case the matching condition for logging will be restricted to the specified additional *acc_types*. Note that *dma_r* will match only *DMA* handles mapped for reading only; *dma_w* will match only *DMA* handles mapped for writing only; *dma* will match only *DMA* handles mapped for both reading and writing.

-l offset [length]

Constrain the range of qualifying accesses. The *offset* and *length* arguments indicate that any access of the type specified with the *-a* option, to the register set or *DMA* handle specified with the *-r* option, lie at least *offset* bytes into the register set or *DMA* handle and at most *offset + length* bytes into it. The default for *offset* is 0. The default for *length* is the maximum value that can be placed in an *offset_t* C data type (see *types.h*). Negative values are converted into unsigned quantities. Thus, *th_define -l 0 -1* is maximal.

-c count [failcount]

Wait for *count* number of matching accesses, then apply an operator and operand (see the *-o* option) to the next *failcount* number of matching accesses. If the access

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type (see the `-a` option) includes logging, the number of logged accesses is given by `count + failcount - 1`. The `-1` is required because the last access coincides with the first faulting access.

Note that access logging may be combined with error injection if `failcount` and `operator` are nonzero and if the access type includes logging and any of the other access types (`pio`, `dma` and `intr`) See the description of access types in the definition of the `-a` option, above.

When the `count` and `failcount` fields reach zero, the status of the `errdef` is reported to standard output. When all active `errdefs` created by the `th_define` process complete, the process exits. If `acc_types` includes `log`, `count` determines how many accesses to log. If `count` is not specified, a default value is used. If `failcount` is set in this mode, it will simply increase the number of accesses logged by a further `failcount - 1`.

-o *operator* [*operand*]

For qualifying PIO read and write accesses, the value read from or written to the hardware is corrupted according to the value of *operator*:

- `EQ` *operand* is returned to the driver.
- `OR` *operand* is bitwise ORed with the real value.
- `AND` *operand* is bitwise ANDed with the real value.
- `XOR` *operand* is bitwise XORed with the real value.

For PIO write accesses, the following operator is allowed:

- `NO` Simply ignore the driver's attempt to write to the hardware.

Note that a driver performs PIO via the `ddi_getX()`, `ddi_putX()`, `ddi_rep_getX()` and `ddi_rep_putX()` routines (where `X` is 8, 16, 32 or 64). Accesses made using `ddi_getX()` and `ddi_putX()` are treated as a single access, whereas an access made using the `ddi_rep_*(9F)` routines are broken down into their respective number of accesses, as given by the `repcount` parameter to these DDI calls. If the access is performed via a DMA handle, *operator* and *value* are applied to every access that comprises the DMA request. If interference with interrupts has been requested then the operator may take any of the following values:

- `DELAY` After *count* accesses (see the `-c` option), delay delivery of the next *failcount* number of interrupts for *operand* number of microseconds.
- `LOSE` After *count* number of interrupts, fail to deliver the next *failcount* number of real interrupts to the driver.
- `EXTRA` After *count* number of interrupts, start delivering *operand* number of extra interrupts for the next *failcount* number of real interrupts.

The default value for *operand* and *operator* is to corrupt the data access by flipping each bit (XOR with `-1`).

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-f *acc_chk*

If the *acc_chk* parameter is set to 1 or *pio*, then the driver's calls to `ddi_check_acc_handle(9F)` return `DDI_FAILURE` when the access count goes to 1. If the *acc_chk* parameter is set to 2 or *dma*, then the driver's calls to `ddi_check_dma_handle(9F)` return `DDI_FAILURE` when the access count goes to 1.

-w *max_wait_period* [*report_interval*]

Constrain the period for which an error definition will remain active. The option applies only to non-logging errdefs. If an error definition remains active for *max_wait_period* seconds, the test will be aborted. If *report_interval* is set to a nonzero value, the current status of the error definition is reported to standard output every *report_interval* seconds. The default value is zero. The status of the errdef is reported in parsable format (eight fields, each separated by a colon (:) character, the last of which is a string enclosed by double quotes and the remaining seven fields are integers):

ft:mt:ac:fc:chk:ec:s:"message" which are defined as follows:

<i>ft</i>	The UTC time when the fault was injected.
<i>mt</i>	The UTC time when the driver reported the fault.
<i>ac</i>	The number of remaining non-faulting accesses.
<i>fc</i>	The number of remaining faulting accesses.
<i>chk</i>	The value of the <i>acc_chk</i> field of the errdef.
<i>ec</i>	The number of fault reports issued by the driver against this errdef (<i>mt</i> holds the time of the initial report).
<i>s</i>	The severity level reported by the driver.
<i>"message"</i>	Textual reason why the driver has reported a fault.

-h

Display the command usage string.

-s *collect_time*

If *acc_types* is given with the *-a* option and includes *log*, the errdef will log accesses for *collect_time* seconds (the default is to log until the log becomes full). Note that, if the errdef specification matches multiple driver handles, multiple logging errdefs are registered with the *bofi* driver and logging terminates when all logs become full or when *collect_time* expires or when the associated errdefs are cleared. The current state of the log can be checked with the `th_manage(1M)` command, using the *broadcast* parameter. A log can be terminated by running `th_manage(1M)` with the *clear_errdefs* option or by sending a *SIGALRM* signal to the `th_define` process. See *alarm(2)* for the semantics of *SIGALRM*.

-p *policy*

Applicable when the *acc_types* option includes *log*. The parameter modifies the policy used for converting from logged accesses to errdefs. All policies are inclusive:

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- Use `rare` to bias error definitions toward rare accesses (default).
- Use `operator` to produce a separate error definition for each operator type (default).
- Use `common` to bias error definitions toward common accesses.
- Use `median` to bias error definitions toward median accesses.
- Use `maximal` to produce multiple error definitions for duplicate accesses.
- Use `unbiased` to create unbiased error definitions.
- Use `onebyte`, `twobyte`, `fourbyte`, or `eightbyte` to select `errdefs` corresponding to 1, 2, 4 or 8 byte accesses (if chosen, the `-xr` option is enforced in order to ensure that `ddi_rep_*()` calls are decomposed into *multiple single accesses*).
- Use `multibyte` to create error definitions for multibyte accesses performed using `ddi_rep_get*()` and `ddi_rep_put*()`.

Policies can be combined by adding together these options. See the NOTES section for further information.

`-x flags`

Applicable when the `acc_types` option includes `log`. The `flags` parameter modifies the way in which the `bofi` driver logs accesses. It is specified as a string containing any combination of the following letters:

<code>w</code>	Continuous logging (that is, the log will wrap when full).
<code>t</code>	Timestamp each log entry (access times are in seconds).
<code>r</code>	Log repeated I/O as individual accesses (for example, a <code>ddi_rep_get16(9F)</code> call which has a <code>repcount</code> of <code>N</code> is logged <code>N</code> times with each transaction logged as size 2 bytes. Without this option, the default logging behavior is to log this access once only, with a transaction size of twice the <code>repcount</code>).

`-C comment_string`

Applicable when the `acc_types` option includes `log`. It provides a comment string to be placed in any generated test scripts. The string must be enclosed in double quotes.

`-e fixup_script [args]`

Applicable when the `acc_types` option includes `log`. The output of a logging `errdefs` is to generate a test script for each driver access handle. Use this option to embed a command in the resulting script before the errors are injected. The generated test scripts will take an instance offline and bring it back online before injecting errors in order to bring the instance into a known fault-free state. The executable `fixup_script` will be called twice with the set of optional `args`— once just before the instance is taken offline and again after the instance has been brought online. The following variables are passed into the environment of the called executable:

`DRIVER_PATH`

Identifies the device path of the instance.

`DRIVER_INSTANCE`

Identifies the instance number of the device.

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DRIVER_UNCONFIGURE

Has the value 1 when the instance is about to be taken offline.

DRIVER_CONFIGURE

Has the value 1 when the instance has just been brought online.

Typically, the executable ensures that the device under test is in a suitable state to be taken offline (unconfigured) or in a suitable state for error injection (for example configured, error free and servicing a workload). A minimal script for a network driver could be:

```
#!/bin/ksh

driver=xyznetdriver
ifnum=$driver$DRIVER_INSTANCE

if [[ $DRIVER_CONFIGURE = 1 ]]; then
    ifconfig $ifnum plumb
    ifconfig $ifnum ...
    ifworkload start $ifnum
elif [[ $DRIVER_UNCONFIGURE = 1 ]]; then
    ifworkload stop $ifnum
    ifconfig $ifnum down
    ifconfig $ifnum unplumb
fi
exit $?
```

The -e option must be the last option on the command line.

If the -a log option is selected but the -e option is not given, a default script is used. This script repeatedly attempts to detach and then re-attach the device instance under test.

EXAMPLES

Examples of Error Definitions

```
th_define -n foo -i 1 -a log
```

Logs all accesses to all handles used by instance 1 of the `foo` driver while running the default workload (attaching and detaching the instance). Then generates a set of test scripts to inject appropriate errdefs while running that default workload.

```
th_define -n foo -i 1 -a log pio
```

Logs PIO accesses to each PIO handle used by instance 1 of the `foo` driver while running the default workload (attaching and detaching the instance). Then generates a set of test scripts to inject appropriate errdefs while running that default workload.

```
th_define -n foo -i 1 -p onebyte median -e fixup arg -now
```

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Logs all accesses to all handles used by instance 1 of the `foo` driver while running the workload defined in the fixup script `fixup` with arguments `arg` and `-now`. Then generates a set of test scripts to inject appropriate `errdefs` while running that workload. The resulting error definitions are requested to focus upon single byte accesses to locations that are accessed a *median* number of times with respect to frequency of access to I/O addresses.

```
th_define -n se -l 0x20 1 -a pio_r -o OR 0x4 -c 10 1000
```

Simulates a stuck serial chip command by forcing 1000 consecutive read accesses made by any instance of the `se` driver to its command status register, thereby returning status busy.

```
th_define -n foo -i 3 -r 1 -a pio_r -c 0 1 -f 1 -o OR 0x100
```

Causes 0x100 to be ORed into the next physical I/O read access from any register in register set 1 of instance 3 of the `foo` driver. Subsequent calls in the driver to `ddi_check_acc_handle()` return `DDI_FAILURE`.

```
th_define -n foo -i 3 -r 1 -a pio_r -c 0 1 -o OR 0x0
```

Causes 0x0 to be ORed into the next physical I/O read access from any register in register set 1 of instance 3 of the `foo` driver. This is of course a no-op.

```
th_define -n foo -i 3 -r 1 -l 0x8100 1 -a pio_r -c 0 10 -o EQ 0x70003
```

Causes the next ten next physical I/O reads from the register at offset 0x8100 in register set 1 of instance 3 of the `foo` driver to return 0x70003.

```
th_define -n foo -i 3 -r 1 -l 0x8100 1 -a pio_w -c 100 3 -o AND 0xffffffffffffefff
```

The next 100 physical I/O writes to the register at offset 0x8100 in register set 1 of instance 3 of the `foo` driver take place as normal. However, on each of the three subsequent accesses, the 0x1000 bit will be cleared.

```
th_define -n foo -i 3 -r 1 -l 0x8100 0x10 -a pio_r -c 0 1 -f 1 -o XOR 7
```

Causes the bottom three bits to have their values toggled for the next physical I/O read access to registers with offsets in the range 0x8100 to 0x8110 in register set 1 of instance 3 of the `foo` driver. Subsequent calls in the driver to `ddi_check_acc_handle()` return `DDI_FAILURE`.

```
th_define -n foo -i 3 -a pio_w -c 0 1 -o NO 0
```

Prevents the next physical I/O write access to any register in any register set of instance 3 of the `foo` driver from going out on the bus.

```
th_define -n foo -i 3 -l 0 8192 -a dma_r -c 0 1 -o OR 7
```

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Causes 0x7 to be ORed into each long long in the first 8192 bytes of the next DMA read, using any DMA handle for instance 3 of the foo driver.

```
th_define -n foo -i 3 -r 2 -l 0 8 -a dma_r -c 0 1 -o OR
0x7070707070707070
```

Causes 0x70 to be ORed into each byte of the first long long of the next DMA read, using the DMA handle with sequential allocation number 2 for instance 3 of the foo driver.

```
th_define -n foo -i 3 -l 256 256 -a dma_w -c 0 1 -f 2 -o OR 7
```

Causes 0x7 to be ORed into each long long in the range from offset 256 to offset 512 of the next DMA write, using any DMA handle for instance 3 of the foo driver. Subsequent calls in the driver to ddi_check_dma_handle() return DDI_FAILURE.

```
th_define -n foo -i 3 -r 0 -l 0 8 -a dma_w -c 100 3 -o AND
0xffffffffffffffffffff
```

The next 100 DMA writes using the DMA handle with sequential allocation number 0 for instance 3 of the foo driver take place as normal. However, on each of the three subsequent accesses, the 0x1000 bit will be cleared in the first long long of the transfer.

```
th_define -n foo -i 3 -a intr -c 0 6 -o LOSE 0
```

Causes the next six interrupts for instance 3 of the foo driver to be lost.

```
th_define -n foo -i 3 -a intr -c 30 1 -o EXTRA 10
```

When the thirty-first subsequent interrupt for instance 3 of the foo driver occurs, a further ten interrupts are also generated.

```
th_define -n foo -i 3 -a intr -c 0 1 -o DELAY 1024
```

Causes the next interrupt for instance 3 of the foo driver to be delayed by 1024 microseconds.

NOTES

The policy option in the th_define -p syntax determines how a set of logged accesses will be converted into the set of error definitions. Each logged access will be matched against the chosen policies to determine whether an error definition should be created based on the access.

Any number of policy options can be combined to modify the generated error definitions.

Bytewise Policies

These select particular I/O transfer sizes. Specifying a byte policy will exclude other byte policies that have not been chosen. If none of the byte type policies is selected, all transfer sizes are treated equally. Otherwise, only those specified transfer sizes will be selected.

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**Frequency of
Access Policies**

onebyte	Create errdefs for one byte accesses (ddi_get8())
twobyte	Create errdefs for two byte accesses (ddi_get16())
fourbyte	Create errdefs for four byte accesses (ddi_get32())
eightbyte	Create errdefs for eight byte accesses (ddi_get64())
multibyte	Create errdefs for repeated byte accesses (ddi_rep_get*())

The frequency of access to a location is determined according to the access type, location and transfer size (for example, a two-byte read access to address A is considered distinct from a four-byte read access to address A). The algorithm is to count the number of accesses (of a given type and size) to a given location, and find the locations that were most and least accessed (let *maxa* and *mina* be the number of times these locations were accessed, and *mean* the total number of accesses divided by total number of locations that were accessed). Then a rare access is a location that was accessed less than

$(mean - mina) / 3 + mina$

times. Similarly for the definition of common accesses:

$maxa - (maxa - mean) / 3$

A location whose access patterns lies within these cutoffs is regarded as a location that is accessed with median frequency.

rare	Create errdefs for locations that are rarely accessed.
common	Create errdefs for locations that are commonly accessed.
median	Create errdefs for locations that are accessed a median frequency.

**Policies for
Minimizing
errdefs**

If a transaction is duplicated, either a single or multiple errdefs will be written to the test scripts, depending upon the following two policies:

maximal	Create multiple errdefs for locations that are repeatedly accessed.
unbiased	Create a single errdef for locations that are repeatedly accessed.
operators	For each location, a default operator and operand is typically applied. For maximal test coverage, this default may be modified using the operators policy so that a separate errdef is created for each of the possible corruption operators.

SEE ALSO

kill(1), th_manage(1M), alarm(2), ddi_check_acc_handle(9F),
ddi_check_dma_handle(9F)

NAME	th_manage – manage the fault injection test harness														
SYNOPSIS	th_manage <i>name instance command</i> th_manage <i>path command</i>														
DESCRIPTION	th_manage applies the action specified by <i>command</i> to the instance specified by <i>instance</i> of the driver specified by <i>name</i> (or the driver instance specified by <i>path</i>). The driver instance must be running fault injection specifications (errdefs) defined by th_define(1M). th_manage supports several commands that operate on the driver instance specified by <i>name</i> and <i>instance</i> (or <i>path</i>). The commands are: <table> <tr> <td>broadcast</td><td>Awaken all th_define processes, causing them to display their current status and exit if the errdef is now defunct (that is, if <i>count</i>, <i>failcount</i>, and <i>acc_chk</i> are all zero).</td></tr> <tr> <td>clear_acc_chk</td><td>Awaken all th_define processes. If <i>count</i> and <i>failcount</i> are already zero, then set <i>acc_chk</i> to zero, so that th_define exits once it has displayed its status.</td></tr> <tr> <td>clear_errdefs</td><td>Awaken all th_define processes. <i>count</i>, <i>failcount</i> and <i>acc_chk</i> are all set to zero so that all th_define commands exit once they have displayed their status.</td></tr> <tr> <td>clear_errors</td><td>Awaken all th_define processes. If <i>count</i> is already zero, set <i>failcount</i> and <i>acc_chk</i> to zero, so that th_define exits once it has displayed its status.</td></tr> <tr> <td>get_handles</td><td>List all the access handles.</td></tr> <tr> <td>start</td><td>Begin or resume execution of all errdefs.</td></tr> <tr> <td>stop</td><td>Suspend all errdefs for this <i>name</i> and <i>instance</i> (or <i>path</i>).</td></tr> </table>	broadcast	Awaken all th_define processes, causing them to display their current status and exit if the errdef is now defunct (that is, if <i>count</i> , <i>failcount</i> , and <i>acc_chk</i> are all zero).	clear_acc_chk	Awaken all th_define processes. If <i>count</i> and <i>failcount</i> are already zero, then set <i>acc_chk</i> to zero, so that th_define exits once it has displayed its status.	clear_errdefs	Awaken all th_define processes. <i>count</i> , <i>failcount</i> and <i>acc_chk</i> are all set to zero so that all th_define commands exit once they have displayed their status.	clear_errors	Awaken all th_define processes. If <i>count</i> is already zero, set <i>failcount</i> and <i>acc_chk</i> to zero, so that th_define exits once it has displayed its status.	get_handles	List all the access handles.	start	Begin or resume execution of all errdefs.	stop	Suspend all errdefs for this <i>name</i> and <i>instance</i> (or <i>path</i>).
broadcast	Awaken all th_define processes, causing them to display their current status and exit if the errdef is now defunct (that is, if <i>count</i> , <i>failcount</i> , and <i>acc_chk</i> are all zero).														
clear_acc_chk	Awaken all th_define processes. If <i>count</i> and <i>failcount</i> are already zero, then set <i>acc_chk</i> to zero, so that th_define exits once it has displayed its status.														
clear_errdefs	Awaken all th_define processes. <i>count</i> , <i>failcount</i> and <i>acc_chk</i> are all set to zero so that all th_define commands exit once they have displayed their status.														
clear_errors	Awaken all th_define processes. If <i>count</i> is already zero, set <i>failcount</i> and <i>acc_chk</i> to zero, so that th_define exits once it has displayed its status.														
get_handles	List all the access handles.														
start	Begin or resume execution of all errdefs.														
stop	Suspend all errdefs for this <i>name</i> and <i>instance</i> (or <i>path</i>).														
EXAMPLES	EXAMPLE 1 Useful Commands To begin the tests, enter: <pre># th_manage foo 0 start</pre> To check the status of the errdefs, enter: <pre># th_manage foo 0 broadcast</pre> This causes each th_define process to print out its current status. If the driver has reported a fatal error, you can take the driver offline using libdevice, clear the error condition by entering: <pre># th_manage foo 0 clear_acc_chk</pre> or														

th_manage(1M)

EXAMPLE 1 Useful Commands *(Continued)*

```
# th_manage foo 0 clear_errors
```

and bring the driver online again using libdevice.

To terminate testing, enter:

```
# th_manage foo 0 clear_errdefs
```

SEE ALSO th_define(1M)

NAME	tic – terminfo compiler				
SYNOPSIS	tic [-v [<i>n</i>]] [-c] <i>file</i>				
DESCRIPTION	The command tic translates a terminfo file from the source format into the compiled format. The results are placed in the directory <code>/usr/share/lib/terminfo</code>. The compiled format is necessary for use with the library routines in curses(3CURSES). If the environment variable TERMINFO is set, the compiled results are placed there instead of <code>/usr/share/lib/terminfo</code>. Total compiled entries cannot exceed 4096 bytes. The name field cannot exceed 128 bytes. Terminal names exceeding 14 characters will be truncated to 14 characters and a warning message will be printed.				
OPTIONS	The following options are supported: -c Specifies to check only <i>file</i> for errors. Errors in use= links are not detected. -v[<i>n</i>] Specify that (verbose) output be written to standard error trace information showing tic's progress. The optional integer <i>n</i> is a number from 1 to 10, indicating the desired level of detail of information. If <i>n</i> is omitted, the default level is 1. If <i>n</i> is specified and greater than 1, the level of detail is increased.				
OPERANDS	<i>file</i> Contains one or more terminfo terminal descriptions in source format [see terminfo(4)]. Each description in the file describes the capabilities of a particular terminal. When a <code>use=entry-name</code> field is discovered in a terminal entry currently being compiled, tic reads in the binary from <code>/usr/share/lib/terminfo</code> to complete the entry. (Entries created from <i>file</i> will be used first. If the environment variable TERMINFO is set, that directory is searched instead of <code>/usr/share/lib/terminfo</code>.) tic duplicates the capabilities in <i>entry-name</i> for the current entry, with the exception of those capabilities that are explicitly defined in the current entry.				
FILES	<code>/usr/share/lib/terminfo/?/*</code> Compiled terminal description database				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
	<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	captainfo(1M) , infocmp(1M) , curses(3CURSES) , terminfo(4) , attributes(5)				

tic(1M)

NOTES	When an entry, for example, <code>entry_name_1</code> , contains a <code>use=entry_name_2</code> field, any canceled capabilities in <code>entry_name_2</code> must also appear in <code>entry_name_1</code> before <code>use=</code> for these capabilities to be canceled in <code>entry_name_1</code> .

NAME	tracert – print the route packets take to network host
SYNOPSIS	tracert [-adFIlnSvx] [-A <i>addr_family</i>] [-c <i>traffic_class</i>] [-f <i>first_hop</i>] [-g <i>gateway</i> [-g <i>gateway...</i>] -r] [-i <i>iface</i>] [-L <i>flow_label</i>] [-m <i>max_hop</i>] [-P <i>pause_sec</i>] [-p <i>port</i>] [-Q <i>max_timeout</i>] [-q <i>nqueries</i>] [-s <i>src_addr</i>] [-t <i>tos</i>] [-w <i>wait_time</i>] host [<i>packetlen</i>]
DESCRIPTION	The Internet is a large and complex aggregation of network hardware, connected by gateways. Tracking the route a packet follows can be difficult. The utility <code>tracert</code> traces the route that an IP packet follows to another internet host. The <code>tracert</code> utility utilizes the both the IPv4 and IPv6 protocols. Use the -A option to override the default behavior. <code>tracert</code> uses the IPv4 protocol <i>tll</i> (time to live) field or the IPv6 field <i>hop limit</i>. It attempts to elicit an ICMP or ICMP6 <code>TIME_EXCEEDED</code> response from each <i>gateway</i> along the path, and a <code>PORT_UNREACHABLE</code>(or <code>ECHO_REPLY</code> if -I is used) response from the destination host. It starts by sending probes with a <i>tll</i> or <i>hop limit</i> of 1 and increases by 1 until it either gets to the host, or it hits the maximum <i>max_hop</i>. The default maximum <i>max_hop</i> is 30 hops, but this can be set by the -m option. Three probes are sent at each <i>tll</i> (<i>hop limit</i>) setting, and a line is printed showing the <i>tll</i> (<i>hop limit</i>), the hostname and the address of the gateway, and the <i>rtt</i> (round trip time) of each probe. The number of probes may be specifically set using the -q option. If the probe answers come from different gateways, the hostname and the address of each responding system will be printed. If there is no response within a 5 second timeout interval, a "*" is printed for that probe. The -w option may be used to set the timeout interval. Other possible annotations that may appear after the time are: <pre> ! the tll (hop limit) value in the received packet is <= 1. !H host unreachable. !X communication administratively prohibited. <!N> ICMP (ICMP6) unreachable code N. </pre> The following annotations appear only for IPv4: <pre> !F fragmentation needed. This should never occur. If this is seen, the associated gateway is broken. !N network unreachable. !P protocol unreachable. !S source route failed. It is likely that the gateway does not support source routing. !T unreachable for the specified tos (type-of-service). !U source host isolated or precedence problem. </pre> The following annotations appear only for IPv6:

traceroute(1M)

- !A host unreachable for a reason other than lack of an entry in the routing table.
- !B packet too big.
- !E destination is not a neighbor.
- !R unrecognized next header.

If almost all the probes result in some kind of unreachable code, then `traceroute` gives up and exits.

The destination *host* is not supposed to process the UDP probe packets, so the destination *port* default is set to an unlikely value. However, if some application on the destination is using that value, the value of *port* can be changed with the `-p` option.

The only mandatory parameter is the destination *host* name or IP number. The default probe datagram length is 40 bytes (60 bytes for IPv6), but this may be increased by specifying a packet length (in bytes) after the destination *host* name.

All integer arguments to `traceroute` can be specified in either decimal or hexadecimal notation. For example, *packetlen* can be specified either as 256 or 0x100.

OPTIONS

- A *addr_family* Specify the address family of the target host. *addr_family* can be either `inet` or `inet6`. Address family determines which protocol to use. For an argument of `inet`, IPv4 is used. For `inet6`, IPv6 is used.

By default, if the name of a host is provided, not the literal IP address, and a valid IPv6 address exists in the name service database, `traceroute` will use this address. Otherwise, if the name service database contains an IPv4 address, it will try the IPv4 address.

Specify the address family `inet` or `inet6` to override the default behavior. If the argument specified is `inet`, `traceroute` will use the IPv4 address associated with the hostname. If none exists, `traceroute` will state that the host is unknown and exit. It will not try to determine if an IPv6 address exists in the name service database.

If the specified argument is `inet6`, `traceroute` will use the IPv6 address that is associated with the hostname. If none exists, `traceroute` will state that the host is unknown and exit.
- a Probe all of the addresses of a multi-homed destination. The output looks like `traceroute` has been run once for each IP address of the destination. If

	this option is used together with <code>-A</code>, <code>tracert</code> probes only the addresses that are of the specified address family. While probing one of the addresses of the destination, user can skip to the next address by sending a <code>SIGINT</code>, or exit <code>tracert</code> by sending a <code>SIGQUIT</code> signal. See <code>signal(3C)</code>
<code>-c traffic_class</code>	Specify the traffic class of probe packets. The value must be an integer in the range from 0 to 255. Gateways along the path may route the probe packet differently depending upon the value of <code>traffic_class</code> set in the probe packet. This option is valid only on IPv6.
<code>-d</code>	Set the <code>SO_DEBUG</code> socket option.
<code>-F</code>	Set the "don't fragment" bit. This option is valid only on IPv4.
<code>-f first_hop</code>	Set the starting <code>tll (hop limit)</code> value to <code>first_hop</code> , to override the default value 1. <code>tracert</code> skips processing for those intermediate gateways which are less than <code>first_hop</code> hops away.
<code>-g gateway</code>	Specify a loose source route <i>gateway</i> . The user can specify more than one <i>gateway</i> by using <code>-g</code> for each gateway. The maximum number of gateways is 8 for IPv4 and 127 for IPv6. Note that some factors such as the link MTU can further limit the number of gateways for IPv6. This option cannot be used with the <code>-r</code> option.
<code>-I</code>	Use ICMP (ICMP6) ECHO instead of UDP datagrams.
<code>-i iface</code>	For IPv4, this option specifies a network interface to obtain the source IP address. This is normally only useful on a multi-homed host. The <code>-s</code> option is also another way to do this. For IPv6, it specifies the network interface on which probe packets are transmitted. The argument can be either an interface index, for example, 1, 2, or an interface name, for example, <code>le0</code> , <code>hme0</code> .
<code>-L flow_label</code>	Specify the flow label of probe packets. The value must be an integer in the range from 0 to 1048575. This option is valid only on IPv6.
<code>-l</code>	Print the value of the <code>tll (hop limit)</code> field in each packet received.
<code>-m max_hop</code>	Set the maximum <code>tll (hop limit)</code> used in outgoing probe packets. The default is 30 hops, which is the same default used for TCP connections.

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-n	Print hop addresses numerically rather than symbolically and numerically. This saves a nameserver address-to-name lookup for each gateway found on the path.
-P <i>pause_sec</i>	Specify a delay, in seconds, to pause between probe packets. This may be necessary if the final destination does not accept undeliverable packets in bursts. By default, <code>traceroute</code> sends the next probe as soon as it has received a reply. Note that <i>pause_sec</i> is a real number.
-p <i>port</i>	Set the base UDP <i>port</i> number used in probes. The default is 33434. <code>traceroute</code> hopes that nothing is listening on UDP <i>ports</i> (base+ (nhops-1) *nqueries) to (base+ (nhops*nqueries) -1) at the destination host, so that an ICMP (ICMP6) PORT_UNREACHABLE message will be returned to terminate the route tracing. If something is listening on a <i>port</i> in the default range, this option can be used to select an unused <i>port</i> range. nhops is defined as the number of hops between the source and the destination.
-Q <i>max_timeout</i>	Stop probing this hop after <i>max_timeout</i> consecutive timeouts are detected. The default value is 5. Useful in combination with the -q option if you have specified a large <i>nqueries</i> probe count.
-q <i>nqueries</i>	Set the desired number of probe queries. The default is 3.
-r	Bypass the normal routing tables and send directly to a host on an attached network. If the host is not on a directly-attached network, an error is returned. This option can be used to send probes to a local host through an interface that has been dropped by the router daemon. See <code>in.routed(1M)</code> . You cannot use this option if the -g option is used.
-s <i>src_addr</i>	Use the following address, which usually is given as a literal IP address, not a hostname, as the source address in outgoing probe packets. On multi-homed hosts, those with more than one IP address, this option can be used to force the source address to be something other than the IP address <code>traceroute</code> picks by default. If the IP address is not one of this machine's interface addresses, an error is returned and nothing is sent. For IPv4, when used together with the -i option, the given IP address should be configured on the specified

	interface. Otherwise, an error will be returned. In the case of IPv6, the interface name and the source address do not have to match.
-t <i>tos</i>	Set the <i>tos</i>(type-of-service) in probe packets to the specified value. The default is zero. The value must be an integer in the range from 0 to 255. Gateways along the path may route the probe packet differently depending upon the <i>tos</i> value set in the probe packet. This option is valid only on IPv4.
-v	Verbose output. For each hop, the size and the destination of the response packets is displayed. Also ICMP (ICMP6) packets received other than <code>TIME_EXCEEDED</code> and <code>UNREACHABLE</code> are listed as well.
-w <i>waittime</i>	Set the time, in seconds, to wait for a response to a probe. The default is 5 seconds.
-x	Prevent <code>tracert</code> from calculating checksums. Note that checksums are usually required for the last hop when using ICMP ECHO probes. This option is valid only on IPv4. See the <code>-I</code> option.
OPERANDS	The following operands are supported: <i>host</i> The network host.
EXAMPLES	EXAMPLE 1 Sample Output From the <code>tracert</code> Utility Some sample output from the <code>tracert</code> utility might be: <pre>istanbul% tracert london tracert: Warning: london has multiple addresses; \ using 4::114:a00:20ff:ab3d:83ed tracert: Warning: Multiple interfaces found; \ using 4::56:a00:20ff:fe93:8dde @ 1e0:2 tracert to london (4::114:a00:20ff:ab3d:83ed), 30 hops max, \ 60 byte packets 1 frbldg7c-86 (4::56:a00:20ff:felf:65a1) 1.786 ms 1.544 ms 1.719 ms 2 frbldg7b-77 (4::255:0:0:c0a8:517) 2.587 ms 3.001 ms 2.988 ms 3 london (4::114:a00:20ff:ab3d:83ed) 3.122 ms 2.744 ms 3.356 ms</pre> The target host, london, has both IPv4 and IPv6 addresses in the name service database. According to the default behavior, <code>tracert</code> uses IPv6 address of the destination host. EXAMPLE 2 Using the <code>tracert</code> Utility For a Host Which has Only IPv4 Addresses In the following examples, <code>tracert</code> is tracking the route to host sanfrancisco, which has only IPv4 addresses in the name service database. Therefore <code>tracert</code> uses only IPv4 addresses. The following shows the 7-hop path that a packet would follow from the host istanbul to the host sanfrancisco.

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EXAMPLE 2 Using the traceroute Utility For a Host Which has Only IPv4 Addresses (Continued)

```
istanbul% traceroute sanfrancisco
traceroute: Warning: Multiple interfaces found; using 172.31.86.247 @ le0
traceroute to sanfrancisco (172.29.64.39), 30 hops max, 40 byte packets
 1  frbldg7c-86 (172.31.86.1)  1.516 ms  1.283 ms  1.362 ms
 2  bldg1a-001 (172.31.1.211)  2.277 ms  1.773 ms  2.186 ms
 3  bldg4-bldg1 (172.30.4.42)  1.978 ms  1.986 ms  13.996 ms
 4  bldg6-bldg4 (172.30.4.49)  2.655 ms  3.042 ms  2.344 ms
 5  ferbldg11a-001 (172.29.1.236)  2.636 ms  3.432 ms  3.830 ms
 6  frbldg12b-153 (172.29.153.72)  3.452 ms  3.146 ms  2.962 ms
 7  sanfrancisco (172.29.64.39)  3.430 ms  3.312 ms  3.451 ms
```

EXAMPLE 3 Using the traceroute Utility With Source Routing

The following example shows the path of a packet that goes from istanbul to sanfrancisco through the hosts cairo and paris, as specified by the `-g` option. The `-I` option makes `traceroute` send ICMP ECHO probes to the host sanfrancisco. The `-i` options sets the source address to the IP address configured on the interface `qe0`.

```
istanbul% traceroute -g cairo -g paris -i qe0 -q 1 -I sanfrancisco
traceroute to sanfrancisco (172.29.64.39), 30 hops max, 56 byte packets
 1  frbldg7c-86 (172.31.86.1)  2.012 ms
 2  flrbldg7u (172.31.17.131)  4.960 ms
 3  cairo (192.168.163.175)  4.894 ms
 4  flrbldg7u (172.31.17.131)  3.475 ms
 5  frbldg7c-017 (172.31.17.83)  4.126 ms
 6  paris (172.31.86.31)  4.086 ms
 7  frbldg7b-82 (172.31.82.1)  6.454 ms
 8  bldg1a-001 (172.31.1.211)  6.541 ms
 9  bldg6-bldg4 (172.30.4.49)  6.518 ms
10  ferbldg11a-001 (172.29.1.236)  9.108 ms
11  frbldg12b-153 (172.29.153.72)  9.634 ms
12  sanfrancisco (172.29.64.39)  14.631 ms
```

EXIT STATUS The following exit values are returned:

0	Successful operation.
>0	An error occurred.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO netstat(1M), signal(3C), ping(1M), attributes(5)

WARNINGS This utility is intended for use in network testing, measurement and management. It should be used primarily for manual fault isolation. Because of the load it could impose on the network, it is unwise to use `traceroute(1M)` during normal operations or from automated scripts.

trapstat(1M)

NAME	trapstat – report trap statistics
SYNOPSIS	<pre> /usr/platform/ platform-name /sbin/trapstat [-t -T -e entry] [-C processor_set_id -c cpulist] [-P] [-a] [-r rate] [[interval [count]] command [args]] /usr/platform/ platform-name /sbin/trapstat -l </pre>
DESCRIPTION	The trapstat utility gathers and displays run-time trap statistics on UltraSPARC-based systems. The default output is a table of trap types and CPU IDs, with each row of the table denoting a trap type and each column of the table denoting a CPU. If standard output is a terminal, the table contains as many columns of data as can fit within the terminal width; if standard output is not a terminal, the table contains at most six columns of data. By default, data is gathered and displayed for all CPUs; if the data cannot fit in a single table, it is printed across multiple tables. The set of CPUs for which data is gathered and displayed can be optionally specified with the <code>-c</code> or <code>-C</code> option. Unless the <code>-r</code> option or the <code>-a</code> option is specified, the value displayed in each entry of the table corresponds to the number of traps per second. If the <code>-r</code> option is specified, the value corresponds to the number of traps over the interval implied by the specified sampling rate; if the <code>-a</code> option is specified, the value corresponds to the accumulated number of traps since the invocation of trapstat. By default, trapstat displays data once per second, and runs indefinitely; both of these behaviors can be optionally controlled with the <i>interval</i> and <i>count</i> parameters, respectively. The <i>interval</i> is specified in seconds; the <i>count</i> indicates the number of intervals to be executed before exiting. Alternatively, <i>command</i> can be specified, in which case trapstat executes the provided command and continues to run until the command exits. A positive integer is assumed to be an <i>interval</i>; if the desired <i>command</i> cannot be distinguished from an integer, the full path of <i>command</i> must be specified. UltraSPARC I, II and III handle translation lookaside buffer (TLB) misses by trapping to the operating system. TLB miss traps can be a significant component of overall system performance for some workloads; the <code>-t</code> option provides in-depth information on these traps. When run with this option, trapstat displays both the rate of TLB miss traps and the percentage of time spent processing those traps. Additionally, TLB misses that hit in the translation storage buffer (TSB) are differentiated from TLB misses that further miss in the TSB. (The TSB is a software structure used as a translation entry cache to allow the TLB to be quickly filled; it is discussed in detail in the <i>UltraSPARC I&II User's Manual</i>.) The TLB and TSB miss information is further broken down into user- and kernel-mode misses. Workloads with working sets that exceed the TLB reach may spend a significant amount of time missing in the TLB. To accommodate such workloads, the operating system supports multiple page sizes: larger page sizes increase the effective TLB reach and thereby reduce the number of TLB misses. To provide insight into the relationship

between page size and TLB miss rate, `trapstat` optionally provides in-depth TLB miss information broken down by page size using the `-T` option. The information provided by the `-T` option is a superset of that provided by the `-t` option; only one of `-t` and `-T` can be specified.

OPTIONS The following options are supported:

- `-a` Displays the number of traps as accumulating, monotonically increasing values instead of per-second or per-interval rates.
- `-c cpulist` Enables `trapstat` only on the CPUs specified by *cpulist*.

cpulist can be a single processor ID (for example, 4), a range of processor IDs (for example, 4-6), or a comma separated list of processor IDs or processor ID ranges (for example, 4, 5, 6 or 4, 6-8).
- `-C processor_set_id` Enables `trapstat` only on the CPUs in the processor set specified by *processor_set_id*.

`trapstat` modifies its output to always reflect the CPUs in the specified processor set. If a CPU is added to the set, `trapstat` modifies its output to include the added CPU; if a CPU is removed from the set, `trapstat` modifies its output to exclude the removed CPU. At most one processor set can be specified.
- `-e entrylist` Enables `trapstat` only for the trap table entry or entries specified by *entrylist*. A trap table entry can be specified by trap number or by trap name (for example, the level-10 trap can be specified as 74, 0x4A, 0x4a, or level-10).

entrylist can be a single trap table entry or a comma separated list of trap table entries. If the specified trap table entry is not valid, `trapstat` prints a table of all valid trap table entries and values. A list of valid trap table entries is also found in *The SPARC Architecture Manual, Version 9* and the *Sun Microelectronics UltraSPARC I&II User's Manual*. If the parsable option (`-P`) is specified in addition to the `-e` option, the format of the data is as follows:

Field	Contents
1	Timestamp (nanoseconds since start)

trapstat(1M)

-l

Field	Contents
2	CPU ID
3	Trap number (in hexadecimal)
4	Trap name
5	Trap rate per interval

Each field is separated with whitespace. If the format is modified, it will be modified by adding potentially new fields beginning with field 6; exant fields will remain unchanged.

Lists trap table entries. By default, a table is displayed containing all valid trap numbers, their names and a brief description. The trap name is used in both the default output and in the *entrylist* parameter for the -e argument. If the parsable option (-P) is specified in addition to the -l option, the format of the data is as follows:

Field	Contents
1	Trap number in hexadecimal
2	Trap number in decimal
3	Trap name
Remaining	Trap description

-P

Generates parsable output. When run without other data gathering modifying options (that is, -e, -t or -T), trapstat's the parsable output has the following format:

Field	Contents
1	Timestamp (nanoseconds since start)
2	CPU ID
3	Trap number (in hexadecimal)

Field	Contents
4	Trap name
5	Trap rate per interval

Each field is separated with whitespace. If the format is modified, it will be modified by adding potentially new fields beginning with field 6; extant fields will remain unchanged.

-r *rate*

Explicitly sets the sampling rate to be *rate* samples per second. If this option is specified, *trapstat*'s output changes from a traps-per-second to traps-per-sampling-interval.

-t

Enables TLB statistics.

A table is displayed with four principal columns of data: *itlb-miss*, *itsb-miss*, *dtlb-miss*, and *dtstb-miss*. The columns contain both the rate of the corresponding event and the percentage of CPU time spent processing the event. The percentage of CPU time is given only in terms of a single CPU. The rows of the table correspond to CPUs, with each CPU consuming two rows: one row for user-mode events (denoted with *u*) and one row for kernel-mode events (denoted with *k*). For each row, the percentage of CPU time is totalled and displayed in the rightmost column. The CPUs are delineated with a solid line. If the parsable option (**-P**) is specified in addition to the **-t** option, the format of the data is as follows:

Field	Contents
1	Timestamp (nanoseconds since start)
2	CPU ID
3	Mode (<i>k</i> denotes kernel, <i>u</i> denotes user)
4	I-TLB misses
5	Percentage of time in I-TLB miss handler
6	I-TSB misses

trapstat(1M)

-T

Field	Contents
7	Percentage of time in I-TSB miss handler
8	D-TLB misses
9	Percentage of time in D-TLB miss handler
10	D-TSB misses
11	Percentage of time in D-TSB miss handler

Each field is separated with whitespace. If the format is modified, it will be modified by adding potentially new fields beginning with field 12; extant fields will remain unchanged.

Enables TLB statistics, with page size information. As with the `-t` option, a table is displayed with four principal columns of data: *itlb-miss*, *itsb-miss*, *dtlb-miss*, and *dtsb-miss*. The columns contain both the absolute number of the corresponding event, and the percentage of CPU time spent processing the event. The percentage of CPU time is given only in terms of a single CPU. The rows of the table correspond to CPUs, with each CPU consuming two sets of rows: one set for user-level events (denoted with *u*) and one set for kernel-level events (denoted with *k*). Each set, in turn, contains as many rows as there are page sizes supported (see `getpagesizes(3C)`). For each row, the percentage of CPU time is totalled and displayed in the right-most column. The two sets are delineated with a dashed line; CPUs are delineated with a solid line. If the parsable option (`-P`) is specified in addition to the `-T` option, the format of the data is as follows:

Field	Contents
1	Timestamp (nanoseconds since start)
2	CPU ID
3	Mode <i>k</i> denotes kernel, <i>u</i> denotes user)
4	Page size, in decimal

Field	Contents
5	I-TLB misses
6	Percentage of time in I-TLB miss handler
7	I-TSB misses
8	Percentage of time in I-TSB miss handler
9	D-TLB misses
10	Percentage of time in D-TLB miss handler
11	D-TSB misses
12	Percentage of time in D-TSB miss handler

Each field is separated with whitespace. If the format is modified, it will be modified by adding potentially new fields beginning with field 13; extant fields will remain unchanged.

EXAMPLES**EXAMPLE 1** Using trapstat Without Options

When run without options, trapstat displays a table of trap types and CPUs. At most six columns can fit in the default terminal width; if (as in this example) there are more than six CPUs, multiple tables are displayed:

```
example# trapstat
vct  name          |      cpu0      cpu1      cpu4      cpu5      cpu8      cpu9
-----+-----
24 cleanwin        |      6446      4837      6368      2153      2623      1321
41 level-1         |           100           0           0           0           1           0
44 level-4         |           0           1           1           1           0           0
45 level-5         |           0           0           0           0           0           0
47 level-7         |           0           0           0           0           9           0
49 level-9         |           100          100          100          100          100          100
4a level-10        |           100           0           0           0           0           0
4d level-13        |           6          10           7          16          13          11
4e level-14        |           100           0           0           0           1           0
60 int-vec         |           2607          2740          2642          2922          2920          3033
64 itlb-miss       |           3129          2475          3167          1037          1200          569
68 dtlb-miss       |      121061      86162      109838      37386      45639      20269
6c dtlb-prot       |           997           847          1061          379           406          184
84 spill-user-32   |           2809          2133          2739      200806      332776      454504
88 spill-user-64   |          45819      207856      93487      228529      68373      77590
8c spill-user-32-cln |           784           561           767          274           353          215
90 spill-user-64-cln |           9           37           17           39           12           13
98 spill-kern-64   |          62913          50145          63869          21916          28431          11738
a4 spill-asuser-32 |           1327           947          1288           460           572           335
a8 spill-asuser-64 |           26           48           18           54           10           14
```

EXAMPLE 1 Using trapstat Without Options (Continued)

ac	spill-asuser-32-cln	4580	3599	4555	1538	1978	857
b0	spill-asuser-64-cln	26	0	0	2	0	0
c4	fill-user-32	2862	2161	2798	191746	318115	435850
c8	fill-user-64	45813	197781	89179	217668	63905	74281
cc	fill-user-32-cln	3802	2833	3733	10153	16419	19475
d0	fill-user-64-cln	329	10105	4873	10603	4235	3649
d8	fill-kern-64	62519	49943	63611	21824	28328	11693
108	syscall-32	2285	1634	2278	737	957	383
126	self-xcall	100	0	0	0	0	0

vct	name	cpu12	cpu13	cpu14	cpu15
24	cleanwin	5435	4232	6302	6104
41	level-1	0	0	0	0
44	level-4	2	0	0	1
45	level-5	0	0	0	0
47	level-7	0	0	0	0
49	level-9	100	100	100	100
4a	level-10	0	0	0	0
4d	level-13	15	11	22	11
4e	level-14	0	0	0	0
60	int-vec	2813	2833	2738	2714
64	itlb-miss	2636	1925	3133	3029
68	dtlb-miss	90528	70639	107786	103425
6c	dtlb-prot	819	675	988	954
84	spill-user-32	175768	39933	2811	2742
88	spill-user-64	0	241348	96907	118298
8c	spill-user-32-cln	681	513	753	730
90	spill-user-64-cln	0	42	16	20
98	spill-kern-64	52158	40914	62305	60141
a4	spill-asuser-32	1113	856	1251	1208
a8	spill-asuser-64	0	64	16	24
ac	spill-asuser-32-cln	3816	2942	4515	4381
b0	spill-asuser-64-cln	0	0	0	0
c4	fill-user-32	170744	38444	2876	2784
c8	fill-user-64	0	230381	92941	111694
cc	fill-user-32-cln	8550	3790	3612	3553
d0	fill-user-64-cln	0	10726	4495	5845
d8	fill-kern-64	51968	40760	62053	59922
108	syscall-32	1839	1495	2144	2083
126	self-xcall	0	0	0	0

EXAMPLE 2 Using trapstat with CPU Filtering

The `-c` option can be used to limit the CPUs on which trapstat is enabled. This example limits CPU 1 and CPUs 12 through 15.

example# **trapstat -c 1,12-15**

vct	name	cpu1	cpu12	cpu13	cpu14	cpu15
24	cleanwin	6923	3072	2500	3518	2261
44	level-4	3	0	0	1	1
49	level-9	100	100	100	100	100
4d	level-13	23	8	14	19	14

EXAMPLE 2 Using trapset with CPU Filtering (Continued)

60	int-vec		2559	2699	2752	2688	2792
64	itlb-miss		3296	1548	1174	1698	1087
68	dtlb-miss		114788	54313	43040	58336	38057
6c	dtlb-prot		1046	549	417	545	370
84	spill-user-32		66551	29480	301588	26522	213032
88	spill-user-64		0	318652	111239	299829	221716
8c	spill-user-32-cln		856	347	331	416	293
90	spill-user-64-cln		0	55	21	59	39
98	spill-kern-64		66464	31803	24758	34004	22277
a4	spill-asuser-32		1423	569	560	698	483
a8	spill-asuser-64		0	74	32	98	46
ac	spill-asuser-32-cln		4875	2250	1728	2384	1584
b0	spill-asuser-64-cln		0	2	0	1	0
c4	fill-user-32		64193	28418	287516	27055	202093
c8	fill-user-64		0	305016	106692	288542	210654
cc	fill-user-32-cln		6733	3520	15185	2396	12035
d0	fill-user-64-cln		0	13226	3506	12933	11032
d8	fill-kern-64		66220	31680	24674	33892	22196
108	syscall-32		2446	967	817	1196	755

EXAMPLE 3 Using trapstat with TLB Statistics

The `-t` option displays in-depth TLB statistics, including the amount of time spent performing TLB miss processing. The following example shows that the machine is spending 14.1 percent of its time just handling D-TLB misses:

```
example# trapstat -t
cpu m| itlb-miss %tim itsb-miss %tim | dtlb-miss %tim dtsb-miss %tim |%tim
-----+-----+-----+-----+-----+-----+-----+-----+-----+
0 u|      2571  0.3      0 0.0 |      10802  1.3      0 0.0 | 1.6
0 k|         0  0.0      0 0.0 |     106420 13.4     184  0.1 |13.6
-----+-----+-----+-----+-----+-----+-----+
1 u|      3069  0.3      0 0.0 |      10983  1.2     100  0.0 | 1.6
1 k|         27  0.0      0 0.0 |     106974 12.6      19  0.0 |12.7
-----+-----+-----+-----+-----+-----+-----+
2 u|      3033  0.3      0 0.0 |      11045  1.2     105  0.0 | 1.6
2 k|         43  0.0      0 0.0 |     107842 12.7     108  0.0 |12.8
-----+-----+-----+-----+-----+-----+-----+
3 u|      2924  0.3      0 0.0 |      10380  1.2     121  0.0 | 1.6
3 k|         54  0.0      0 0.0 |     102682 12.2      16  0.0 |12.2
-----+-----+-----+-----+-----+-----+-----+
4 u|      3064  0.3      0 0.0 |      10832  1.2     120  0.0 | 1.6
4 k|         31  0.0      0 0.0 |     107977 13.0     236  0.1 |13.1
=====+=====+=====+=====+=====+=====+=====+=====+=====
ttl |     14816  0.3      0 0.0 |     585937 14.1     1009  0.0 |14.5
```

EXAMPLE 4 Using trapstat with TLB Statistics and Page Size Information

By specifying the `-T` option, `trapstat` shows TLB misses broken down by page size. In this example, CPU 0 is spending 7.9 percent of its time handling user-mode TLB misses on 8K pages, and another 2.3 percent of its time handling user-mode TLB misses on 64K pages.

EXAMPLE 4 Using trapstat with TLB Statistics and Page Size Information (Continued)

```
example# trapstat -T -c 0
```

cpu	m	size	itlb-miss	%tim	itsb-miss	%tim	dtlb-miss	%tim	dtlb-miss	%tim
0	u	8k	1300	0.1	15	0.0	104897	7.9	90	0.0
0	u	64k	0	0.0	0	0.0	29935	2.3	7	0.0
0	u	512k	0	0.0	0	0.0	3569	0.2	2	0.0
0	u	4m	0	0.0	0	0.0	233	0.0	2	0.0
0	k	8k	13	0.0	0	0.0	71733	6.5	110	0.0
0	k	64k	0	0.0	0	0.0	0	0.0	0	0.0
0	k	512k	0	0.0	0	0.0	0	0.0	206	0.1
0	k	4m	0	0.0	0	0.0	0	0.0	0	0.0
=====										
ttl			1313	0.1	15	0.0	210367	17.1	417	0.2

EXAMPLE 5 Using trapstat with Entry Filtering

By specifying the `-e` option, trapstat displays statistics for only specific trap types. Using this option minimizes the probe effect when seeking specific data. This example yields statistics for only the *dtlb-prot* and *syscall-32* traps on CPUs 12 through 15:

```
example# trapstat -e dtlb-prot,syscall-32 -c 12-15
```

vct	name	cpu12	cpu13	cpu14	cpu15
6c	dtlb-prot	817	754	1018	560
108	syscall-32	1426	1647	2186	1142

vct	name	cpu12	cpu13	cpu14	cpu15
6c	dtlb-prot	1085	996	800	707
108	syscall-32	2578	2167	1638	1452

EXAMPLE 6 Using trapstat with a Higher Sampling Rate

The following example uses the `-r` option to specify a sampling rate of 1000 samples per second, and filter only for the level-10 trap. Additionally, specifying the `-P` option yields parsable output.

Notice the timestamp difference between the level-10 events: 9,998,000 nanoseconds and 10,007,000 nanoseconds. These level-10 events correspond to the system clock, which by default ticks at 100 hertz (that is, every 10,000,000 nanoseconds).

```
example# trapstat -e level-10 -P -r 1000
```

```
1070400 0 4a level-10 0
2048600 0 4a level-10 0
3030400 0 4a level-10 1
4035800 0 4a level-10 0
5027200 0 4a level-10 0
6027200 0 4a level-10 0
7027400 0 4a level-10 0
8028200 0 4a level-10 0
9026400 0 4a level-10 0
```


EXAMPLE 6 Using trapstat with a Higher Sampling Rate (Continued)

```

10029600 0 4a level-10 0
11028600 0 4a level-10 0
12024000 0 4a level-10 0
13028400 0 4a level-10 1
14031200 0 4a level-10 0
15027200 0 4a level-10 0
16027600 0 4a level-10 0
17025000 0 4a level-10 0
18026000 0 4a level-10 0
19027800 0 4a level-10 0
20025600 0 4a level-10 0
21025200 0 4a level-10 0
22025000 0 4a level-10 0
23035400 0 4a level-10 1
24027400 0 4a level-10 0
25026000 0 4a level-10 0
26027000 0 4a level-10 0

```

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu
Interface Stability	
Human Readable Output	Unstable
Parsable Output	Evolving

SEE ALSO lockstat(1M), pmap(1), psrset(1M), psrinfo(1M), pbind(1M), ppgsz(1), getpagesizes(3C)

Sun Microelectronics UltraSPARC I&II User's Manual, January 1997, STP1031,

The SPARC Architecture Manual, Version 9, 1994, Prentice-Hall.

NOTES When enabled, trapstat induces a varying probe effect, depending on the type of information collected. While the precise probe effect depends upon the specifics of the hardware, the following table can be used as a rough guide:

Option	Approximate probe effect
default	3-5% per trap
-e	3-5% per specified trap

trapstat(1M)

Option	Approximate probe effect
-t, -T	40-45% per TLB miss trap hitting in the TSB, 25-30% per TLB miss trap missing in the TSB

These probe effects are *per trap* not for the system as a whole. For example, running `trapstat` with the default options on a system that spends 7% of total time handling traps induces a performance degradation of less than one half of one percent; running `trapstat` with the `-t` or `-T` option on a system spending 5% of total time processing TLB misses induce a performance degradation of no more than 2.5%.

When run with the `-t` or `-T` option, `trapstat` accounts for its probe effect when calculating the `%tim` fields. This assures that the `%tim` fields are a reasonably accurate indicator of the time a given workload is spending handling TLB misses — regardless of the perturbing presence of `trapstat`.

While the `%tim` fields include the explicit cost of executing the TLB miss handler, they do *not* include the implicit costs of TLB miss traps (for example, pipeline effects, cache pollution, etc). These implicit costs become more significant as the trap rate grows; if high `%tim` values are reported (greater than 50%), you can accurately infer that much of the balance of time is being spent on the implicit costs of the TLB miss traps.

Due to the potential system wide degradation induced, only the super-user can run `trapstat`.

Due to the limitation of the underlying statistics gathering methodology, only one instance of `trapstat` can run at a time.

NAME	ttyadm – format and output port monitor-specific information
SYNOPSIS	<pre> /usr/sbin/ttyadm [-b] [-c] [-h] [-I] [-r count] [-i msg] [-m modules] [-p prompt] [-t timeout] [-S y n] [-T termtype] -d device -l ttylabel -s service /usr/sbin/ttyadm -V </pre>
DESCRIPTION	The <code>ttyadm</code> command is an administrative command that formats <code>ttymon</code>(1M)-specific information and writes it to standard output. The Service Access Facility (SAF) requires each port monitor to provide such a command. Note that the port monitor administrative file is updated by the Service Access Controller's administrative commands, <code>sacadm</code>(1M) and <code>pmadm</code>(1M). <code>ttyadm</code> provides a means of presenting formatted port monitor-specific (<code>ttymon</code>-specific) data to these commands.
OPTIONS	The following options are supported: -b Set the “bi-directional port” flag. When this flag is set, the line can be used in both directions. <code>ttymon</code> will allow users to connect to the service associated with the port, but if the port is free, <code>uucico</code>(1M), <code>cu</code>(1C), or <code>ct</code>(1C) can use it for dialing out. -c Set the connect-on-carrier flag for the port. If the <code>-c</code> flag is set, <code>ttymon</code> will invoke the port's associated service immediately when a connect indication is received (that is, no prompt is printed and no baud-rate searching is done). -d <i>device</i> <i>device</i> is the full pathname of the device file for the TTY port. -h Set the hangup flag for the port. If the <code>-h</code> flag is not set, <code>ttymon</code> will force a hangup on the line by setting the speed to 0 before setting the speed to the default or specified value. -i <i>message</i> Specify the inactive (disabled) response message. This message will be sent to the TTY port if the port is disabled or the <code>ttymon</code> monitoring the port is disabled. -I Initialize only. If the <code>-I</code> option is used, <code>ttymon</code> will invoke the service only once. This can be used to configure a particular device without actually monitoring it, as with software carrier. -l <i>ttylabel</i> Specify which <i>ttylabel</i> in the <code>/etc/ttydefs</code> file to use as the starting point when searching for the proper baud rate. -m <i>modules</i> Specify a list of pushable STREAMS modules. The modules will be pushed in the order in which they are specified before the service is invoked. <i>modules</i> must be a comma-separated list of modules, with no white space included. Any modules currently on the stream will be popped before these modules are pushed. -p <i>prompt</i> Specify the prompt message, for example, “login:”.

tttadm(1M)

- r *count*** When the **-r** option is invoked, **tttymon** will wait until it receives data from the port before it displays a prompt. If *count* is 0, **tttymon** will wait until it receives any character. If *count* is greater than 0, **tttymon** will wait until *count* newlines have been received.
- s *service*** *service* is the full pathname of the service to be invoked when a connection request is received. If arguments are required, the command and its arguments must be enclosed in double quotes ("").
- S *y|n*** Set the software carrier value. *y* will turn software carrier on. *n* will turn software carrier off.
- t *timeout*** Specify that **tttymon** should close a port if the open on the port succeeds, and no input data is received in *timeout* seconds.
- T *termtype*** Set the terminal type. The **TERM** environment variable will be set to *termtype*.
- V** Display the version number of the current **/usr/lib/saf/tttymon** command.

OUTPUT If successful, **tttadm** will generate the requested information, write it to standard output, and exit with a status of 0. If **tttadm** is invoked with an invalid number of arguments or invalid arguments, or if an incomplete option is specified, an error message will be written to standard error and **tttymon** will exit with a non-zero status.

FILES **/etc/ttydefs**

ATTRIBUTES See **attributes(5)** for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO **ct(1C)**, **cu(1C)**, **pmadm(1M)**, **sacadm(1M)**, **tttymon(1M)**, **uucico(1M)**, **attributes(5)**

System Administration Guide: Basic Administration

NAME	ttypmon – port monitor for terminal ports
SYNOPSIS	<pre> /usr/lib/saf/ttypmon /usr/lib/saf/ttypmon -g [-d device] [-h] [-t timeout] [-l ttylabel] [-p prompt] [-m modules] [-T termtype] </pre>
DESCRIPTION	ttypmon is a STREAMS-based TTY port monitor. Its function is to monitor ports, to set terminal modes, baud rates, and line disciplines for the ports, and to connect users or applications to services associated with the ports. Normally, ttypmon is configured to run under the Service Access Controller, sac(1M), as part of the Service Access Facility (SAF). It is configured using the sacadm(1M) command. Each instance of ttypmon can monitor multiple ports. The ports monitored by an instance of ttypmon are specified in the port monitor's administrative file. The administrative file is configured using the pmadm(1M) and ttyadm(1M) commands. When an instance of ttypmon is invoked by the sac command, it starts to monitor its ports. For each port, ttypmon first initializes the line disciplines, if they are specified, and the speed and terminal settings. For ports with entries in /etc/logindevperm, device owner, group and permissions are set. (See logindevperm(4).) The values used for initialization are taken from the appropriate entry in the TTY settings file. This file is maintained by the sttydefs(1M) command. Default line disciplines on ports are usually set up by the autopush(1M) command of the Autopush Facility. ttypmon then writes the prompt and waits for user input. If the user indicates that the speed is inappropriate by pressing the BREAK key, ttypmon tries the next speed and writes the prompt again. When valid input is received, ttypmon interprets the per-service configuration file for the port, if one exists, creates a utmpx entry if required (see utmpx(4)), establishes the service environment, and then invokes the service associated with the port. Valid input consists of a string of at least one non-newline character, terminated by a carriage return. After the service terminates, ttypmon cleans up the utmpx entry, if one exists, and returns the port to its initial state. If <i>autobaud</i> is enabled for a port, ttypmon will try to determine the baud rate on the port automatically. Users must enter a carriage return before ttypmon can recognize the baud rate and print the prompt. Currently, the baud rates that can be determined by <i>autobaud</i> are 110, 1200, 2400, 4800, and 9600. If a port is configured as a bidirectional port, ttypmon will allow users to connect to a service, and, if the port is free, will allow uucico(1M), cu(1C), or ct(1C) to use it for dialing out. If a port is bidirectional, ttypmon will wait to read a character before it prints a prompt. If the <i>connect-on-carrier</i> flag is set for a port, ttypmon will immediately invoke the port's associated service when a connection request is received. The prompt message will not be sent. If a port is disabled, ttypmon will not start any service on that port. If a disabled message is specified, ttypmon will send out the disabled message when a connection request is received. If ttypmon is disabled, all ports under that instance of ttypmon will also be disabled.

ttymon(1M)

SERVICE INVOCATION

The service `ttymon` invokes for a port is specified in the `ttymon` administrative file. `ttymon` will scan the character string giving the service to be invoked for this port, looking for a `%d` or a `%%` two-character sequence. If `%d` is found, `ttymon` will modify the service command to be executed by replacing those two characters by the full path name of this port (the device name). If `%%` is found, they will be replaced by a single `%`. When the service is invoked, file descriptor 0, 1, and 2 are opened to the port device for reading and writing. The service is invoked with the user ID, group ID and current home directory set to that of the user name under which the service was registered with `ttymon`. Two environment variables, `HOME` and `TTYPROMPT`, are added to the service's environment by `ttymon`. `HOME` is set to the home directory of the user name under which the service is invoked. `TTYPROMPT` is set to the prompt string configured for the service on the port. This is provided so that a service invoked by `ttymon` has a means of determining if a prompt was actually issued by `ttymon` and, if so, what that prompt actually was.

See `ttyadm(1M)` for options that can be set for ports monitored by `ttymon` under the Service Access Controller.

SECURITY

`ttymon` uses `pam(3PAM)` for session management. The PAM configuration policy, listed through `/etc/pam.conf`, specifies the modules to be used for `ttymon`. Here is a partial `pam.conf` file with entries for `ttymon` using the UNIX session management module.

```
ttymon session required /usr/lib/security/pam_unix.so.1
```

If there are no entries for the `ttymon` service, then the entries for the "other" service will be used.

OPTIONS

- `-g` A special invocation of `ttymon` is provided with the `-g` option. This form of the command should only be called by applications that need to set the correct baud rate and terminal settings on a port and then connect to login service, but that cannot be pre-configured under the SAC. The following combinations of options can be used with `-g`:
- `-d device` *device* is the full path name of the port to which `ttymon` is to attach. If this option is not specified, file descriptor 0 must be set up by the invoking process to a TTY port.
- `-h` If the `-h` flag is not set, `ttymon` will force a hangup on the line by setting the speed to zero before setting the speed to the default or specified speed.
- `-l ttylabel` *ttylabel* is a link to a speed and TTY definition in the `ttydefs` file. This definition tells `ttymon` at what speed to run initially, what the initial TTY settings are, and what speed to try next if the user indicates that the speed is inappropriate by pressing the BREAK key. The default speed is 9600 baud.
- `-m modules` When initializing the port, `ttymon` will pop all modules on the port, and then push *modules* in the order specified. *modules* is a

ENVIRONMENT VARIABLES

- comma-separated list of pushable modules. Default modules on the ports are usually set up by the Autopush Facility.
- p *prompt*** Allows the user to specify a prompt string. The default prompt is Login: .
- t *timeout*** Specifies that `ttymon` should exit if no one types anything in *timeout* seconds after the prompt is sent.
- T *termtype*** Sets the `TERM` environment variable to *termtype*.

If any of the `LC_*` variables (`LC_CTYPE`, `LC_MESSAGES`, `LC_TIME`, `LC_COLLATE`, `LC_NUMERIC`, and `LC_MONETARY`) (see `environ(5)`) are not set in the environment, the operational behavior of `ttymon` for each corresponding locale category is determined by the value of the `LANG` environment variable. If `LC_ALL` is set, its contents are used to override both the `LANG` and the other `LC_*` variables. If none of the above variables is set in the environment, the "C" (U.S. style) locale determines how `ttymon` behaves.

LC_CTYPE Determines how `ttymon` handles characters. When `LC_CTYPE` is set to a valid value, `ttymon` can display and handle text and filenames containing valid characters for that locale. `ttymon` can display and handle Extended Unix Code (EUC) characters where any individual character can be 1, 2, or 3 bytes wide. `ttymon` can also handle EUC characters of 1, 2, or more column widths. In the "C" locale, only characters from ISO 8859-1 are valid.

FILES

/etc/logindevperm

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

`ct(1C)`, `cu(1C)`, `autopush(1M)`, `pmadm(1M)`, `sac(1M)`, `sacadm(1M)`, `sttydefs(1M)`, `ttyadm(1M)`, `uucico(1M)`, `pam(3PAM)`, `logindevperm(4)`, `pam.conf(4)`, `utmpx(4)`, `attributes(5)`, `environ(5)`, `pam_authtok_check(5)`, `pam_authtok_get(5)`, `pam_authtok_store(5)`, `pam_dhkeys(5)`, `pam_passwd_auth(5)`, `pam_unix(5)`, `pam_unix_account(5)`, `pam_unix_auth(5)`, `pam_unix_session(5)`

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NOTES

If a port is monitored by more than one `ttymon`, it is possible for the `ttymons` to send out prompt messages in such a way that they compete for input.

The `pam_unix(5)` module might not be supported in a future release. Similar functionality is provided by `pam_authtok_check(5)`, `pam_authtok_get(5)`, `pam_authtok_store(5)`, `pam_dhkeys(5)`, `pam_passwd_auth(5)`, `pam_unix_account(5)`, `pam_unix_auth(5)`, and `pam_unix_session(5)`.

tuneufs(1M)

NAME	tuneufs – tune up an existing file system
SYNOPSIS	tuneufs [-a <i>maxcontig</i>] [-d <i>rotdelay</i>] [-e <i>maxbpg</i>] [-m <i>minfree</i>] [-o [space time]] <i>special</i> <i>filesystem</i>
DESCRIPTION	tuneufs is designed to change the dynamic parameters of a file system which affect the layout policies. When using tuneufs with <i>filesystem</i>, <i>filesystem</i> must be in /etc/vfstab. The parameters which are to be changed are indicated by the options given below. Generally, one should optimize for time unless the file system is over 90% full.
OPTIONS	The following options are supported: -a <i>maxcontig</i> Specifies the maximum number of contiguous logical blocks that will be laid out before forcing a rotational delay (see -d). The default value is determined from the disk drive's maximum transfer rate. - UFS supports no more than 1048576 byte (1MB) runs. With a logical block size of 4096, this gives a <i>maxcontig</i> limit of 256. With 8192, the limit is 128. -d <i>rotdelay</i> Specifies the expected time (in milliseconds) to service a transfer completion interrupt and initiate a new transfer on the same disk. It is used to decide how much rotational spacing to place between successive blocks in a file. -e <i>maxbpg</i> Indicates the maximum number of contiguous logical blocks any single file can allocate out of a cylinder group before it is forced to begin allocating blocks from another cylinder group. Typically this value is set to approximately one quarter of the total contiguous logical blocks in a cylinder group. The intent is to prevent any single file from using up all the blocks in a single cylinder group, thus degrading access times for all files subsequently allocated in that cylinder group. The effect of this limit is to cause big files to do long seeks more frequently than if they were allowed to allocate all the blocks in a cylinder group before seeking elsewhere. For file systems with exclusively large files, this parameter should be set higher. -m <i>minfree</i> Specifies the percentage of space held back from normal users; the minimum free space threshold. This value can be set to 0; however, up to a factor of three in throughput will be lost over the performance obtained at a 10% threshold. <i>Note:</i> If the value is raised above the current usage level, users will be unable to allocate files until enough files have been deleted to get under the higher threshold. -o [space time] Changes optimization strategy for the file system. - space: conserves space - time: attempt to organize file layout to minimize access time

tunefs(1M)

USAGE See largefile(5) for the description of the behavior of tunefs when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO mkfs(1M), attributes(5), largefile(5)

tzselect(1M)

NAME	tzselect – select a time zone						
SYNOPSIS	/usr/bin/tzselect						
DESCRIPTION	The <code>tzselect</code> program asks you a series of questions about the current location and outputs the resulting time zone description to standard output. The output is suitable as a value for the <code>TZ</code> environment variable. All user interaction is through standard input and standard error.						
OPTIONS	The <code>tzselect</code> command has no options.						
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Timezone information was successfully obtained.</td></tr><tr><td>>0</td><td>An error occurred.</td></tr></table>	0	Timezone information was successfully obtained.	>0	An error occurred.		
0	Timezone information was successfully obtained.						
>0	An error occurred.						
FILES	<code>/usr/share/lib/zoneinfo</code> directory containing timezone data files						
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr><tr><td>Stability</td><td>Evolving</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu	Stability	Evolving
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWcsu						
Stability	Evolving						
SEE ALSO	<code>zdump(1M)</code> , <code>zic(1M)</code> , <code>ctime(3C)</code> , <code>attributes(5)</code>						

NAME	uadmin – administrative control				
SYNOPSIS	<pre>/usr/sbin/uadmin cmd fcn [mdep] /sbin/uadmin cmd fcn [mdep]</pre>				
DESCRIPTION	The uadmin command provides control for basic administrative functions. This command is tightly coupled to the system administration procedures and is not intended for general use. It may be invoked only by the super-user. Both the <i>cmd</i> (command) and <i>fcn</i> (function) arguments are converted to integers and passed to the uadmin system call. The optional <i>mdep</i> (machine dependent) argument is only available for the <i>cmd</i> values of 1 (A_REBOOT), 2 (A_SHUTDOWN), or 5 (A_DUMP). For any other <i>cmd</i> value, no <i>mdep</i> command-line argument is allowed. When passing an <i>mdep</i> value that contains whitespaces, the string must be grouped together as a single argument enclosed within quotes, for example: <pre>uadmin 1 1 "-s kernel/unix"</pre>				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	uadmin(2), attributes(5)				

ufsdump(1M)

NAME	ufsdump – incremental file system dump						
SYNOPSIS	/usr/sbin/ufsdump [<i>options</i>] [<i>arguments</i>] <i>files_to_dump</i>						
DESCRIPTION	ufsdump backs up all files specified by <i>files_to_dump</i> (normally either a whole file system or files within a file system changed after a certain date) to magnetic tape, diskette, or disk file. When running ufsdump, the file system must be inactive; otherwise, the output of ufsdump may be inconsistent and restoring files correctly may be impossible. A file system is inactive when it is unmounted or the system is in single user mode. A file system is not considered inactive if one tree of the file system is quiescent while another tree has files or directories being modified. <i>options</i> is a single string of one-letter ufsdump options. <i>arguments</i> may be multiple strings whose association with the options is determined by order. That is, the first argument goes with the first option that takes an argument; the second argument goes with the second option that takes an argument, and so on. <i>files_to_dump</i> is required and must be the last argument on the command line. See OPERANDS for more information. With most devices ufsdump can automatically detect the end-of-media. Consequently, the <i>d</i>, <i>s</i>, and <i>t</i> options are not necessary for multi-volume dumps, unless ufsdump does not understand the way the device detects the end-of-media, or the files are to be restored on a system with an older version of the <i>restore</i> command.						
OPTIONS	The following options are supported: <table><tr><td>0–9</td><td>The “dump level.” All files specified by <i>files_to_dump</i> that have been modified since the last ufsdump at a lower dump level are copied to the <i>dump_file</i> destination (normally a magnetic tape device). For instance, if a “level 2” dump was done on Monday, followed by a “level 4” dump on Tuesday, a subsequent “level 3” dump on Wednesday would contain all files modified or added since the “level 2” (Monday) backup. A “level 0” dump copies the entire file system to the <i>dump_file</i>.</td></tr><tr><td>a <i>archive_file</i></td><td>Archive file. Archive a dump table-of-contents in the specified <i>archive_file</i> to be used by ufsrestore(1M) to determine whether a file is in the dump file that is being restored.</td></tr><tr><td>b <i>factor</i></td><td>Blocking factor. Specify the blocking factor for tape writes. The default is 20 blocks per write for tapes of density less than 6250BPI (bytes-per-inch). The default blocking factor for tapes of density 6250BPI and greater is 64. The default blocking factor for cartridge tapes (<i>c</i> option) is 126. The highest blocking factor available</td></tr></table>	0–9	The “dump level.” All files specified by <i>files_to_dump</i> that have been modified since the last ufsdump at a lower dump level are copied to the <i>dump_file</i> destination (normally a magnetic tape device). For instance, if a “level 2” dump was done on Monday, followed by a “level 4” dump on Tuesday, a subsequent “level 3” dump on Wednesday would contain all files modified or added since the “level 2” (Monday) backup. A “level 0” dump copies the entire file system to the <i>dump_file</i> .	a <i>archive_file</i>	Archive file. Archive a dump table-of-contents in the specified <i>archive_file</i> to be used by ufsrestore(1M) to determine whether a file is in the dump file that is being restored.	b <i>factor</i>	Blocking factor. Specify the blocking factor for tape writes. The default is 20 blocks per write for tapes of density less than 6250BPI (bytes-per-inch). The default blocking factor for tapes of density 6250BPI and greater is 64. The default blocking factor for cartridge tapes (<i>c</i> option) is 126. The highest blocking factor available
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a <i>archive_file</i>	Archive file. Archive a dump table-of-contents in the specified <i>archive_file</i> to be used by ufsrestore(1M) to determine whether a file is in the dump file that is being restored.						
b <i>factor</i>	Blocking factor. Specify the blocking factor for tape writes. The default is 20 blocks per write for tapes of density less than 6250BPI (bytes-per-inch). The default blocking factor for tapes of density 6250BPI and greater is 64. The default blocking factor for cartridge tapes (<i>c</i> option) is 126. The highest blocking factor available						

	with most tape drives is 126. Note: the blocking factor is specified in terms of 512-byte blocks, for compatibility with <code>tar(1)</code> .
<code>c</code>	Cartridge. Set the defaults for cartridge instead of the standard half-inch reel. This sets the density to 1000BPI and the blocking factor to 126. Since <code>ufsdump</code> can automatically detect the end-of-media, only the blocking parameter normally has an effect. When cartridge tapes are used, and this option is <i>not</i> specified, <code>ufsdump</code> will slightly miscompute the size of the tape. If the <code>b</code> , <code>d</code> , <code>s</code> or <code>t</code> options are specified with this option, their values will override the defaults set by this option.
<code>d bpi</code>	Tape density. Not normally required, as <code>ufsdump</code> can detect end-of-media. This parameter can be used to keep a running tab on the amount of tape used per reel. The default density is 6250BPI except when the <code>c</code> option is used for cartridge tape, in which case it is assumed to be 1000BPI per track. Typical values for tape devices are: 1/2 inch tape 6250 BPI 1/4 inch cartridge 1000 BPI The tape densities and other options are documented in the <code>st(7D)</code> man page.
<code>D</code>	Diskette. Dump to diskette.
<code>f dump_file</code>	Dump file. Use <i>dump_file</i> as the file to dump to, instead of <code>/dev/rmt/0</code> . If <i>dump_file</i> is specified as <code>-</code> , dump to standard output. If the name of the file is of the form <i>machine:device</i> , the dump is done from the specified machine over the network using <code>rmt(1M)</code> . Since <code>ufsdump</code> is normally run by root, the name of the local machine must appear in the <code>/ .rhosts</code> file of the remote machine. If the file is specified as <i>user@machine:device</i> , <code>ufsdump</code> will attempt to execute as the specified user on the remote machine. The specified user must have a <code>.rhosts</code> file on the remote machine that allows the user invoking the command from the local machine to access the remote machine.
<code>l</code>	Autoload. When the end-of-tape is reached before the dump is complete, take the drive offline and wait up to two minutes for the tape drive to be ready again. This

ufsdump(1M)

	gives autoloading (stackloader) tape drives a chance to load a new tape. If the drive is ready within two minutes, continue. If it is not, prompt for another tape and wait.
L <i>string</i>	Sets the tape label to <i>string</i> , instead of the default none. <i>string</i> may be no more than sixteen characters long. If it is longer, it is truncated and a warning printed; the dump will still be done. The tape label is specific to the ufsdump tape format, and bears no resemblance to IBM or ANSI-standard tape labels.
n	Notify all operators in the sys group that ufsdump requires attention by sending messages to their terminals, in a manner similar to that used by the wall(1M) command. Otherwise, such messages are sent only to the terminals (such as the console) on which the user running ufsdump is logged in.
N <i>device_name</i>	Use <i>device_name</i> when recording information in /etc/dumpdates (see the u option) and when comparing against information in /etc/dumpdates for incremental dumps. The <i>device_name</i> provided can contain no white space as defined in scanf(3C) and is case-sensitive.
o	Offline. Take the drive offline when the dump is complete or the end-of-media is reached and rewind the tape, or eject the diskette. In the case of some autoloading 8mm drives, the tape is removed from the drive automatically. This prevents another process which rushes in to use the drive, from inadvertently overwriting the media.
s <i>size</i>	Specify the <i>size</i> of the volume being dumped to. Not normally required, as ufsdump can detect end-of-media. When the specified size is reached, ufsdump waits for you to change the volume. ufsdump interprets the specified size as the length in feet for tapes and cartridges, and as the number of 1024-byte blocks for diskettes. The values should be a little smaller than the actual physical size of the media (for example, 425 for a 450-foot cartridge). Typical values for tape devices depend on the c option, for cartridge devices, and the D option for diskettes: 1/2 inch tape 2300 feet

	60-Mbyte 1/4 inch cartridge 425 feet
	150-Mbyte 1/4 inch cartridge 700 feet
	diskette 1422 blocks (Corresponds to a 1.44-Mbyte diskette, with one cylinder reserved for bad block information.)
S	Size estimate. Determine the amount of space that is needed to perform the dump without actually doing it, and display the estimated number of bytes it will take. This is useful with incremental dumps to determine how many volumes of media will be needed.
t <i>tracks</i>	Specify the number of tracks for a cartridge tape. Not normally required, as <code>ufsdump</code> can detect end-of-media. The default is 9 tracks. The <code>t</code> option is not compatible with the <code>D</code> option. Values for Sun-supported tape devices are: 60-Mbyte 1/4 inch cartridge 9 tracks 150-Mbyte 1/4 inch cartridge 18 tracks
T <i>time_wait</i> [hms]	Sets the amount of time to wait for an <code>autoload</code> command to complete. This option is ignored unless the <code>l</code> option has also been specified. The default time period to wait is two minutes. Specify time units with a trailing <code>h</code> (for hours), <code>m</code> (for minutes), or <code>s</code> (for seconds). The default unit is minutes.
u	Update the dump record. Add an entry to the file <code>/etc/dumpdates</code> , for each file system successfully dumped that includes the file system name (or <i>device_name</i> as specified with the <code>N</code> option), date, and dump level.
v	Verify. After each tape or diskette is written, verify the contents of the media against the source file system. If any discrepancies occur, prompt for new media, then repeat the dump/verification process. The file system <i>must</i> be unmounted. This option cannot be used to verify a dump to standard output.
w	Warning. List the file systems that have not been backed up within a day. This information is gleaned from the files <code>/etc/dumpdates</code> and <code>/etc/vfstab</code> . When the <code>w</code> option is used, all other options are ignored. After reporting, <code>ufsdump</code> exits immediately.

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	W	Warning with highlight. Similar to the w option, except that the W option includes all file systems that appear in /etc/dumpdates, along with information about their most recent dump dates and levels. File systems that have not been backed up within a day are highlighted.
OPERANDS	The following operand is supported: <i>files_to_dump</i> Specifies the files to dump. Usually it identifies a whole file system by its raw device name (for example, /dev/rdsk/c0t3d0s6). Incremental dumps (levels 1 to 9) of files changed after a certain date only apply to a whole file system. Alternatively, <i>files_to_dump</i> can identify individual files or directories. All named directories that may be examined by the user running ufsdump, as well as any explicitly-named files, are dumped. This dump is equivalent to a level 0 dump of the indicated portions of the filesystem, except that /etc/dumpdates is not updated even if the -u option has been specified. In all cases, the files must be contained in the same file system, and the file system must be local to the system where ufsdump is being run. <i>files_to_dump</i> is required and must be the last argument on the command line. If no options are given, the default is 9uf /dev/rmt/0 <i>files_to_dump</i> .	
USAGE	See largefile(5) for the description of the behavior of ufsdump when encountering files greater than or equal to 2 Gbyte (2 ³¹ bytes).	
EXAMPLES	EXAMPLE 1 A sample display of the ufsdump command. To make a full dump of a root file system on c0t3d0, on a 150-MByte cartridge tape unit 0, use: example# ufsdump 0cfu /dev/rmt/0 /dev/rdsk/c0t3d0s0 To make and verify an incremental dump at level 5 of the usr partition of c0t3d0, on a 1/2 inch reel tape unit 1, use: example# ufsdump 5fuv /dev/rmt/1 /dev/rdsk/c0t3d0s6	
EXIT STATUS	While running, ufsdump emits many verbose messages. ufsdump returns the following exit values: 0 Normal exit. 1 Startup errors encountered. 3 Abort – no checkpoint attempted.	
FILES	/dev/rmt/0	default unit to dump to

/etc/dumpdates	dump date record
/etc/group	to find group sys
/etc/hosts	to gain access to remote system with drive
/etc/vfstab	list of file systems

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO cpio(1), tar(1), dd(1M), devnm(1M), prtvtoc(1M), rmt(1M), shutdown(1M), ufsrestore(1M), volcopy(1M), wall(1M), scanf(3C), attributes(5), largefile(5), st(7D)

NOTES

Read Errors Fewer than 32 read errors on the file system are ignored.

Process Per Reel Because each reel requires a new process, parent processes for reels that are already written hang around until the entire tape is written.

Operator Intervention ufsdump requires operator intervention on these conditions: end of volume, end of dump, volume write error, volume open error or disk read error (if there are more than a threshold of 32). In addition to alerting all operators implied by the `n` option, ufsdump interacts with the operator on ufsdump's control terminal at times when ufsdump can no longer proceed, or if something is grossly wrong. All questions ufsdump poses *must* be answered by typing `yes` or `no`, as appropriate.

Since backing up a disk can involve a lot of time and effort, ufsdump checkpoints at the start of each volume. If writing that volume fails for some reason, ufsdump will, with operator permission, restart itself from the checkpoint after a defective volume has been replaced.

Suggested Dump Schedule It is vital to perform full, "level 0", dumps at regular intervals. When performing a full dump, bring the machine down to single-user mode using `shutdown(1M)`. While preparing for a full dump, it is a good idea to clean the tape drive and heads. Incremental dumps should be performed with the system running in single-user mode.

Incremental dumps allow for convenient backup and recovery of active files on a more frequent basis, with a minimum of media and time. However, there are some tradeoffs. First, the interval between backups should be kept to a minimum (once a day at least). To guard against data loss as a result of a media failure (a rare, but possible occurrence), capture active files on (at least) two sets of dump volumes. Another consideration is the desire to keep unnecessary duplication of files to a minimum to

ufsdump(1M)

save both operator time and media storage. A third consideration is the ease with which a particular backed-up version of a file can be located and restored. The following four-week schedule offers a reasonable tradeoff between these goals.

	Sun	Mon	Tue	Wed	Thu	Fri
Week 1:	Full	5	5	5	5	3
Week 2:		5	5	5	5	3
Week 3:		5	5	5	5	3
Week 4:		5	5	5	5	3

Although the Tuesday through Friday incrementals contain “extra copies” of files from Monday, this scheme assures that any file modified during the week can be recovered from the previous day’s incremental dump.

Process Priority of ufsdump

ufsdump uses multiple processes to allow it to read from the disk and write to the media concurrently. Due to the way it synchronizes between these processes, any attempt to run dump with a *nice* (process priority) of ‘-5’ or better will likely make ufsdump run *slower* instead of faster.

Overlapping Partitions

Most disks contain one or more overlapping slices because slice 2 covers the entire disk. The other slices are of various sizes and usually do not overlap. For example, a common configuration places `root` on slice 0, `swap` on slice 1, `/opt` on slice 5 and `/usr` on slice 6.

It should be emphasized that ufsdump dumps one `ufs` file system at a time. Given the above scenario where slice 0 and slice 2 have the same starting offset, executing ufsdump on slice 2 with the intent of dumping the entire disk would instead dump only the `root` file system on slice 0. To dump the entire disk, the user must dump the file systems on each slice separately.

BUGS

The `/etc/vfstab` file does not allow the desired frequency of backup for file systems to be specified (as `/etc/fstab` did). Consequently, the `w` and `W` options assume file systems should be backed up daily, which limits the usefulness of these options.

NAME	ufsrestore – incremental file system restore
SYNOPSIS	<pre>/usr/sbin/ufsrestore i r R t x [abcdfhlmostvyLT] [archive_file] [factor] [dumpfile] [n] [label] [timeout] [filename...]</pre>
DESCRIPTION	The ufsrestore utility restores files from backup media created with the ufsdump command. ufsrestore's actions are controlled by the <i>key</i> argument. The <i>key</i> is exactly one function <i>letter</i> (i, r, R, t, or x) and zero or more <i>function modifiers</i> (letters). The <i>key</i> string contains no SPACE characters. Function modifier arguments are listed on the command line in the same order as their corresponding function modifiers appear in the <i>key</i> string. <i>filename</i> arguments which appear on the command line, or as arguments to an interactive command, are treated as shell glob patterns by the x and t functions; any files or directories matching the patterns are selected. The metacharacters *, ?, and [] must be protected from the shell if they appear on the command line. There is no way to quote these metacharacters to explicitly match them in a filename. The temporary files rstdir* and rstmode* are placed in /tmp by default. If the environment variable TMPDIR is defined with a non-empty value, that location is used instead of /tmp.
OPTIONS	
Function Letters	You must specify one (and only one) of the function letters listed below. Note that i, x, and r are intended to restore files into an empty directory. The R function is intended for restoring into a populated directory. i Interactive. After reading in the directory information from the media, ufsrestore invokes a shell-like interface that allows you to browse through the dump file's directory hierarchy and select individual files to be extracted. Restoration has the same semantics as x (see below). See Interactive Commands, below, for a description of available commands. r Recursive. Starting with an empty directory and a level 0 dump, the r function recreates the filesystem relative to the current working directory, exactly as it appeared when the dump was made. Information used to restore incremental dumps on top of the full dump (for example, restoresymtable) is also included. Several ufsrestore runs are typical, one for each higher level of dump (0, 1, ..., 9). Files that were deleted between the level 0 and a subsequent incremental dump will not exist after the final restore. To completely restore a file system, use the r function restore the level 0 dump, and again for each incremental dump. Although this function letter is intended for a complete restore onto a new file system (one just created with newfs(1M)), if the file system contains files not on the backup media, they are preserved.

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	R	Resume restoring. If an <i>r</i> -mode <i>ufsrestore</i> was interrupted, this function prompts for the volume from which to resume restoring and continues the restoration from where it was left off. Otherwise identical to <i>r</i> .
	t	Table of contents. List each <i>filename</i> that appears on the media. If no <i>filename</i> argument is given, the root directory is listed. This results in a list of all files on the media, unless the <i>h</i> function modifier is in effect. The table of contents is taken from the media or from the specified archive file, when the <i>a</i> function modifier is used. The <i>a</i> function modifier is mutually exclusive with the <i>x</i> and <i>r</i> function letters.
	x	Extract the named files from the media. Files are restored to the same relative locations that they had in the original file system. If the <i>filename</i> argument matches a directory whose contents were written onto the media, and the <i>h</i> modifier is not in effect, the directory is recursively extracted, relative to the current directory, which is expected to be empty. For each file, the owner, modification time, and mode are restored (if possible). If you omit the <i>filename</i> argument or specify <i>.</i> , the root directory is extracted. This results in the entire tape being extracted, unless the <i>h</i> modifier is in effect. <i>.</i> With the <i>x</i> function, existing files are overwritten and <i>ufsrestore</i> displays the names of the overwritten files. Overwriting a currently-running executable can have unfortunate consequences. Use the <i>x</i> option to restore partial file system dumps, as they are (by definition) not entire file systems.
	Function Modifiers	
	<i>a archive_file</i>	Read the table of contents from <i>archive_file</i> instead of the media. This function modifier can be used in combination with the <i>t</i> , <i>i</i> , or <i>x</i> function letters, making it possible to check whether files are on the media without having to mount the media. When used with the <i>x</i> and interactive (<i>i</i>) function letters, it prompts for the volume containing the file(s) before extracting them.
	<i>b factor</i>	Blocking factor. Specify the blocking factor for tape reads. For variable length SCSI tape devices, unless the data was written with the default blocking factor, a blocking factor at least as great as that used to write the tape must be used; otherwise, an error will be generated. Note that a tape block is 512 bytes. Refer to the man page for your specific tape driver for the maximum blocking factor.
	<i>c</i>	Convert the contents of the media in 4.1BSD format to the new <i>ufs</i> file system format.
	<i>d</i>	Debug. Turn on debugging output.

<i>f dump_file</i>	Use <i>dump_file</i> instead of <code>/dev/rmt/0</code> as the file to restore from. Typically <i>dump_file</i> specifies a tape or diskette drive. If <i>dump_file</i> is specified as <code>'-'</code>, <code>ufsrestore</code> reads from the standard input. This allows <code>ufsdump(1M)</code> and <code>ufsrestore</code> to be used in a pipeline to copy a file system: <pre>example# ufsdump 0f - /dev/rdisk/c0t0d0s7 \ (cd /home;ufsrestore xf -)</pre> If the name of the file is of the form <i>machine:device</i>, the restore is done from the specified machine over the network using <code>rmt(1M)</code>. Since <code>ufsrestore</code> is normally run by root, the name of the local machine must appear in the <code>.rhosts</code> file of the remote machine. If the file is specified as <i>user@machine:device</i>, <code>ufsrestore</code> will attempt to execute as the specified user on the remote machine. The specified user must have a <code>.rhosts</code> file on the remote machine that allows the user invoking the command from the local machine to access the remote machine.
<i>h</i>	Extract or list the actual directory, rather than the files that it references. This prevents hierarchical restoration of complete subtrees from the tape.
<i>l</i>	Autoload. When the end-of-tape is reached before the restore is complete, take the drive off-line and wait up to two minutes (the default, see the <code>T</code> function modifier) for the tape drive to be ready again. This gives autoloading (stackloader) tape drives a chance to load a new tape. If the drive is ready within two minutes, continue. If it is not, prompt for another tape and wait.
<i>L label</i>	The label that should appear in the header of the dump file. If the labels do not match, <code>ufsrestore</code> issues a diagnostic and exits. The tape label is specific to the <code>ufsdump</code> tape format, and bears no resemblance to IBM or ANSI-standard tape labels.
<i>m</i>	Extract by inode numbers rather than by filename to avoid regenerating complete pathnames. Regardless of where the files are located in the dump hierarchy, they are restored into the current directory and renamed with their inode number. This is useful if only a few files are being extracted.
<i>o</i>	Offline. Take the drive off-line when the restore is complete or the end-of-media is reached and rewind the tape, or eject the diskette. In the case of some autoloading 8mm drives, the tape is removed from the drive automatically.
<i>s n</i>	Skip to the <i>n</i> 'th file when there are multiple dump files on the same tape. For example, the command: <pre>example# ufsrestore xfs /dev/rmt/0hn 5</pre>

ufsrestore(1M)

Interactive Commands

	would position you to the fifth file on the tape when reading volume 1 of the dump. If a dump extends over more than one volume, all volumes except the first are assumed to start at position 0, no matter what "s <i>n</i>" value is specified. If "s <i>n</i>" is specified, the backup media must be at BOT (beginning of tape). Otherwise, the initial positioning to read the table of contents will fail, as it is performed by skipping the tape forward <i>n</i> - 1 files rather than by using absolute positioning. This is because on some devices absolute positioning is very time consuming.
T timeout [hms]	Sets the amount of time to wait for an autoload command to complete. This function modifier is ignored unless the l function modifier has also been specified. The default timeout period is two minutes. The time units may be specified as a trailing h (hours), m (minutes), or s (seconds). The default unit is minutes.
v	Verbose. ufsrestore displays the name and inode number of each file it restores, preceded by its file type.
y	Do not ask whether to abort the restore in the event of tape errors. ufsrestore tries to skip over the bad tape block(s) and continue as best it can.
ufsrestore enters interactive mode when invoked with the i function letters. Interactive commands are reminiscent of the shell. For those commands that accept an argument, the default is the current directory. The interactive options are:	
add [filename]	Add the named file or directory to the list of files to extract. If a directory is specified, add that directory and its files (recursively) to the extraction list (unless the h modifier is in effect).
cd directory	Change to <i>directory</i> (within the dump file).
delete [filename]	Delete the current directory, or the named file or directory from the list of files to extract. If a directory is specified, delete that directory and all its descendents from the extraction list (unless the h modifier is in effect). The most expedient way to extract a majority of files from a directory is to add that directory to the extraction list, and then delete specific files to omit.
extract	Extract all files on the extraction list from the dump media. ufsrestore asks which volume the user wishes to mount. The fastest way to extract a small number of files is to start with the last volume and work toward the first. If "s <i>n</i> " is given on the command line, volume 1 will automatically be positioned to file <i>n</i> when it is read.

	help	Display a summary of the available commands.
	ls [<i>directory</i>]	List files in <i>directory</i> or the current directory, represented by a '.' (period). Directories are appended with a '/' (slash). Entries marked for extraction are prefixed with a '*' (asterisk). If the verbose option is in effect, inode numbers are also listed.
	marked [<i>directory</i>]	Like <code>ls</code> , except only files marked for extraction are listed.
	pager	Toggle the pagination of the output from the <code>ls</code> and <code>marked</code> commands. The pager used is that defined by the <code>PAGER</code> environment variable, or <code>more(1)</code> if that <code>envvar</code> is not defined. The <code>PAGER</code> <code>envvar</code> may include white-space-separated arguments for the pagination program.
	pwd	Print the full pathname of the current working directory.
	quit	<code>ufsrestore</code> exits immediately, even if the extraction list is not empty.
	setmodes	Prompts: set owner/mode for '.' (period). Type <code>y</code> for yes to set the mode (permissions, owner, times) of the current directory '.' (period) into which files are being restored equal to the mode of the root directory of the file system from which they were dumped. Normally, this is what you want when restoring a whole file system, or restoring individual files into the same locations from which they were dumped. Type <code>n</code> for no, to leave the mode of the current directory unchanged. Normally, this is what you want when restoring part of a dump to a directory other than the one from which the files were dumped.
	setpager <i>command</i>	Sets the command to use for paginating output instead of the default or that inherited from the environment. The <i>command</i> string may include arguments in addition to the command itself.
	verbose	Toggle the status of the <code>v</code> modifier. While <code>v</code> is in effect, the <code>ls</code> command lists the inode numbers of all entries, and <code>ufsrestore</code> displays information about each file as it is extracted.
	what	Display the dump header on the media.
OPERANDS	The following operands are supported.	

ufsrestore(1M)

	<i>filename</i>	Specifies the pathname of files (or directories) to be restored to disk. Unless the <i>h</i> function modifier is also used, a directory name refers to the files it contains, and (recursively) its subdirectories and the files they contain. <i>filename</i> is associated with either the <i>x</i> or <i>t</i> function letters, and must come last.				
USAGE	See <code>largefile(5)</code> for the description of the behavior of <code>ufsrestore</code> when encountering files greater than or equal to 2 Gbyte (2^{31} bytes).					
EXIT STATUS	The following exit values are returned:					
	0	Successful completion.				
	1	An error occurred. Verbose messages are displayed.				
ENVIRONMENT VARIABLES	PAGER	The command to use as a filter for paginating output. This can also be used to specify the options to be used. Default is <code>more(1)</code> .				
	TMPDIR	Selects the directory for temporary files. Defaults to <code>/tmp</code> if not defined in the environment.				
FILES	<code>/dev/rmt/0</code>	the default tape drive				
	<code>\$TMPDIR/rstdir*</code>	file containing directories on the tape				
	<code>\$TMPDIR/rstmode*</code>	owner, mode, and timestamps for directories				
	<code>./restoresymtable</code>	information passed between incremental restores				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:					
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE					
Availability	SUNWcsu					
SEE ALSO	<code>more(1)</code> , <code>mkfs(1M)</code> , <code>mount(1M)</code> , <code>rmt(1M)</code> , <code>ufsdump(1M)</code> , <code>attributes(5)</code> , <code>largefile(5)</code>					
DIAGNOSTICS	<code>ufsrestore</code> complains about bad option characters. Read errors result in complaints. If <i>y</i> has been specified, or the user responds <i>y</i>, <code>ufsrestore</code> will attempt to continue. If the dump extends over more than one tape, <code>ufsrestore</code> asks the user to change tapes. If the <i>x</i> or <i>i</i> function letter has been specified, <code>ufsrestore</code> also asks which volume the user wishes to mount. If the <i>s</i> modifier has been specified, and volume 1 is mounted, it is automatically positioned to the indicated file. There are numerous consistency checks that can be listed by <code>ufsrestore</code>. Most checks are self-explanatory or can “never happen”. Common errors are given below.					

Converting to new file system format

A dump tape created from the old file system has been loaded. It is automatically converted to the new file system format.

filename: not found on tape

The specified file name was listed in the tape directory, but was not found on the tape. This is caused by tape read errors while looking for the file, using a dump tape created on an active file system, or restoring a partial dump with the *r* function.

expected next file *inumber*, got *inumber*

A file that was not listed in the directory showed up. This can occur when using a dump tape created on an active file system.

Incremental tape too low

When doing an incremental restore, a tape that was written before the previous incremental tape, or that has too low an incremental level has been loaded.

Incremental tape too high

When doing incremental restore, a tape that does not begin its coverage where the previous incremental tape left off, or one that has too high an incremental level has been loaded.

media read error: invalid argument

Blocking factor specified for read is smaller than the blocking factor used to write data.

Tape read error while restoring

Tape read error while skipping over inode *inumber*

Tape read error while trying to resynchronize

A tape read error has occurred

If a file name is specified, then its contents are probably partially wrong. If an inode is being skipped or the tape is trying to resynchronize, then no extracted files have been corrupted, though files may not be found on the tape.

resync ufsrestore, skipped *num*

After a tape read error, ufsrestore may have to resynchronize itself. This message lists the number of blocks that were skipped over.

Incorrect tape label. Expected 'foo', got 'bar'.

The *L* option was specified, and its value did not match what was recorded in the header of the dump file.

NOTES

ufsrestore can get confused when doing incremental restores from dump tapes that were made on active file systems.

A level 0 dump must be done after a full restore. Because ufsrestore runs in user mode, it has no control over inode allocation. This means that ufsrestore repositions the files, although it does not change their contents. Thus, a full dump must be done to get a new set of directories reflecting the new file positions, so that later incremental dumps will be correct.

unshare(1M)

NAME	unshare – make local resource unavailable for mounting by remote systems				
SYNOPSIS	unshare [-F <i>FSType</i>] [-o <i>specific_options</i>] [<i>pathname</i> <i>resourcename</i>]				
DESCRIPTION	The unshare command makes a shared local resource unavailable as file system type <i>FSType</i> . If the option -F <i>FSType</i> is omitted, then the first file system type listed in file <i>/etc/dfs/fstypes</i> will be used as the default. <i>Specific_options</i> , as well as the semantics of <i>resourcename</i> , are specific to particular distributed file systems.				
OPTIONS	-F <i>FSType</i> Specify the file system type. -o <i>specific_options</i> Specify options specific to the file system provided by the -F option.				
FILES	<i>/etc/dfs/fstypes</i> <i>/etc/dfs/sharetab</i>				
ATTRIBUTES	See <i>attributes(5)</i> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<i>share(1M)</i> , <i>shareall(1M)</i> , <i>attributes(5)</i>				
NOTES	If <i>pathname</i> or <i>resourcename</i> is not found in the shared information, an error message will be sent to standard error. When an unshare command completes successfully, a client mounting a file system specified in that unshare command no longer has access to that file system.				

NAME	unshare_nfs – make local NFS file systems unavailable for mounting by remote systems
SYNOPSIS	unshare [-F nfs] <i>pathname</i>
DESCRIPTION	The unshare command makes local file systems unavailable for mounting by remote systems. The shared file system must correspond to a line with NFS as the <i>FSType</i> in the file /etc/dfs/sharetab.
OPTIONS	The following options are supported: -F This option may be omitted if NFS is the first file system type listed in the file /etc/dfs/fstypes.
FILES	/etc/dfs/fstypes /etc/dfs/sharetab
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnfssu

SEE ALSO share(1M), attributes(5)

NOTES If the file system being unshared is a symbolic link to a valid pathname, the canonical path (the path which the symbolic link follows) will be unshared.

For example, if /export/foo is a symbolic link to /export/bar (/export/foo -> /export/bar), the following unshare command will result in /export/bar as the unshared pathname (and not /export/foo):

```
example# unshare -F nfs /export/foo
```

update_drv(1M)

NAME	update_drv – modify device driver attributes				
SYNOPSIS	update_drv [-f] <i>device_driver</i>				
DESCRIPTION	The <code>update_drv</code> command is used to inform the system about attribute changes to an installed device driver. By default, the system rereads the <code>driver.conf(4)</code> file and reloads the driver binary module.				
OPTIONS	The following option is supported: -f Force the system to reread the <code>driver.conf</code> file even if the driver module cannot be unloaded.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWcsu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>add_drv(1M)</code> , <code>modunload(1M)</code> , <code>driver.conf(4)</code> , <code>attributes(5)</code>				
NOTES	A forced update of the <code>driver.conf</code> file reloads the <code>driver.conf</code> file without reloading the driver binary module. In this case, devices which can not be detached reference driver global properties from the old <code>driver.conf</code> file, while the remaining driver instances reference global properties in the new <code>driver.conf</code> file.				

NAME	useradd – administer a new user login on the system						
SYNOPSIS	<pre> useradd [-c <i>comment</i>] [-d <i>dir</i>] [-e <i>expire</i>] [-f <i>inactive</i>] [-g <i>group</i>] [-G <i>group</i> [, <i>group</i>...]] [-m [-k <i>skel_dir</i>]] [-u <i>uid</i> [-o]] [-s <i>shell</i>] [-A <i>authorization</i> [, <i>authorization</i>...]] [-P <i>profile</i> [, <i>profile</i>...]] [-R <i>role</i> [, <i>role</i>...]] [-p <i>projname</i>] <i>login</i> useradd -D [-b <i>base_dir</i>] [-e <i>expire</i>] [-f <i>inactive</i>] [-g <i>group</i>] [-p <i>projname</i>] </pre>						
DESCRIPTION	useradd adds a new user to the <code>/etc/passwd</code> and <code>/etc/shadow</code> and <code>/etc/user_attr</code> files. The <code>-A</code> and <code>-P</code> options respectively assign authorizations and profiles to the user. The <code>-R</code> option assigns roles to a user. The <code>-p</code> option associates a project with a user. useradd also creates supplementary group memberships for the user (<code>-G</code> option) and creates the home directory (<code>-m</code> option) for the user if requested. The new login remains locked until the <code>passwd(1)</code> command is executed. Specifying useradd <code>-D</code> with the <code>-g</code>, <code>-b</code>, <code>-f</code>, <code>-e</code>, <code>-A</code>, <code>-P</code>, <code>-p</code>, or <code>-R</code> option (or any combination of these options) sets the default values for the respective fields. See the <code>-D</code> option, below. Subsequent useradd commands without the <code>-D</code> option use these arguments. The system file entries created with this command have a limit of 512 characters per line. Specifying long arguments to several options can exceed this limit. The login (<code>login</code>) and role (<code>role</code>) fields accept a string of no more than eight bytes consisting of characters from the set of alphabetic characters, numeric characters, period (<code>.</code>), underscore (<code>_</code>), and hyphen (<code>-</code>). The first character should be alphabetic and the field should contain at least one lower case alphabetic character. A warning message will be written if these restrictions are not met. A future Solaris release may refuse to accept login and role fields that do not meet these requirements. The login and role fields must contain at least one character and must not contain a colon (<code>:</code>) or a newline (<code>\n</code>).						
OPTIONS	The following options are supported: <table> <tr> <td><code>-A <i>authorization</i></code></td><td>One or more comma separated authorizations defined in <code>auth_attr(4)</code>. Only a user or role who has grant rights to the authorization can assign it to an account.</td></tr> <tr> <td><code>-b <i>base_dir</i></code></td><td>The default base directory for the system if <code>-d <i>dir</i></code> is not specified. <i>base_dir</i> is concatenated with the account name to define the home directory. If the <code>-m</code> option is not used, <i>base_dir</i> must exist.</td></tr> <tr> <td><code>-c <i>comment</i></code></td><td>Any text string. It is generally a short description of the login, and is currently used as the field for the user's full name. This information is stored in the user's <code>/etc/passwd</code> entry.</td></tr> </table>	<code>-A <i>authorization</i></code>	One or more comma separated authorizations defined in <code>auth_attr(4)</code> . Only a user or role who has grant rights to the authorization can assign it to an account.	<code>-b <i>base_dir</i></code>	The default base directory for the system if <code>-d <i>dir</i></code> is not specified. <i>base_dir</i> is concatenated with the account name to define the home directory. If the <code>-m</code> option is not used, <i>base_dir</i> must exist.	<code>-c <i>comment</i></code>	Any text string. It is generally a short description of the login, and is currently used as the field for the user's full name. This information is stored in the user's <code>/etc/passwd</code> entry.
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<code>-c <i>comment</i></code>	Any text string. It is generally a short description of the login, and is currently used as the field for the user's full name. This information is stored in the user's <code>/etc/passwd</code> entry.						

useradd(1M)

<code>-d <i>dir</i></code>	The home directory of the new user. It defaults to <i>base_dir/account_name</i> , where <i>base_dir</i> is the base directory for new login home directories and <i>account_name</i> is the new login name.																						
<code>-D</code>	Display the default values for <code>group</code>, <code>base_dir</code>, <code>skel_dir</code>, <code>shell</code>, <code>inactive</code>, <code>expire</code>, <code>proj</code> and <code>projname</code>. When used with the <code>-g</code>, <code>-b</code>, <code>-f</code>, <code>-e</code>, <code>-A</code>, <code>-P</code>, <code>-p</code>, or <code>-R</code> options, the <code>-D</code> option sets the default values for the specified fields. The default values are: <table> <tr> <td><code>group</code></td><td><code>other</code> (GID of 1)</td></tr> <tr> <td><code>base_dir</code></td><td><code>/home</code></td></tr> <tr> <td><code>skel_dir</code></td><td><code>/etc/skel</code></td></tr> <tr> <td><code>shell</code></td><td><code>/bin/sh</code></td></tr> <tr> <td><code>inactive</code></td><td><code>0</code></td></tr> <tr> <td><code>expire</code></td><td><code>null</code></td></tr> <tr> <td><code>auths</code></td><td><code>null</code></td></tr> <tr> <td><code>profiles</code></td><td><code>null</code></td></tr> <tr> <td><code>proj</code></td><td><code>3</code></td></tr> <tr> <td><code>projname</code></td><td><code>default</code></td></tr> <tr> <td><code>roles</code></td><td><code>null</code></td></tr> </table>	<code>group</code>	<code>other</code> (GID of 1)	<code>base_dir</code>	<code>/home</code>	<code>skel_dir</code>	<code>/etc/skel</code>	<code>shell</code>	<code>/bin/sh</code>	<code>inactive</code>	<code>0</code>	<code>expire</code>	<code>null</code>	<code>auths</code>	<code>null</code>	<code>profiles</code>	<code>null</code>	<code>proj</code>	<code>3</code>	<code>projname</code>	<code>default</code>	<code>roles</code>	<code>null</code>
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<code>projname</code>	<code>default</code>																						
<code>roles</code>	<code>null</code>																						
<code>-e <i>expire</i></code>	Specify the expiration date for a login. After this date, no user will be able to access this login. The expire option argument is a date entered using one of the date formats included in the template file <code>/etc/datemsk</code>. See <code>getdate(3C)</code>. If the date format that you choose includes spaces, it must be quoted. For example, you can enter <code>10/6/90</code> or <code>"October 6, 1990"</code>. A null value (<code>" "</code>) defeats the status of the expired date. This option is useful for creating temporary logins.																						
<code>-f <i>inactive</i></code>	The maximum number of days allowed between uses of a login ID before that ID is declared invalid. Normal values are positive integers. A value of 0 defeats the status.																						
<code>-g <i>group</i></code>	An existing group's integer ID or character-string name. Without the <code>-D</code> option, it defines the new user's																						

	primary group membership and defaults to the default group. You can reset this default value by invoking <code>useradd -D -g group</code> .
<code>-G group</code>	An existing group's integer ID or character-string name. It defines the new user's supplementary group membership. Duplicates between <i>group</i> with the <code>-g</code> and <code>-G</code> options are ignored. No more than <code>NGROUPS_MAX</code> groups can be specified.
<code>-k skel_dir</code>	A directory that contains skeleton information (such as <code>.profile</code>) that can be copied into a new user's home directory. This directory must already exist. The system provides the <code>/etc/skel</code> directory that can be used for this purpose.
<code>-m</code>	Create the new user's home directory if it does not already exist. If the directory already exists, it must have read, write, and execute permissions by <i>group</i> , where <i>group</i> is the user's primary group.
<code>-o</code>	This option allows a UID to be duplicated (non-unique).
<code>-P profile</code>	One or more comma-separated execution profiles defined in <code>prof_attr(4)</code> .
<code>-p projname</code>	Name of the project with which the added user is associated. See the <i>projname</i> field as defined in <code>project(4)</code> .
<code>-R role</code>	One or more comma-separated execution profiles defined in <code>user_attr(4)</code> . Roles cannot be assigned to other roles.
<code>-s shell</code>	Full pathname of the program used as the user's shell on login. It defaults to an empty field causing the system to use <code>/bin/sh</code> as the default. The value of <i>shell</i> must be a valid executable file.
<code>-u uid</code>	The UID of the new user. This UID must be a non-negative decimal integer below <code>MAXUID</code> as defined in <code><sys/param.h></code> . The UID defaults to the next available (unique) number above the highest number currently assigned. For example, if UIDs 100, 105, and 200 are assigned, the next default UID number will be 201. (UIDs from 0-99 are reserved for possible use in future applications.)
FILES	/etc/datemsk /etc/passwd

useradd(1M)

/etc/shadow
/etc/group
/etc/skel
/usr/include/limits.h
/etc/user_attr

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO passwd(1), profiles(1), roles(1), users(1B), groupadd(1M), groupdel(1M), groupmod(1M), grpck(1M), logins(1M), pwck(1M), userdel(1M), usermod(1M), getdate(3C), auth_attr(4), passwd(4), prof_attr(4), project(4), user_attr(4), attributes(5)

DIAGNOSTICS In case of an error, useradd prints an error message and exits with a non-zero status.

The following indicates that login specified is already in use:

UX: useradd: ERROR: login is already in use. Choose another.

The following indicates that the *uid* specified with the -u option is not unique:

UX: useradd: ERROR: uid *uid* is already in use. Choose another.

The following indicates that the *group* specified with the -g option is already in use:

UX: useradd: ERROR: group *group* does not exist. Choose another.

The following indicates that the *uid* specified with the -u option is in the range of reserved UIDs (from 0-99):

UX: useradd: WARNING: uid *uid* is reserved.

The following indicates that the *uid* specified with the -u option exceeds MAXUID as defined in <sys/param.h>:

UX: useradd: ERROR: uid *uid* is too big. Choose another.

The following indicates that the /etc/passwd or /etc/shadow files do not exist:

UX: useradd: ERROR: Cannot update system files - login cannot be created.

NOTES The useradd utility adds definitions to only the local /etc/group, etc/passwd, /etc/passwd, /etc/shadow, /etc/project, and /etc/user_attr files. If a network name service such as NIS or NIS+ is being used to supplement the local

/etc/passwd file with additional entries, useradd cannot change information supplied by the network name service. However useradd will verify the uniqueness of the user name (or role) and user id and the existence of any group names specified against the external name service.

userdel(1M)

NAME	userdel – delete a user’s login from the system				
SYNOPSIS	userdel [-r] <i>login</i>				
DESCRIPTION	The userdel utility deletes a user account from the system and makes the appropriate account-related changes to the system file and file system.				
OPTIONS	The following options are supported: -r Remove the user’s home directory from the system. This directory must exist. The files and directories under the home directory will no longer be accessible following successful execution of the command.				
OPERANDS	The following operands are supported: <i>login</i> An existing login name to be deleted.				
EXIT STATUS	The following exit values are returned: 0 Successful completion. 2 Invalid command syntax. A usage message for the userdel command is displayed. 6 The account to be removed does not exist. 8 The account to be removed is in use. 10 Cannot update the <i>/etc/group</i> or <i>/etc/user_attr</i> file but the login is removed from the <i>/etc/passwd</i> file. 12 Cannot remove or otherwise modify the home directory.				
FILES	<i>/etc/passwd</i> system password file <i>/etc/shadow</i> system file contain users’ encrypted passwords and related information <i>/etc/group</i> system file containing group definitions <i>/etc/user_attr</i> system file containing additional user attributes				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	auths(1), passwd(1), profiles(1), roles(1), users(1B), groupadd(1M), groupdel(1M), groupmod(1M), logins(1M), roleadd(1M), rolemod(1M), useradd(1M), userdel(1M), usermod(1M), passwd(4), prof_attr(4), user_attr(4), attributes(5)				

NOTES | The `userdel` utility only deletes an account definition that is in the local `/etc/group`, `/etc/passwd`, `/etc/shadow`, and `/etc/user_attr` file. If a network name service such as NIS or NIS+ is being used to supplement the local `/etc/passwd` file with additional entries, `userdel` cannot change information supplied by the network name service.

usermod(1M)

NAME	usermod – modify a user’s login information on the system												
SYNOPSIS	usermod [-u <i>uid</i> [-o]] [-g <i>group</i>] [-G <i>group</i> [, <i>group</i> ...]] [-d <i>dir</i> [-m]] [-s <i>shell</i>] [-c <i>comment</i>] [-l <i>new_name</i>] [-f <i>inactive</i>] [-e <i>expire</i>] [-A <i>authorization</i> [, <i>authorization</i>]] [-P <i>profile</i> [, <i>profile</i>]] [-R <i>role</i> [, <i>role</i>]] <i>login</i>												
DESCRIPTION	The usermod utility modifies a user’s login definition on the system. It changes the definition of the specified login and makes the appropriate login-related system file and file system changes. The system file entries created with this command have a limit of 512 characters per line. Specifying long arguments to several options may exceed this limit.												
OPTIONS	The following options are supported: <table> <tr> <td>-A <i>authorization</i></td><td>One or more comma separated authorizations as defined in <code>auth_attr(4)</code>. Only a user or role who has grant rights to the <i>authorization</i> can assign it to an account. This replaces any existing authorization setting.</td></tr> <tr> <td>-c <i>comment</i></td><td>Specify a comment string. <i>comment</i> can be any text string. It is generally a short description of the login, and is currently used as the field for the user’s full name. This information is stored in the user’s <code>/etc/passwd</code> entry.</td></tr> <tr> <td>-d <i>dir</i></td><td>Specify the new home directory of the user. It defaults to <code>base_dir/login</code>, where <i>base_dir</i> is the base directory for new login home directories, and <i>login</i> is the new login.</td></tr> <tr> <td>-e <i>expire</i></td><td>Specify the expiration date for a login. After this date, no user will be able to access this login. The expire option argument is a date entered using one of the date formats included in the template file <code>/etc/datemsk</code>. See <code>getdate(3C)</code>.</td></tr> <tr> <td>-f <i>inactive</i></td><td>Specify the maximum number of days allowed between uses of a login ID before that login ID is declared invalid. Normal values are positive integers. A value of 0 defeats the status.</td></tr> <tr> <td>-g <i>group</i></td><td>Specify an existing group’s integer ID or character-string name. It redefines the user’s primary group membership.</td></tr> </table>	-A <i>authorization</i>	One or more comma separated authorizations as defined in <code>auth_attr(4)</code> . Only a user or role who has grant rights to the <i>authorization</i> can assign it to an account. This replaces any existing authorization setting.	-c <i>comment</i>	Specify a comment string. <i>comment</i> can be any text string. It is generally a short description of the login, and is currently used as the field for the user’s full name. This information is stored in the user’s <code>/etc/passwd</code> entry.	-d <i>dir</i>	Specify the new home directory of the user. It defaults to <code>base_dir/login</code> , where <i>base_dir</i> is the base directory for new login home directories, and <i>login</i> is the new login.	-e <i>expire</i>	Specify the expiration date for a login. After this date, no user will be able to access this login. The expire option argument is a date entered using one of the date formats included in the template file <code>/etc/datemsk</code> . See <code>getdate(3C)</code> .	-f <i>inactive</i>	Specify the maximum number of days allowed between uses of a login ID before that login ID is declared invalid. Normal values are positive integers. A value of 0 defeats the status.	-g <i>group</i>	Specify an existing group’s integer ID or character-string name. It redefines the user’s primary group membership.
-A <i>authorization</i>	One or more comma separated authorizations as defined in <code>auth_attr(4)</code> . Only a user or role who has grant rights to the <i>authorization</i> can assign it to an account. This replaces any existing authorization setting.												
-c <i>comment</i>	Specify a comment string. <i>comment</i> can be any text string. It is generally a short description of the login, and is currently used as the field for the user’s full name. This information is stored in the user’s <code>/etc/passwd</code> entry.												
-d <i>dir</i>	Specify the new home directory of the user. It defaults to <code>base_dir/login</code> , where <i>base_dir</i> is the base directory for new login home directories, and <i>login</i> is the new login.												
-e <i>expire</i>	Specify the expiration date for a login. After this date, no user will be able to access this login. The expire option argument is a date entered using one of the date formats included in the template file <code>/etc/datemsk</code> . See <code>getdate(3C)</code> .												
-f <i>inactive</i>	Specify the maximum number of days allowed between uses of a login ID before that login ID is declared invalid. Normal values are positive integers. A value of 0 defeats the status.												
-g <i>group</i>	Specify an existing group’s integer ID or character-string name. It redefines the user’s primary group membership.												

<code>-G group</code>	Specify an existing group's integer "ID" "," or character string name. It redefines the user's supplementary group membership. Duplicates between <i>group</i> with the <code>-g</code> and <code>-G</code> options are ignored. No more than NGROUPS_UMAX groups may be specified as defined in <param.h>.
<code>-l new_logname</code>	Specify the new login name for the user. The <i>new_logname</i> argument is a string no more than eight bytes consisting of characters from the set of alphabetic characters, numeric characters, period (.), underline (_), and hyphen (-). The first character should be alphabetic and the field should contain at least one lower case alphabetic character. A warning message will be written if these restrictions are not met. A future Solaris release may refuse to accept login fields that do not meet these requirements. The <i>new_logname</i> argument must contain at least one character and must not contain a colon (:) or NEWLINE (\n).
<code>-m</code>	Move the user's home directory to the new directory specified with the <code>-d</code> option. If the directory already exists, it must have permissions read/write/execute by <i>group</i> , where <i>group</i> is the user's primary group.
<code>-o</code>	This option allows the specified UID to be duplicated (non-unique).
<code>-P profile</code>	One or more comma-separated execution profiles defined in <code>prof_attr(4)</code> . This replaces any existing profile setting.
<code>-R role</code>	One or more comma-separated execution profiles defined in <code>auth_attr(4)</code> . This replaces any existing role setting.
<code>-s shell</code>	Specify the full pathname of the program that is used as the user's shell on login. The value of <i>shell</i> must be a valid executable file.
<code>-u uid</code>	Specify a new UID for the user. It must be a non-negative decimal integer less than MAXUID as defined in <param.h>. The UID associated with the user's home directory is not modified with this option; a user will not have access to their home directory until the UID is manually reassigned using <code>chown(1M)</code> .

OPERANDS

The following operands are supported:

`login` An existing login name to be modified.

usermod(1M)

EXIT STATUS

In case of an error, `usermod` prints an error message and exits with one of the following values:

2	The command syntax was invalid. A usage message for the <code>usermod</code> command is displayed.
3	An invalid argument was provided to an option.
4	The <i>uid</i> given with the <code>-u</code> option is already in use.
5	The password files contain an error. <code>pwconv(1M)</code> can be used to correct possible errors. See <code>passwd(4)</code> .
6	The login to be modified does not exist, the <i>group</i> does not exist, or the login shell does not exist.
8	The login to be modified is in use.
9	The <i>new_logname</i> is already in use.
10	Cannot update the <code>/etc/group</code> or <code>/etc/user_attr</code> file. Other update requests will be implemented.
11	Insufficient space to move the home directory (<code>-m</code> option). Other update requests will be implemented.
12	Unable to complete the move of the home directory to the new home directory.

FILES

<code>/etc/group</code>	system file containing group definitions
<code>/etc/datemsk</code>	system file of date formats
<code>/etc/passwd</code>	system password file
<code>/etc/shadow</code>	system file containing users' encrypted passwords and related information
<code>/etc/usr_attr</code>	system file containing additional user and role attributes

ATTRIBUTES

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

`passwd(1)`, `users(1B)`, `chown(1M)`, `groupadd(1M)`, `groupdel(1M)`, `groupmod(1M)`, `logins(1M)`, `pwconv(1M)`, `roleadd(1M)`, `roledel(1M)`, `rolemod(1M)`, `useradd(1M)`, `userdel(1M)`, `getdate(3C)`, `auth_attr(4)`, `passwd(4)`, `attributes(5)`

NOTES | The usermod utility modifies passwd definitions only in the local `/etc/passwd` and `/etc/shadow` files. If a network nameservice such as NIS or NIS+ is being used to supplement the local files with additional entries, usermod cannot change information supplied by the network nameservice. However usermod will verify the uniqueness of user name and user ID against the external nameservice.

The usermod utility uses the `/etc/datemsk` file, available with SUNWaccr, for date formatting.

utmpd(1M)

NAME	utmpd – utmpx monitoring daemon						
SYNOPSIS	utmpd [-debug]						
DESCRIPTION	The utmpd daemon monitors the /var/adm/utmpx file. See utmpx(4) (and utmp(4) for historical information). utmpd receives requests from pututxline(3C) by way of a named pipe. It maintains a table of processes and uses poll(2) on /proc files to detect process termination. When utmpd detects that a process has terminated, it checks that the process has removed its utmpx entry from /var/adm/utmpx. If the process’ utmpx entry has not been removed, utmpd removes the entry. By periodically scanning the /var/adm/utmpx file, utmpd also monitors processes that are not in its table.						
OPTIONS	-debug Run in debug mode, leaving the process connected to the controlling terminal. Write debugging information to standard output.						
EXIT STATUS	The following exit values are returned: 0 Successful completion. >0 An error occurred.						
FILES	/etc/default/utmpd	You can set default values for the flags listed below. For example: SCAN_PERIOD=600					
	SCAN_PERIOD	The number of seconds that utmpd sleeps between checks of /proc to see if monitored processes are still alive. The default is 300.					
	MAX_FDS	The maximum number of processes that utmpd attempts to monitor. The default value is 4096.					
	/var/adm/utmpx	File containing user and accounting information for commands such as who(1), write(1), and login(1).					
	/proc	Directory containing files for processes whose utmpx entries are being monitored.					
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:						
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>			ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWcsu						
SEE ALSO	poll(2), pututxline(3C), proc(4), utmp(4), utmpx(4), attributes(5)						

NAME	uucheck – check the uucp directories and permissions file				
SYNOPSIS	/usr/lib/uucp/uucheck [-v] [-x <i>debug-level</i>]				
DESCRIPTION	uucheck checks for the presence of the uucp system required files and directories. uucheck also does error checking of the Permissions file (/etc/uucp/Permissions). uucheck is executed during package installation. uucheck can only be used by the super-user or uucp.				
OPTIONS	The following options are supported: -v Give a detailed (verbose) explanation of how the uucp programs will interpret the Permissions file. -x <i>debug-level</i> Produce debugging output on the standard output. <i>debug-level</i> is a number from 0 to 9. Higher numbers give more detailed debugging information.				
FILES	/etc/uucp/Devices /etc/uucp/Limits /etc/uucp/Permissions /etc/uucp/Systems /var/spool/locks/* /var/spool/uucp/* /var/spool/uucppublic/*				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWbnuu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWbnuu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWbnuu				
SEE ALSO	uucp(1C), uustat(1C), uux(1C), uucico(1M), uusched(1M), attributes (5)				
BUGS	The program does not check file/directory modes or some errors in the Permissions file such as duplicate login or machine name.				

uucico(1M)

NAME	uucico – file transport program for the uucp system														
SYNOPSIS	/usr/lib/uucp/uucico [-f] [-c <i>type</i>] [-d <i>spool-directory</i>] [-i <i>interface</i>] [-r <i>role-number</i>] [-s <i>system-name</i>] [-x <i>debug-level</i>]														
DESCRIPTION	uucico is the file transport program for uucp work file transfers.														
OPTIONS	The following options are supported: <table><tr><td>-f</td><td>This option is used to "force execution" of uucico by ignoring the limit on the maximum number of uucicos defined in the <code>/etc/uucp/Limits</code> file.</td></tr><tr><td>-c <i>type</i></td><td>The first field in the <code>Devices</code> file is the "Type" field. The -c option forces uucico to only use entries in the "Type" field that match the user specified type. The specified type is usually the name of a local area network.</td></tr><tr><td>-d <i>spool-directory</i></td><td>This option specifies the directory <i>spool-directory</i> that contains the uucp work files to be transferred. The default spool directory is <code>/var/spool/uucp</code>.</td></tr><tr><td>-i <i>interface</i></td><td>This option defines the <i>interface</i> used with uucico. The interface only affects slave mode. Known interfaces are UNIX (default), TLI (basic Transport Layer Interface), and TLIS (Transport Layer Interface with Streams modules, read/write).</td></tr><tr><td>-r <i>role-number</i></td><td>The <i>role-number</i> 1 is used for master mode. <i>role-number</i> 0 is used for slave mode (default). When uucico is started by a program or cron, <i>role-number</i> 1 should be used for master mode.</td></tr><tr><td>-s <i>system-name</i></td><td>The -s option defines the remote system (<i>system-name</i>) that uucico will try to contact. It is required when the role is master; <i>system-name</i> must be defined in the <code>Systems</code> file.</td></tr><tr><td>-x <i>debug-level</i></td><td>Both uux and uucp queue jobs that will be transferred by uucico. These jobs are normally started by the uuxd scheduler, for debugging purposes, and can be started manually. For example, the shell <code>Uutry</code> starts uucico with debugging turned on. The <i>debug-level</i> is a number between 0 and 9. Higher numbers give more detailed debugging information.</td></tr></table>	-f	This option is used to "force execution" of uucico by ignoring the limit on the maximum number of uucicos defined in the <code>/etc/uucp/Limits</code> file.	-c <i>type</i>	The first field in the <code>Devices</code> file is the "Type" field. The -c option forces uucico to only use entries in the "Type" field that match the user specified type. The specified type is usually the name of a local area network.	-d <i>spool-directory</i>	This option specifies the directory <i>spool-directory</i> that contains the uucp work files to be transferred. The default spool directory is <code>/var/spool/uucp</code> .	-i <i>interface</i>	This option defines the <i>interface</i> used with uucico. The interface only affects slave mode. Known interfaces are UNIX (default), TLI (basic Transport Layer Interface), and TLIS (Transport Layer Interface with Streams modules, read/write).	-r <i>role-number</i>	The <i>role-number</i> 1 is used for master mode. <i>role-number</i> 0 is used for slave mode (default). When uucico is started by a program or cron, <i>role-number</i> 1 should be used for master mode.	-s <i>system-name</i>	The -s option defines the remote system (<i>system-name</i>) that uucico will try to contact. It is required when the role is master; <i>system-name</i> must be defined in the <code>Systems</code> file.	-x <i>debug-level</i>	Both uux and uucp queue jobs that will be transferred by uucico. These jobs are normally started by the uuxd scheduler, for debugging purposes, and can be started manually. For example, the shell <code>Uutry</code> starts uucico with debugging turned on. The <i>debug-level</i> is a number between 0 and 9. Higher numbers give more detailed debugging information.
-f	This option is used to "force execution" of uucico by ignoring the limit on the maximum number of uucicos defined in the <code>/etc/uucp/Limits</code> file.														
-c <i>type</i>	The first field in the <code>Devices</code> file is the "Type" field. The -c option forces uucico to only use entries in the "Type" field that match the user specified type. The specified type is usually the name of a local area network.														
-d <i>spool-directory</i>	This option specifies the directory <i>spool-directory</i> that contains the uucp work files to be transferred. The default spool directory is <code>/var/spool/uucp</code> .														
-i <i>interface</i>	This option defines the <i>interface</i> used with uucico. The interface only affects slave mode. Known interfaces are UNIX (default), TLI (basic Transport Layer Interface), and TLIS (Transport Layer Interface with Streams modules, read/write).														
-r <i>role-number</i>	The <i>role-number</i> 1 is used for master mode. <i>role-number</i> 0 is used for slave mode (default). When uucico is started by a program or cron, <i>role-number</i> 1 should be used for master mode.														
-s <i>system-name</i>	The -s option defines the remote system (<i>system-name</i>) that uucico will try to contact. It is required when the role is master; <i>system-name</i> must be defined in the <code>Systems</code> file.														
-x <i>debug-level</i>	Both uux and uucp queue jobs that will be transferred by uucico. These jobs are normally started by the uuxd scheduler, for debugging purposes, and can be started manually. For example, the shell <code>Uutry</code> starts uucico with debugging turned on. The <i>debug-level</i> is a number between 0 and 9. Higher numbers give more detailed debugging information.														

FILES /etc/uucp/Devconfig
/etc/uucp/Devices
/etc/uucp/Limits
/etc/uucp/Permissions
/etc/uucp/Sysfiles
/etc/uucp/Systems
/var/spool/locks/*
/var/spool/uucp/*
/var/spool/uucppublic/*

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWbnuu

SEE ALSO uucp(1C), uustat(1C), uux(1C), Uutry(1M), cron(1M), uusched(1M), attributes(5)

uucleanup(1M)

NAME	uucleanup – uucp spool directory clean-up
SYNOPSIS	<code>/usr/lib/uucp/uucleanup</code> [-C <i>time</i>] [-D <i>time</i>] [-m <i>string</i>] [-o <i>time</i>] [-s <i>system</i>] [-W <i>time</i>] [-x <i>debug-level</i>] [-X <i>time</i>]
DESCRIPTION	uucleanup will scan the spool directories for old files and take appropriate action to remove them in a useful way: ■ Inform the requester of send/receive requests for systems that can not be reached. ■ Return undeliverable mail to the sender. ■ Deliver rnews files addressed to the local system. ■ Remove all other files. In addition, there is a provision to warn users of requests that have been waiting for a given number of days (default 1 day). Note: uucleanup will process as if all option times were specified to the default values unless time is specifically set. This program is typically started by the shell uudemon.cleanup, which should be started by cron(1M).
OPTIONS	-C<i>time</i> Remove any C. files greater or equal to <i>time</i> days old and send appropriate information to the requester (default 7 days). -D<i>time</i> Remove any D. files greater or equal to <i>time</i> days old, make an attempt to deliver mail messages, and execute rnews when appropriate (default 7 days). -m<i>string</i> Include <i>string</i> in the warning message generated by the -W option. The default line is "See your local administrator to locate the problem". -o<i>time</i> Delete other files whose age is more than <i>time</i> days (default 2 days). -s<i>system</i> Execute for <i>system</i> spool directory only. -W<i>time</i> Any C. files equal to <i>time</i> days old will cause a mail message to be sent to the requester warning about the delay in contacting the remote. The message includes the <i>JOBID</i>, and in the case of mail, the mail message. The administrator may include a message line telling whom to call to check the problem (-m option) (default 1 day). -x<i>debug-level</i> Produce debugging output on standard output. <i>debug-level</i> is a single digit between 0 and 9; higher numbers give more detailed debugging information. (This option may not be available on all systems.) -X<i>time</i> Any X. files greater or equal to <i>time</i> days old will be removed. The D. files are probably not present (if they were, the X. could get executed). But if there are D. files, they will be taken care of by D. processing (default 2 days).

uucleanup(1M)

FILES	/usr/lib/uucp	directory with commands used by uucleanup internally
	/var/spool/uucp	spool directory

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWbnuu

SEE ALSO	uucp(1C), uux(1C), cron(1M), attributes(5)

uusched(1M)

NAME	uusched – uucp file transport program scheduler				
SYNOPSIS	/usr/lib/uucp/uusched [-u <i>debug-level</i>] [-x <i>debug-level</i>]				
DESCRIPTION	uusched is the uucp(1C) file transport scheduler. It is usually started by the daemon <i>uudemon.hour</i> that is started by <i>cron(1M)</i> from an entry in user uucp's crontab file: <pre>11,41 * * * * /etc/uucp/uucp/uudemon.hour</pre>				
OPTIONS	The options are for debugging purposes only. <i>debug-level</i> is a number between 0 and 9. Higher numbers give more detailed debugging information: The following options are supported: -u <i>debug-level</i> Passes the -u <i>debug-level</i> option <i>uucico(1M)</i> as -x <i>debug-level</i>. -x <i>debug-level</i> Outputs debugging messages from uusched.				
FILES	/etc/uucp/Devices /etc/uucp/Permissions /etc/uucp/Systems /var/spool/locks/* /var/spool/uucp/* /var/spool/uucppublic/*				
ATTRIBUTES	See <i>attributes(5)</i> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWbnuu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWbnuu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWbnuu				
SEE ALSO	<i>uucp(1C)</i> , <i>uustat(1C)</i> , <i>uux(1C)</i> , <i>cron(1M)</i> , <i>uucico(1M)</i> , <i>attributes(5)</i>				

NAME	Uutry, uutry – attempt to contact remote system with debugging on				
SYNOPSIS	/usr/lib/uucp/Uutry [-r] [-c <i>type</i>] [-x <i>debug-level</i>] <i>system-name</i>				
DESCRIPTION	Uutry is a shell script that is used to invoke uucico(1M) to call a remote site. Debugging is initially turned on and is set to the default value of 5. The debugging output is put in file <i>/tmp/system-name</i> .				
OPTIONS	The following options are supported: -r This option overrides the retry time that is set in file <i>/var/uucp/.Status/system-name</i>. -c <i>type</i> The first field in the Devices file is the "Type" field. The -c option forces uucico to use only entries in the "Type" field that match the user-specified type. The specified type is usually the name of a local area network. -x <i>debug-level</i> <i>debug-level</i> is a number from 0 to 9. Higher numbers give more detailed debugging information.				
FILES	<i>/etc/uucp/Devices</i> <i>/etc/uucp/Limits</i> <i>/etc/uucp/Permissions</i> <i>/etc/uucp/Systems</i> <i>/tmp/system-name</i> <i>/var/spool/locks/*</i> <i>/var/spool/uucp/*</i> <i>/var/spool/uucppublic/*</i>				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWbnuu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWbnuu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWbnuu				
SEE ALSO	uucp(1C), uux(1C), uucico(1M), attributes(5)				

uuxqt(1M)

NAME	uuxqt – execute remote command requests				
SYNOPSIS	/usr/lib/uucp/uuxqt [-s <i>system</i>] [-x <i>debug-level</i>]				
DESCRIPTION	uuxqt is the program that executes remote job requests from remote systems generated by the use of the uux command. (mail uses uux for remote mail requests). uuxqt searches the spool directories looking for execution requests. For each request, uuxqt checks to see if all the required data files are available, accessible, and the requested commands are permitted for the requesting system. The Permissions file is used to validate file accessibility and command execution permission. There are two environment variables that are set before the uuxqt command is executed: ■ UU_MACHINE is the machine that sent the job (the previous one). ■ UU_USER is the user that sent the job. These can be used in writing commands that remote systems can execute to provide information, auditing, or restrictions.				
OPTIONS	The following options are supported: -s <i>system</i> Specifies the remote <i>system</i> name. -x <i>debug-level</i> <i>debug-level</i> is a number from 0 to 9. Higher numbers give more detailed debugging information.				
FILES	/etc/uucp/Limits /etc/uucp/Permissions /var/spool/locks/* /var/spool/uucp/*				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWbnuu</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWbnuu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWbnuu				
SEE ALSO	mail(1), uucp(1C), uustat(1C), uux(1C), uucico(1M), attributes(5)				

NAME	vmstat – report virtual memory statistics
SYNOPSIS	vmstat [-cipsS] [disks] [interval [count]]
DESCRIPTION	vmstat reports virtual memory statistics regarding kernel thread, virtual memory, disk, trap, and CPU activity. On MP (multi-processor) systems, vmstat averages the number of CPUs into the output. For per-processor statistics, see mpstat(1M). vmstat only supports statistics for certain devices. For more general system statistics, use sar(1), iostat(1M), or sar(1M). Without options, vmstat displays a one-line summary of the virtual memory activity since the system was booted. During execution of this kernel status command, the "state" of the kernel can change. An example would be CPUs going online or offline. vmstat will report this as <<State change>>. See <i>System Administration Guide: Advanced Administration</i> for device naming conventions for disks.
OPTIONS	The following options are supported: -c Report cache flushing statistics. By default, report the total number of each kind of cache flushed since boot time. The types are: user, context, region, segment, page, and partial-page. -i Report the number of interrupts per device. <i>count</i> and <i>interval</i> does not apply to the -i option. -p Report paging activity in details. This option will display the following, respectively: - epi Executable page-ins. - epo Executable page-outs. - epf Executable page-frees. - api Anonymous page-ins. - apo Anonymous page-outs. - apf Anonymous page-frees. - fpi File system page-ins. - fpo File system page-outs. - fpf File system page-frees. -s Display the total number of various system events since boot. <i>count</i> and <i>interval</i> does not apply to the -s option.

vmstat(1M)

	-S	Report on swapping rather than paging activity. This option will change two fields in <i>vmstat</i> 's "paging" display: rather than the "re" and "mf" fields, <i>vmstat</i> will report "si" (swap-ins) and "so" (swap-outs).																																																																																																																																																																																																																								
OPERANDS	The following operands are supported:																																																																																																																																																																																																																									
	<i>count</i>	Specifies the number of times that the statistics are repeated. <i>count</i> does not apply to the -i and -s options.																																																																																																																																																																																																																								
	<i>disks</i>	Specifies which disks are to be given priority in the output (only four disks fit on a line). Common disk names are <i>id</i> , <i>sd</i> , <i>xd</i> , or <i>xy</i> , followed by a number (for example, <i>sd2</i> , <i>xd0</i> , and so forth).																																																																																																																																																																																																																								
	<i>interval</i>	Specifies the last number of seconds over which <i>vmstat</i> summarizes activity. This number of seconds repeats forever. <i>interval</i> does not apply to the -i and -s options.																																																																																																																																																																																																																								
EXAMPLES	EXAMPLE 1 Using <i>vmstat</i>																																																																																																																																																																																																																									
	The following command displays a summary of what the system is doing every five seconds.																																																																																																																																																																																																																									
	<pre>example% vmstat 5</pre> <table><thead><tr><th colspan="2">kthr</th><th colspan="2">memory</th><th colspan="4">page</th><th colspan="4">disk</th><th colspan="3">faults</th><th colspan="3">cpu</th></tr><tr><th>r</th><th>b</th><th>w</th><th>swap</th><th>free</th><th>re</th><th>mf</th><th>pi</th><th>p</th><th>fr</th><th>de</th><th>sr</th><th>s0</th><th>s1</th><th>s2</th><th>s3</th><th>in</th><th>sy</th><th>cs</th><th>us</th><th>sy</th><th>id</th></tr></thead><tbody><tr><td>0</td><td>0</td><td>0</td><td>11456</td><td>4120</td><td>1</td><td>41</td><td>19</td><td>1</td><td>3</td><td>0</td><td>2</td><td>0</td><td>4</td><td>0</td><td>0</td><td>48</td><td>112</td><td>130</td><td>4</td><td>14</td><td>82</td></tr><tr><td>0</td><td>0</td><td>1</td><td>10132</td><td>4280</td><td>0</td><td>4</td><td>44</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>23</td><td>0</td><td>0</td><td>211</td><td>230</td><td>144</td><td>3</td><td>35</td><td>62</td></tr><tr><td>0</td><td>0</td><td>1</td><td>10132</td><td>4616</td><td>0</td><td>0</td><td>20</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>19</td><td>0</td><td>0</td><td>150</td><td>172</td><td>146</td><td>3</td><td>33</td><td>64</td></tr><tr><td>0</td><td>0</td><td>1</td><td>10132</td><td>5292</td><td>0</td><td>0</td><td>9</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>21</td><td>0</td><td>0</td><td>165</td><td>105</td><td>130</td><td>1</td><td>21</td><td>78</td></tr><tr><td>1</td><td>1</td><td>1</td><td>10132</td><td>5496</td><td>0</td><td>0</td><td>5</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>23</td><td>0</td><td>0</td><td>183</td><td>92</td><td>134</td><td>1</td><td>20</td><td>79</td></tr><tr><td>1</td><td>0</td><td>1</td><td>10132</td><td>5564</td><td>0</td><td>0</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>18</td><td>0</td><td>0</td><td>131</td><td>231</td><td>116</td><td>4</td><td>34</td><td>62</td></tr><tr><td>1</td><td>0</td><td>1</td><td>10124</td><td>5412</td><td>0</td><td>0</td><td>37</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>22</td><td>0</td><td>0</td><td>166</td><td>179</td><td>118</td><td>1</td><td>33</td><td>67</td></tr><tr><td>1</td><td>0</td><td>1</td><td>10124</td><td>5236</td><td>0</td><td>0</td><td>24</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>14</td><td>0</td><td>0</td><td>109</td><td>243</td><td>113</td><td>4</td><td>56</td><td>39</td></tr></tbody></table> <pre>^Cexample%</pre>		kthr		memory		page				disk				faults			cpu			r	b	w	swap	free	re	mf	pi	p	fr	de	sr	s0	s1	s2	s3	in	sy	cs	us	sy	id	0	0	0	11456	4120	1	41	19	1	3	0	2	0	4	0	0	48	112	130	4	14	82	0	0	1	10132	4280	0	4	44	0	0	0	0	0	23	0	0	211	230	144	3	35	62	0	0	1	10132	4616	0	0	20	0	0	0	0	0	19	0	0	150	172	146	3	33	64	0	0	1	10132	5292	0	0	9	0	0	0	0	0	21	0	0	165	105	130	1	21	78	1	1	1	10132	5496	0	0	5	0	0	0	0	0	23	0	0	183	92	134	1	20	79	1	0	1	10132	5564	0	0	25	0	0	0	0	0	18	0	0	131	231	116	4	34	62	1	0	1	10124	5412	0	0	37	0	0	0	0	0	22	0	0	166	179	118	1	33	67	1	0	1	10124	5236	0	0	24	0	0	0	0	0	14	0	0	109	243	113	4	56	39
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	kthr	Report the number of kernel threads in each of the three following states:																																																																																																																																																																																																																								
	r	in run queue																																																																																																																																																																																																																								
	b	blocked for resources I/O, paging, and so forth																																																																																																																																																																																																																								
	w	swapped																																																																																																																																																																																																																								
	memory	Report on usage of virtual and real memory.																																																																																																																																																																																																																								
	swap	amount of swap space currently available (Kbytes)																																																																																																																																																																																																																								
	free	size of the free list (Kbytes)																																																																																																																																																																																																																								
	page	Report information about page faults and paging activity. The information on each of the following activities is given in units per second.																																																																																																																																																																																																																								

EXAMPLE 1 Using vmstat (Continued)

	re	page reclaims — but see the -S option for how this field is modified.
	mf	minor faults — but see the -S option for how this field is modified.
	pi	kilobytes paged in
	po	kilobytes paged out
	fr	kilobytes freed
	de	anticipated short-term memory shortfall (Kbytes)
	sr	pages scanned by clock algorithm
disk		Report the number of disk operations per second. There are slots for up to four disks, labeled with a single letter and number. The letter indicates the type of disk (s = SCSI, i = IPI, and so forth); the number is the logical unit number.
faults		Report the trap/interrupt rates (per second).
	in	interrupts
	sy	system calls
	cs	CPU context switches
cpu		Give a breakdown of percentage usage of CPU time. On MP systems, this is an average across all processors.
	us	user time
	sy	system time
	id	idle time

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO sar(1), iostat(1M), mpstat(1M), sar(1M), attributes(5)

System Administration Guide: Basic Administration

System Administration Guide: Advanced Administration

vmstat(1M)

NOTES	The sum of CPU utilization might vary slightly from 100 because of rounding errors in the production of a percentage figure.

NAME	volcopy – make an image copy of file system	
SYNOPSIS	volcopy [-F <i>FSType</i>] [-V] [<i>generic_options</i>] [-o <i>FSType-specific_options</i>] <i>operands</i>	
DESCRIPTION	volcopy makes a literal copy of the file system. This command may not be supported for all <i>FSTypes</i> .	
OPTIONS	The following options are supported: -F <i>FSType</i> Specify the <i>FSType</i> on which to operate. The <i>FSType</i> should either be specified here or be determinable from <i>/etc/vfstab</i> by matching the <i>operands</i> with an entry in the table. Otherwise, the default file system type specified in <i>/etc/default/fs</i> will be used. -V Echo the complete command line, but do not execute the command. The command line is generated by using the options and arguments provided by the user and adding to them information derived from <i>/etc/vfstab</i>. This option should be used to verify and validate the command line. <i>generic_options</i> Options that are commonly supported by most <i>FSType</i>-specific command modules. The following options are available: -a Require the operator to respond “yes” or “no” instead of simply waiting ten seconds before the copy is made. -s (Default) Invoke the DEL if wrong verification sequence. -o <i>FSType-specific_options</i> Specify <i>FSType</i>-specific options in a comma separated (without spaces) list of suboptions and keyword-attribute pairs for interpretation by the <i>FSType</i>-specific module of the command.	
OPERANDS	The following operands are supported: <i>operands</i> generally include the device and volume names and are file system specific. A detailed description of the <i>operands</i> can be found on the <i>FSType</i>-specific man pages of volcopy.	
EXIT STATUS	The following exit values are returned:	

volcopy(1M)

0 Successful file system copy

1 An error has occurred.

FILES

/etc/vfstab

list of default parameters for each file system

/etc/default/fs

default local file system type. Default values can be set for the following flags in /etc/default/fs. For example: LOCAL=ufs.

LOCAL: The default partition for a command if no *FSType* is specified.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

labelit(1M), vfstab(4), attributes(5) Manual pages for the *FSType*-specific modules of volcopy.

NAME	volcopy_ufs – make an image copy of a ufs file system				
SYNOPSIS	volcopy [-F ufs] [<i>generic_options</i>] <i>fsname</i> <i>srcdevice</i> <i>volname1</i> <i>destdevice</i> <i>volname2</i>				
DESCRIPTION	volcopy makes a literal copy of the ufs file system using a blocksize matched to the device.				
OPTIONS	The following option is supported: <i>generic_options</i> options supported by the generic volcopy command. See volcopy(1M).				
OPERANDS	The following operands are supported: <i>fsname</i> represents the mount point (for example, root, u1, etc.) of the file system being copied. <i>srcdevice</i> or <i>destdevice</i> the disk partition specified using the raw device (for example, /dev/rdisk/cld0s8, /dev/rdisk/cld1s8, etc.). <i>srcdevice</i> and <i>volname1</i> the device and physical volume from which the copy of the file system is being extracted. <i>destdevice</i> and <i>volname2</i> the target device and physical volume. <i>fsname</i> and <i>volname</i> are limited to six or fewer characters and recorded in the superblock. <i>volname</i> may be '-' to use the existing volume name.				
EXIT STATUS	The following exit values are returned: 0 Successful file system copy. non-zero An error has occurred.				
FILES	/var/adm/filesave.log a record of file systems/volumes copied				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:				
<table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWcsu</td></tr> </tbody> </table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	cpio(1), dd(1M), labelit(1M), volcopy(1M), attributes(5), ufs(7FS)				
NOTES	volcopy does not support copying to tape devices. Use dd(1M) for copying to and from tape devices.				

vold(1M)

NAME	vold – Volume Management daemon to manage CD-ROM and floppy, ZIP/JAZ, and DVD-ROM devices
SYNOPSIS	/usr/sbin/vold [-n] [-t] [-v] [-f <i>config-file</i>] [-l <i>log-file</i>] [-d <i>root-dir</i>] [-L <i>debug-level</i>]
DESCRIPTION	The Volume Management daemon, vold, creates and maintains a file system image rooted at <i>root-dir</i> that contains symbolic names for floppies, CD-ROMs and other removable devices. The default <i>root-dir</i> is set to /vol if no directory is specified by the -d option. vold reads the /etc/vold.conf configuration file upon startup. If the configuration file is modified later, vold must be told to reread the /etc/vold.conf file. Do this by entering <pre>example# kill -HUP vold_pid</pre> To tell vold to clean up and exit, the SIGTERM signal is used: <pre>example# kill -TERM vold_pid</pre> where vold_pid is the process ID of vold.
OPTIONS	The following options are supported: -n Never writeback. Volume Management updates media labels with unique information if labels are not unique. This flag keeps Volume Management from changing your media. The default setting is FALSE. -t Dump NFS trace information to the log file. The default setting is FALSE. -v Provide lots of status information to the log file. The default setting is FALSE (do not provide status info to log file). -d <i>root-dir</i> Specify an alternate root directory. The default location is /vol. Setting this will also cause other Volume Management utilities to use this as the default root directory. -f <i>config-file</i> Specify an alternate configuration file. The default file is /etc/vold.conf. -l <i>log-file</i> Specify an alternate log file. The default log file is /var/adm/vold.log. -L <i>debug-level</i> Change the level (verbosity) of debug messages sent to the log file. The range is 0 to 99 where 0 is nothing and 99 is everything. The default level is 0.
ENVIRONMENT VARIABLES	vold sets the following environment variables to aid programs which are called when events such as insert, notify, and eject occur:

VOLUME_ACTION	Event that caused this program to be executed.
VOLUME_PATH	Pathname of the matched <i>regex</i> from the <i>vold.conf</i> file.
VOLUME_DEVICE	Device (in <i>/vol/dev</i>) that applies to the media.
VOLUME_NAME	Name of the volume in question.
VOLUME_USER	User ID of the user causing the event to occur.
VOLUME_SYMNAME	Symbolic name of a device containing the volume.
VOLUME_MEDIATYPE	Name of the type of media (CD-ROM, floppy or rmdisk)
FILES	
<i>/etc/vold.conf</i>	Volume Management daemon configuration file. Directs the Volume Management daemon to control certain devices, and causes events to occur when specific criteria are met.
<i>/usr/lib/vold/*.so.1</i>	Shared objects called by Volume Management daemon when certain actions occur.
<i>/var/adm/vold.log</i>	the default log file location (see the <i>-l</i> option for a description).
<i>/vol</i>	the default Volume Management root directory.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWvolu

SEE ALSO *volcancel*(1), *volcheck*(1), *volmissing*(1), *rmmount*(1M), *rpc.smsserverd*(1M), *rmmount.conf*(4), *vold.conf*(4), *attributes*(5), *volfs*(7FS)

System Administration Guide: Basic Administration

wall(1M)

NAME	wall – write to all users				
SYNOPSIS	/usr/sbin/wall [-a] [-g <i>grpname</i>] [<i>filename</i>]				
DESCRIPTION	wall reads its standard input until an end-of-file. It then sends this message to all currently logged-in users preceded by: <pre>Broadcast Message from . . .</pre> If <i>filename</i> is given, then the message is read in from that file. Normally, pseudo-terminals that do not correspond to rlogin sessions are ignored. Thus, when using a window system, the message appears only on the console window. However, -a will send the message even to such pseudo-terminals. It is used to warn all users, typically prior to shutting down the system. The sender must be superuser to override any protections the users may have invoked See mesg(1). wall runs <code>setgid()</code> to the group ID <code>tty</code>, in order to have write permissions on other user's terminals. See setuid(2). wall will detect non-printable characters before sending them to the user's terminal. Control characters will appear as a " ^ " followed by the appropriate ASCII character; characters with the high-order bit set will appear in "meta" notation. For example, '\003' is displayed as '^C' and '\372' as 'M-z'.				
OPTIONS	The following options are supported: <table><tr><td>-a</td><td>Broadcast message to the console and pseudo-terminals.</td></tr><tr><td>-g <i>grpname</i></td><td>Broadcast to the users in a specified group only, per the group database (see group(4)).</td></tr></table>	-a	Broadcast message to the console and pseudo-terminals.	-g <i>grpname</i>	Broadcast to the users in a specified group only, per the group database (see group(4)).
-a	Broadcast message to the console and pseudo-terminals.				
-g <i>grpname</i>	Broadcast to the users in a specified group only, per the group database (see group(4)).				
ENVIRONMENT VARIABLES	If the <code>LC_*</code> variables (<code>LC_CTYPE</code>, <code>LC_TIME</code>, <code>LC_COLLATE</code>, <code>LC_NUMERIC</code>, and <code>LC_MONETARY</code>) are not set in the environment, the operational behavior of wall for each corresponding locale category is determined by the value of the <code>LANG</code> environment variable. See environ(5). If <code>LC_ALL</code> is set, its contents are used to override both the <code>LANG</code> and the other <code>LC_*</code> variables. If none of the above variables are set in the environment, the "C" (U.S. style) locale determines how wall behaves.				
FILES	<code>/dev/tty*</code>				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	mesg(1) , write(1) , setuid(2) , attributes(5) , environ(5)				

wall(1M)

NOTES | wall displays “Cannot send to . . .” when the open on a user’s `tty` file fails.

wanboot_keygen(1M)

NAME	wanboot_keygen – create and display client and server keys for WAN booting
SYNOPSIS	<pre> /usr/lib/inet/wanboot/keygen -c -o net=a.b.c.d ,cid=client_ID,type=3des /usr/lib/inet/wanboot/keygen -c -o net=a.b.c.d ,cid=client_ID,type=aes /usr/lib/inet/wanboot/keygen -m /usr/lib/inet/wanboot/keygen -c -o net=a.b.c.d ,cid=client_ID,type=sha1 /usr/lib/inet/wanboot/keygen -d -m /usr/lib/inet/wanboot/keygen -c -o net=a.b.c.d ,cid=client_ID,type=keytype </pre>
DESCRIPTION	The keygen utility has three purposes: ■ Using the <code>-c</code> flag, to generate and store per-client 3DES/AES encryption keys, avoiding any DES weak keys. ■ Using the <code>-m</code> flag, to generate and store a “master” HMAC SHA-1 key for WAN install, and to derive from the master key per-client HMAC SHA-1 hashing keys, in a manner described in RFC 3118, Appendix A. ■ Using the <code>-d</code> flag along with either the <code>-c</code> or <code>-m</code> flag to indicate the key repository, to display a key of type specified by <i>keytype</i>, which must be one of <code>3des</code>, <code>aes</code>, or <code>sha1</code>. The <code>net</code> and <code>cid</code> arguments are used to identify a specific client. Both arguments are optional. If the <code>cid</code> option is not provided, the key being created or displayed will have a per-network scope. If the <code>net</code> option is not provided, then the key will have a global scope. Default <code>net</code> and <code>code</code> values are used to derive an HMAC SHA-1 key if the values are not provided by the user.
OPTIONS	The following options are supported: <code>-c</code> Generate and store per-client 3DES/AES encryption keys, avoiding any DES weak keys. Also generates and stores per-client HMAC SHA-1 keys. Used in conjunction with <code>-o</code>. <code>-d</code> Display a key of type specified by <i>keytype</i>, which must be one of <code>3des</code>, <code>aes</code>, or <code>sha1</code>. Use <code>-d</code> with <code>-m</code> or with <code>-c</code> and <code>-o</code>. <code>-m</code> Generate and store a “master” HMAC SHA-1 key for WAN install. <code>-o</code> Specifies the WANboot client and/or <i>keytype</i>.
EXAMPLES	EXAMPLE 1 Generate a Master HMAC SHA-1 Key <pre># keygen -m</pre>

EXAMPLE 1 Generate a Master HMAC SHA-1 Key *(Continued)*

EXAMPLE 2 Generate and Then Display a Client-Specific Master HMAC SHA-1 Key

```
# keygen -c -o net=129.148.174.0,cid=010003BA0E6A36,type=sha1
# keygen -d -c -o net=129.148.174.0,cid=010003BA0E6A36,type=sha1
```

EXAMPLE 3 Generate and Display a 3DES Key with a Per-Network Scope

```
# keygen -c -o net=129.148.174.0,type=3des
# keygen -d -o net=129.148.174.0,type=3des
```

EXIT STATUS 0
 Successful operation.

 >0
 An error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwbsup
Interface Stability	Obsolete

SEE ALSO `attributes(5)`

wanboot_keymgmt(1M)

NAME	wanboot_keymgmt – insert and extract keys
SYNOPSIS	<pre>/usr/lib/inet/wanboot/keymgmt -i -k <i>key_file</i> -s <i>keystore</i> -o type=<i>keytype</i> /usr/lib/inet/wanboot/keymgmt -x -f <i>outfile</i> -s <i>keystore</i> -o type=<i>keytype</i></pre>
DESCRIPTION	The keymgmt utility has two purposes: ■ To take a raw key, stored in <i>key_file</i>, and insert it in the repository specified by <i>keystore</i>. ■ To extract a key of a specified type from the repository specified by <i>keystore</i>, depositing it in <i>outfile</i>. <i>outfile</i> will be created if it does not already exist. The type of key being added or extracted is specified by <i>keytype</i> and may have one of four values: 3des, aes, rsa, or sha1 (the last used by HMAC SHA-1). When extracting a key, the first key with an OID matching the supplied type is used.
ARGUMENTS	The following arguments are supported: -i Used in conjunction with -k to insert a raw key in <i>keystore</i>. -f <i>outfile</i> Used to specify a file to receive an extracted key. -k <i>key_file</i> Used in conjunction with -i to specify the file in which a raw key is stored. This key will be inserted in <i>keystore</i>. -o type=<i>keytype</i> Specifies the type of key being inserted or extracted. Must be one of 3des, aes, rsa, or sha1. -s <i>keystore</i> Specifies a repository in which a key will be inserted or from which a key will be extracted. -x Used in conjunction with -f to extract a key of a specified type and deposit it in <i>outfile</i>.
EXIT STATUS	0 Successful operation. >0 An error occurred.
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

wanboot_keymgmt(1M)

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwbsup
Interface Stability	Obsolete

SEE ALSO

attributes(5)

ITU-T Recommendation X.208

wanboot_p12split(1M)

NAME	wanboot_p12split – split a PKCS #12 file into separate certificate and key files						
SYNOPSIS	<pre>/usr/lib/inet/wanboot/p12split -i p12file -c out_cert -k out_key [-t out_trust -l id -v]</pre>						
DESCRIPTION	The <code>p12split</code> utility extracts a certificate and private key from the repository specified by <code>p12file</code>, depositing the certificate in <code>out_cert</code> and the key in <code>out_key</code>. If supplied, the <code>-l</code> option specifies the value for the <code>LocalKeyId</code> that will be used in the new certificate and key files. <code>p12split</code> can optionally extract a trust certificate into the <code>out_trust</code> file if the <code>-t</code> option is specified. Use the <code>-v</code> option to get a verbose description of the split displayed to standard output.						
OPTIONS	The following arguments and options are supported: <code>-c out_cert</code> Specifies a repository that receives a extracted certificate. <code>-i p12file</code> Specifies a repository from which a certificate and private key is extracted. <code>-k out_key</code> Specifies a repository that receives a extracted private key. <code>-l id</code> Specifies the value for the <code>LocalKeyId</code> that will be used in the new certificate and key files. <code>-t out_trust</code> Specifies a file for receiving an extracted trust certificate. <code>-v</code> Displays a verbose description of the split to sdtout.						
EXIT STATUS	0 Successful operation. >0 An error occurred.						
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWwbsup</td></tr><tr><td>Interface Stability</td><td>Unstable</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWwbsup	Interface Stability	Unstable
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWwbsup						
Interface Stability	Unstable						
SEE ALSO	<code>attributes(5)</code>						

NAME	wanbootutil – manage keys and certificates for WAN booting
SYNOPSIS	wanbootutil [keygen] [<i>option_specific_arguments</i>] wanbootutil [keymgmt] [<i>option_specific_arguments</i>] wanbootutil [p12split] [<i>option_specific_arguments</i>]
DESCRIPTION	The wanbootutil command creates and manages WANboot encryption and hashing keys and manipulates PKCS #12 files for use by WAN boot. wanbootutil has three subcommands, each covered in a separate man page: wanboot_keygen(1M) Generates encryption and hashing keys. wanboot_keymgmt(1M) Inserts and extracts keys from WAN boot key repositories. wanboot_p12split(1M) Splits a PKCS #12 file into separate certificate and key files for use by WAN boot.
OPTIONS	The options supported for wanbootutil are the use of keygen, keymgmt, or p12split. The options for these subcommands are described in their respective man pages.
EXAMPLES	EXAMPLE 1 Generate a 3DES Client Key <pre># wanbootutil keygen -c -o net=129.148.174.0,cid=010003BA0E6A36,type=3des</pre> EXAMPLE 2 Insert an RSA Private Client Key <pre>wanbootutil keymgmt -i -k keyfile \ -s /etc/netboot/129.148.174.0/010003BA0E6A36/keystore -o type=rsa</pre> EXAMPLE 3 Split a PKCS #12 File into Certificate and Key Components <pre># wanbootutil p12split -i p12file -c out_cert -k out_key</pre>
EXIT STATUS	0 Successful operation. non-zero An error occurred. Writes an appropriate error message to standard error.
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwbsup

wanbootutil(1M)

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Interface Stability	Obsolete

SEE ALSO wanboot_keygen(1M), wanboot_keymgmt(1M), wanboot_p12split(1M), attributes(5)

NAME	wbemadmin – start Sun WBEM User Manager				
SYNOPSIS	<code>/usr/sadm/bin/wbemadmin</code>				
DESCRIPTION	The <code>wbemadmin</code> utility starts Sun WBEM User Manager, a graphical user interface that enables you to add and delete authorized WBEM users and to set their access privileges. Use this application to manage access to groups of managed resources, such as disks and installed software, in the Solaris operating environment. The <code>wbemadmin</code> utility allows you to perform the following tasks: <table><tr><td>Manage user access rights</td><td>Use the <code>wbemadmin</code> utility to add, delete, or modify an individual user’s access rights to a namespace on a WBEM-enabled system.</td></tr><tr><td>Manage namespace access rights</td><td>Use the <code>wbemadmin</code> utility to add, delete, or modify access rights for all users to a namespace.</td></tr></table> The Sun WBEM User Manager displays a Login dialog box. You must log in as root or a user with write access to the <code>root\security</code> namespace to grant access rights to users. By default, Solaris users have guest privileges, which grants them read access to the default namespaces. Managed resources are described using a standard information model called Common Information Model (CIM). A CIM object is a computer representation, or model, of a managed resource, such as a printer, disk drive, or CPU. CIM objects can be shared by any WBEM-enabled system, device, or application. CIM objects are grouped into meaningful collections called schema. One or more schemas can be stored in directory-like structures called namespaces. All programming operations are performed within a namespace. Two namespaces are created by default during installation: ■ <code>root\cimv2</code> — Contains the default CIM classes that represent objects on your system. ■ <code>root\security</code> — Contains the security classes used by the CIM Object Manager to represent access rights for users and namespaces. When a WBEM client application connects to the CIM Object Manager in a particular namespace, all subsequent operations occur within that namespace. When you connect to a namespace, you can access the classes and instances in that namespace (if they exist) and in any namespaces contained in that namespace. When a WBEM client application accesses CIM data, the WBEM system validates the user’s login information on the current host. By default, a validated WBEM user is granted read access to the Common Information Model (CIM) Schema. The CIM Schema describes managed objects on your system in a standard format that all WBEM-enabled systems and applications can interpret.	Manage user access rights	Use the <code>wbemadmin</code> utility to add, delete, or modify an individual user’s access rights to a namespace on a WBEM-enabled system.	Manage namespace access rights	Use the <code>wbemadmin</code> utility to add, delete, or modify access rights for all users to a namespace.
Manage user access rights	Use the <code>wbemadmin</code> utility to add, delete, or modify an individual user’s access rights to a namespace on a WBEM-enabled system.				
Manage namespace access rights	Use the <code>wbemadmin</code> utility to add, delete, or modify access rights for all users to a namespace.				

wbemadmin(1M)

You can set access privileges on individual namespaces or for a user-namespace combination. When you add a user and select a namespace, by default the user is granted read access to CIM objects in the selected namespace. An effective way to combine user and namespace access rights is to first restrict access to a namespace. Then grant individual users read, read and write, or write access to that namespace.

You cannot set access rights on individual managed objects. However you can set access rights for all managed objects in a namespace as well as on a per-user basis.

If you log in to the root account, you can set the following types of access to CIM objects:

- Read Only — Allows read-only access to CIM Schema objects. Users with this privilege can retrieve instances and classes, but cannot create, delete, or modify CIM objects.
- Read/Write — Allows full read, write, and delete access to all CIM classes and instances.
- Write — Allows write and delete, but not read access to all CIM classes and instances.
- None — Allows no access to CIM classes and instances.

Context help is displayed in the left side of the wbemadmin dialog boxes. When you click on a field, the help content changes to describe the selected field. No context help is available on the main User Manager window.

The wbemadmin security administration tool updates the following Java classes in the root\security namespace:

- Solaris_UserAcl — Updated when access rights are granted or changed for a user.
- Solaris_namespaceAcl — Updated when access rights are granted or changed for a namespace.

USAGE The wbemadmin utility is not the tool for a distributed environment. It is used for local administration on the machine on which the CIM Object Manager is running.

EXIT STATUS The wbemadmin utility terminates with exit status 0.

WARNING The root\security namespace stores access privileges. If you grant other users access to the root\security namespace, those users can grant themselves or other users rights to all other namespaces.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwbcor

wbemadmin(1M)

SEE ALSO mofcomp(1M), wbemlogviewer(1M), init.wbem(1M), attributes(5)

wbemconfig(1M)

NAME	wbemconfig – convert a JavaSpaces datastore to the newer Reliable Log datastore format				
SYNOPSIS	<code>/usr/sadm/lib/wbem/wbemconfig convert</code>				
DESCRIPTION	A Reliable Log directory is created that contains the converted data. This directory is named <code>/var/sadm/wbem/logr</code>. The <code>convert</code> argument is the only supported option of this command. You should only run this command after stopping WBEM (CIM Object Manager) with the <code>init.wbem stop</code> command. Otherwise your data may be corrupted. This command successfully converts any proprietary custom MOFs you have created in the datastore, but not any CIM or Solaris MOFs you have modified. These will be destroyed. To recompile any modified CIM or Solaris MOFs into the new datastore, run the <code>mofcomp</code> command on the MOF files containing the class definitions. Because the <code>wbemconfig convert</code> command invokes the JVM (Java Virtual Machine) to perform conversion of the JavaSpaces datastore, you must be running the same version of the JVM as when the original JavaSpaces storage was created. After the <code>wbemconfig convert</code> command is completed, you can change to any version of the JVM you want. To see what version of the JVM you are running, issue the <code>java -version</code> command.				
OPTIONS	The following options are supported: <table><tr><td><code>convert</code></td><td>Convert a JavaSpaces datastore to the newer Reliable Log datastore format.</td></tr></table>	<code>convert</code>	Convert a JavaSpaces datastore to the newer Reliable Log datastore format.		
<code>convert</code>	Convert a JavaSpaces datastore to the newer Reliable Log datastore format.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWwbcou</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWwbcou
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWwbcou				
SEE ALSO	<code>init.wbem(1M)</code> , <code>wbemadmin(1M)</code> , <code>wbemlogviewer(1M)</code> , <code>mofcomp(1M)</code> , <code>attributes(5)</code>				

NAME	wbemlogviewer – start WBEM Log Viewer
SYNOPSIS	<code>/usr/sadm/bin/wbemlogviewer</code>
DESCRIPTION	The <code>wbemlogviewer</code> utility starts the WBEM Log Viewer graphical user interface, which enables administrators to view and maintain log records created by WBEM clients and providers. The WBEM Log Viewer displays a Login dialog box. You must log in as root or a user with write access to the <code>root\cimv2</code> namespace to view and maintain log files. Namespaces are described in <code>wbemadmin(1M)</code>. Log events can have three severity levels. ■ Errors ■ Warnings ■ Informational The WBEM log file is created in the <code>/var/sadm/wbem/log</code> directory, with the name <code>wbem_log</code>. The first time the log file is backed up, it is renamed <code>wbem_log.1</code>, and a new <code>wbem_log</code> file is created. Each succeeding time the <code>wbem_log</code> file is backed up, the file extension number of each backup log file is increased by 1, and the oldest backup log file is removed <i>if</i> the limit, which in turn is specified in the log service settings, on the number of logfiles is exceeded. Older backup files have higher file extension numbers than more recent backup files. The log file is renamed with a <code>.1</code> file extension and saved when one of the following two conditions occur: ■ The current file reaches the specified file size limit. ■ A WBEM client application uses the <code>clearLog()</code> method in the <code>Solaris_LogService</code> class to clear the current log file. ■ A WBEM client application uses the <code>clearLog()</code> method in the <code>Solaris_LogService</code> class to clear the current log file. ■ A user chooses Action->Back Up Now in the Log Viewer application. Help is displayed in the left panel of each dialog box. Context help is not displayed in the main Log Viewer window.
USAGE	The WBEM Log Viewer is not the tool for a distributed environment. It is used for local administration. The WBEM Log Viewer allows you to perform the following tasks: View the logs Set properties of log files Click Action->Log File Settings to specify log file parameters and the log file directory. Back up a log file Click Action->Back Up Now to back up and close the current log file and start a new log file.

wbemlogviewer(1M)

Open historical log files	Click Action->Open Log File to open a backed-up log file.
Delete an old log file	Open the file and then click Action->Delete Log File. You can only delete backed-up log files.
View log record details	Double-click a log entry or click View->Log Entry Details to display the details of a log record.
Sort the logs	Click View->Sort By to sort displayed entries. You can also click any column heading to sort the list. By default, the log entries are displayed in reverse chronological order (new logs first).

EXIT STATUS The `wbemlogviewer` utility terminates with exit status 0.

FILES `/var/sadm/wbem/log/wbem_log`
WBEM log file

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwbcor

SEE ALSO `wbemadmin(1M)`, `init.wbem(1M)`, `mofcomp(1M)`, `attributes(5)`

NAME	whodo – who is doing what
SYNOPSIS	/usr/sbin/whodo [-h] [-l] [<i>user</i>]
DESCRIPTION	The whodo command produces formatted and dated output from information in the /var/adm/utmpx and /proc/pid files. The display is headed by the date, time, and machine name. For each user logged in, device name, user-ID and login time is shown, followed by a list of active processes associated with the user-ID. The list includes the device name, process-ID, CPU minutes and seconds used, and process name. If <i>user</i> is specified, output is restricted to all sessions pertaining to that user.
OPTIONS	The following options are supported: -h Suppress the heading. -l Produce a long form of output. The fields displayed are: the user's login name, the name of the tty the user is on, the time of day the user logged in (in <i>hours:minutes</i>), the idle time — that is, the time since the user last typed anything (in <i>hours:minutes</i>), the CPU time used by all processes and their children on that terminal (in <i>minutes:seconds</i>), the CPU time used by the currently active processes (in <i>minutes:seconds</i>), and the name and arguments of the current process.
EXAMPLES	EXAMPLE 1 Using the whodo Command The command: <pre>example% whodo</pre> produces a display like this: <pre>Tue Mar 12 15:48:03 1985 bailey tty09 mcn 8:51 tty09 28158 0:29 sh tty52 bdr 15:23 tty52 21688 0:05 sh tty52 22788 0:01 whodo tty52 22017 0:03 vi tty52 22549 0:01 sh xt162 lee 10:20 tty08 6748 0:01 layers xt162 6751 0:01 sh xt163 6761 0:05 sh tty08 6536 0:05 sh</pre>

whodo(1M)

EXAMPLE 1 Using the whodo Command (Continued)

**ENVIRONMENT
VARIABLES**

If any of the LC_* variables (LC_CTYPE, LC_MESSAGES, LC_TIME, LC_COLLATE, LC_NUMERIC, and LC_MONETARY) (see environ(5)) are not set in the environment, the operational behavior of whodo(1) for each corresponding locale category is determined by the value of the LANG environment variable. If LC_ALL is set, its contents are used to override both the LANG and the other LC_* variables. If none of the above variables is set in the environment, the "C" (U.S. style) locale determines how whodo behaves.

LC_CTYPE Determines how whodo handles characters. When LC_CTYPE is set to a valid value, whodo can display and handle text and filenames containing valid characters for that locale. The whodo command can display and handle Extended Unix code (EUC) characters where any individual character can be 1, 2, or 3 bytes wide. whodo can also handle EUC characters of 1, 2, or more column widths. In the "C" locale, only characters from ISO 8859-1 are valid.

LC_MESSAGES Determines how diagnostic and informative messages are presented. This includes the language and style of the messages, and the correct form of affirmative and negative responses. In the "C" locale, the messages are presented in the default form found in the program itself (in most cases, U.S. English).

LC_TIME Determines how whodo handles date and time formats. In the "C" locale, date and time handling follow the U.S. rules.

EXIT STATUS

The following exit values are returned:

0 Successful completion.

non-zero An error occurred.

FILES

/etc/passwd System password file

/var/adm/utmpx User access and administration information

/proc/pid

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO

ps(1), who(1), attributes(5), environ(5)

NAME	wracct – write extended accounting records for active processes and tasks
SYNOPSIS	<code>/usr/sbin/wracct [-t <i>record_type</i>] <i>i id_list</i> {<i>task</i> <i>process</i>}</code>
DESCRIPTION	The wracct utility allows the administrator to invoke the extended accounting system, if active, to write intermediate records representing the resource usage of a selected set of processes or tasks. For tasks, a <i>record_type</i> option is also supported, allowing the administrator to request the writing of a partial record, which leaves the current task usage unchanged, or an interval record, which resets the task usage to zero for that system task, with respect to the extended accounting subsystem. If interval records are used, the total task usage is the sum of all interval records and the final record written at the task's completion. If partial records are used, the completion record reflects the total resource usage.
OPTIONS	The following options are supported: <code>-i <i>id_list</i></code> Select the IDs of the tasks or processes to write records for. Specify <i>id_list</i> as a comma- or space-separated list of IDs, presented as a single argument. For some shells, this requires appropriate quoting of the argument. <code>-t <i>record_type</i></code> Select type of record to write for the selected task or process. For tasks, <i>record_type</i> can be <i>partial</i> or <i>interval</i>. <i>partial</i> is the the default type, and the only type available for process records.
OPERANDS	The following operands are supported: <i>process</i> Treat the given ID as a process ID for the purposes of constructing and writing an extended accounting record. <i>task</i> Treat the given ID as a task ID for the purposes of constructing and writing an extended accounting record.
EXAMPLES	EXAMPLE 1 Writing a partial record Write a partial record for all active <i>sendmail</i> processes. <pre># /usr/sbin/wracct -i "`pgrep sendmail`" process</pre> EXAMPLE 2 Writing an interval record Write an interval record for the task with ID 182. <pre># /usr/sbin/wracct -t interval -i 182 task</pre>
EXIT STATUS	The following exit values are returned: 0 Successful completion. 1 An error occurred. 2 Invalid command line options were specified.

wracct(1M)

3 Pertinent components of extended accounting facility are not active.

FILES /var/adm/exacct/task

/var/adm/exacct/proc Extended accounting data files.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO attributes(5)

NAME	wrsmconf – manage WCI RSM controller configurations
SYNOPSIS	<pre> /usr/platform/sun4u/sbin/wrsmconf create -c controller_id -f config_file wrsmconf initial -f config_file [-c controller_id] wrsmconf remove [-c controller_id] wrsmconf topology [-c controller_id] wrsmconf dump -c controller_id -f config_file </pre>
DESCRIPTION	wrsmconf provides a means to create, install, retrieve, and remove configurations for WCI remote shared memory (RSM) controllers.
OPTIONS	The following options are supported: create -c controller_id -f config_file Create a set of per-node configurations for the specified controller and store them to the file <i>config_file</i>. The created file contains a per-node configuration for each node specified in the input for the specified controller. The file has a checksum on it and cannot be modified directly. This file can be used in a <i>wrsmconf initial</i> call on each node to install the node's configuration into the local driver. A list of nodes and WCI devices connected to those nodes is read from standard input. For each connected pair of links, specify the nodename (uname -n), safari port id, and link number on both sides of the connection. The format of the information looks like this: <pre> <nodename>.<wrsm-portid>.<linkno>=<nodename>.<wrsm-portid>.<linkno> <nodename>.<wrsm-portid>.<linkno>=<nodename>.<wrsm-portid>.<linkno> </pre> This interface is intended for installing configurations for testing (such as for SunVTS). Only direct-connect, non-striped configurations for 1 to 3 nodes can be specified. FM node ids and RSM hardware addresses are assigned to the specified nodes contiguously and in order starting from 0. initial -f config_file [-c controller_id] Install the configuration for the local node stored in the file <i>config_file</i> into the driver as the initial configuration for the specified controller. This command fails under the following circumstances: ■ If <i>controller_id</i> is specified and the configuration in the file is not for the specified controller. ■ If the file does not contain a valid configuration for the local node or if the checksum in the file shows it has been modified. ■ If a configuration has already been installed for the controller. If this happens, use <i>wrsmconf remove</i> to remove the existing configuration. remove [-c controller_id] Disable communication through the installed configuration for all controllers or the specified controller and remove the configuration(s) from the driver.

wrsmconf(1M)

`topology -c controller_id`

For each installed controller (or for the specified controller), print to stdout the set of nodes this controller is configured to reach, including the nodename, FM node id, and RSM hardware address for each node. The following is example output:

FM Node ID	Node Name	Controller Instance	Controller HW Addr
0	hpc00	0	101
0	hpc00	1	333
1	hpc01	0	102
1	hpc01	1	54
1	hpc01	2	34
2	hpc03	0	103
2	hpc03	1	103
2	hpc03	2	103

`dump -c controller-id -f config_file`

Fetch the installed configuration for the specified controller from the driver and store it into the file *config_file* along with a checksum to protect the data. This configuration can later be installed with the command `wrsmconf initial`.

EXIT STATUS This command returns 0 on successful completion, and a non-zero value if an error occurred.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwrsm

SEE ALSO `kstat(1M)`, `wrsmstat(1M)`, `attributes(5)`

NAME	wrmstat – report WCI RSM driver statistics
SYNOPSIS	<pre> /usr/platform/sun4u/sbin/wrmstat controller [-c controller_id] wrmstat wrsm [-i wrsm_instance_num] [-v] wrmstat route [-c controller_id] [-h node_hostname] wrmstat set [-i wrsm_instance_num] -c cmmu -s start -e end </pre>
DESCRIPTION	The wrmstat command provides statistics on remote shared memory (RSM) controllers, routes to nodes, and WCI interfaces managed by the WCI RSM driver (wrsm). It also provides an interface for setting extended performance counter control registers that constrain the wrsm counters available through busstat(1M).
OPTIONS	The following options are supported: controller [-c controller_id] Displays information describing the state of the specified controller, or of all controllers if none is specified. The following is sample output: <pre> \$ wrmstat controller -c 5 Controller 5 ----- Controller state: up Local RSM Hardware address: 0x4 Exported segments: 0 # published: 0 # connections: 0 total bound memory: 0 Imported segments: 0 Send Queues: 0 Registered Handlers: 0 Assigned WCIs: 4 Available WCIs: 2 </pre> wrsm [-i wrsm_instance_num] [-v] Displays information describing the state of the specified RSM WCI, or of all RSM WCIs if none is specified. The following is sample output: <pre> \$ wrmstat wrsm -i 2 WCI instance 2 ----- Portid: 5 Controller ID: 0 Config Version: 5 Link Error Shutdown Trigger: 40000 Link #0 is not present. Link #1 Link Enabled: yes Link State: up Remote RSM HW addr: 1 Remote wnode ID: 1 Remote link num: 1 Remote WCI port ID: 3 Error takedowns: 0 Bad Config takedowns: 0 Failed bringups: 0 Total link errors: 0 Maximum link errors: 0 Average link errors: 0 Auto shutdown enabled: yes Link #2 is not present. </pre> If you specify the -v option, the following additional information is displayed:

wrsmstat(1M)

```
Cluster Error Count:      0
Uncorrectable SRAM ECC error:  no
Maximum SRAM ECC errors:  0
Average SRAM ECC errors:  0
```

route [-c *controller_id*] [-h *nodename*]

Displays the route to the specified node through the specified controller. If no node is specified, displays the routes to all nodes. If no controller is specified, displays the specified node's route through all controllers. If neither is specified, displays the routes to all nodes through all controllers. The following is sample output:

```
$ wrsmstat -c 3 -h fred
Controller 3 - Route to fred
-----
Config Version: 1
FM node id: 0x345543
RSM hardware address: 0x9
Route Changes: 3
Route Type: Passthrough
Number of WCIs: 2
Stripes: 4
WCI #0
  Port ID: 3
  Instance: 0
  Num of hops: 2
  Num of links: 2
    link# 1, first hop RSM HW addr: 0x4
    link# 2, first hop RSM HW addr: 0x2
WCI #1
  Port ID: 13
  Instance: 1
  Num of hops: 2
  Num of links: 2
    link# 0, first hop RSM HW addr: 0x4
    link# 2, first hop RSM HW addr: 0x2
```

set [-i *wrsm_instance_num*] -c *cmmu* -s *<start>* -e *<end>*

For the specified WCI (or for each RSM WCI if none specified), configure the specified range of CMMU entries so that transactions through them are counted by *wrsm* busstat kstats. Each call will cause transactions to be counted through the new ranges of *cmmu* entries in addition to the previously specified ranges. To count transactions through all CMMUs, specify a start value of 0 and end value of 0. To clear all ranges (and not count transactions through any *cmmu* entries), specify a start value of 0 and end value of -1.

EXIT STATUS This command returns 0 on successful completion, and a non-zero value if an error occurred.

ATTRIBUTES See [attributes\(5\)](#) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWwrsm

wrsmstat(1M)

SEE ALSO busstat(1M), kstat(1M), wrsmconf(1M), attributes(5)

xntpd(1M)

NAME	xntpd – Network Time Protocol daemon
SYNOPSIS	<pre>/usr/lib/inet/xntpd [-aAbdm] [-c <i>conf</i>file] [-e <i>auth</i>delay] [-f <i>drift</i>file] [-k <i>key</i>file] [-l <i>log</i>file] [-p <i>pid</i>file] [-r <i>broadcast</i>delay] [-s <i>stats</i>dir] [-t <i>trusted</i>key] [-v <i>variable</i>] [-V <i>variable</i>]</pre>
DESCRIPTION	xntpd is a daemon which sets and maintains a UNIX system time-of-day in agreement with Internet standard time servers. xntpd is a complete implementation of the Network Time Protocol (NTP) version 3 standard, as defined by <i>RFC 1305</i>. It also retains compatibility with version 1 and 2 servers as defined by <i>RFC 1059</i> and <i>RFC 1119</i>, respectively. The computations done in the protocol and clock adjustment code are carried out with high precision and with attention to the details which might introduce systematic bias into the computations. This is done to try to maintain an accuracy suitable for synchronizing with even the most precise external time source. Ordinarily, xntpd reads its configuration from a configuration file at startup time. The default configuration file name is <code>/etc/inet/ntp.conf</code>, although this may be overridden from the command line. It is also possible to specify a working, although limited, xntpd configuration entirely on the command line, obviating the need for a configuration file. This may be particularly appropriate when xntpd is to be configured as a broadcast or multicast client, with all peers being determined by listening to broadcasts at run time. Through the use of the <code>ntpq(1M)</code> program, various internal xntpd variables can be displayed and configuration options altered while the daemon is running. The daemon can operate in any of several modes, including symmetric active/passive, client/server and broadcast/multicast. A broadcast/multicast client can automatically discover remote servers, compute one-way delay correction factors and configure itself automatically. This makes it possible to deploy a fleet of workstations without specifying a configuration file or configuration details specific to its environment.
OPTIONS	The following command line arguments are understood by xntpd. See <i>Configuration Commands</i> for a more complete functional description: -a Run in authentication mode. -A Disable authentication mode. -b Listen for broadcast NTP and sync to this if available. -c <i>conf</i>file Specify an alternate configuration file. -d Specify debugging mode. This flag may occur multiple times, with each occurrence indicating greater detail of display. -e <i>auth</i>delay Specify the time (in seconds) it takes to compute the NTP encryption field on this computer. -f <i>drift</i>file Specify the location of the drift file. -k <i>key</i>file Specify the location of the file which contains the NTP authentication keys.

<code>-l logfile</code>	Specify a log file instead of logging to syslog.
<code>-m</code>	Listen for multicast messages and synchronize to them if available (requires multicast kernel).
<code>-p pidfile</code>	Specify the name of the file to record the daemon's process id.
<code>-r broadcast</code>	Ordinarily, the daemon automatically compensates for the network delay between the broadcast/multicast server and the client; if the calibration procedure fails, use the specified default delay (in seconds).
<code>-s statsdir</code>	Specify the directory to be used for creating statistics files.
<code>-t trustedkey</code>	Add a key number to the trusted key list.
<code>-v variable</code>	Add a system variable.
<code>-V variable</code>	Add a system variable listed by default.

USAGE xntpd's configuration file format is similar to other Unix configuration files. Comments begin with a '#' character and extend to the end of the line. Blank lines are ignored. Configuration commands consist of an initial keyword followed by a list of arguments, separated by whitespace. Some arguments may be optional. These commands may not be continued over multiple lines. Arguments may be host names, host addresses written in dotted-decimal, integers, floating point numbers (when specifying times in seconds) and text strings.

Configuration Commands In the following descriptions, optional arguments are delimited by '[]', while alternatives are separated by '|'. The first three commands specify various time servers to be used and time services to be provided.

`peer host_address [ key # ] [ version # ][ prefer ]`

Specifies that the local server is to operate in "symmetric active" mode with the remote server *host_address* named in the command. In this mode, the local server can be synchronized to the remote server. In addition, the remote server can be synchronized by the local server. This is useful in a network of servers where, depending on various failure scenarios, either the local or remote server host may be the better source of time. The `peer` command, and the `server` and `broadcast` commands that follow, can take the following arguments:

<code>key</code>	Indicates that all packets sent to the address are to include authentication fields, encrypted using the specified key number. The range of this number is that of an unsigned 32 bit integer. By default, an encryption field is not included.
<code>version</code>	Specifies the version number to be used for outgoing NTP packets. Versions 1, 2, and 3 are the choices; version 3 is the default.
<code>prefer</code>	Marks the host as a preferred host. This host will be preferred for synchronization over other comparable hosts.

`server host_address [ key # ] [ version fl# ]`

`[ prefer ] [ mode fl# ] server`

Specifies that the local server is to operate in “client” mode with the remote server named in the command. In this mode the local server can be synchronized to the remote server, but the remote server can never be synchronized to the local server.

`broadcast host_address [ key # ] [ version # ] [ ttl # ]`

Specifies that the local server is to operate in “broadcast” mode where the local server sends periodic broadcast messages to a client population at the broadcast/multicast address named in the command. Ordinarily, this specification applies only to the local server operating as a transmitter. For operation as a broadcast client, see `broadcastclient` or `multicastclient` commands elsewhere in this document. In broadcast mode the *host_address* is usually the broadcast address on a local network or a multicast address assigned to NTP. The IANA has assigned the network, 224.0.1.1 to NTP. This is presently the only network that should be used. The following option is used only with the broadcast mode:

`ttl` Specifies the time-to-live (TTL) to use on multicast packets. Selection of the proper value, which defaults to 127, is something of a black art and must be coordinated with the network administrator(s).

`broadcastclient`

Directs the local server to listen for broadcast messages on the local network, in order to discover other servers on the same subnet. Upon hearing a broadcast message for the first time, the local server measures the nominal network delay using a brief client/server exchange with the remote server. Then the server enters the “broadcastclient” mode, in which it listens for and synchronizes to succeeding broadcast messages. In order to avoid accidental or malicious disruption in this mode, both the local and remote servers must operate using authentication, with the same trusted key and key identifier.

`multicastclient`

`[ IP address ... ]` Used in the same way as the `broadcastclient` command, but operates using IP multicasting. Support for this command requires the use of authentication. If one or more IP addresses are given, the server joins the respective multicast group(s). If none are given, the IP address assigned to NTP (224.0.1.1) is assumed.

`driftfile filename`

Specifies the name of the file used to record the frequency offset of the local clock oscillator. If the file exists, it is read at startup in order to set the initial frequency offset. Then the file is updated once per hour with the current offset computed by the daemon. If the file does not exist or this command is not given, the initial frequency offset is assumed to be zero. In this case, it may take some hours for the frequency to stabilize and the residual timing errors to subside. The file contains a single floating point value equal to the offset in parts-per-million (ppm). The file is updated by first writing the current drift value into a temporary file and then using `rename(2)` to replace the old version. This implies that `xntpd` must have write

permission for the directory the drift file is located in, and that file system links, symbolic or otherwise, should probably be avoided.

```
enable auth | bclient | pll | monitor | stats [ ... ]
disable auth | bclient | pll | monitor | stats
[ ... ]
```

Provides a way to enable or disable various server options. To do so, execute a two word command, where the first word is `enable` or `disable` and the second is the flag. Flags not mentioned are unaffected. Flags that can be changed are described below, along with their default values.

Flag	Default	Description
auth	disable	Causes the server to synchronize with unconfigured peers only if the peer has been correctly authenticated using a trusted key and key identifier.
bclient	disable	Causes the server to listen for a message from a broadcast or multicast server. After this occurs, an association is automatically instantiated for that server. default for this flag is disable (off).
pll	enable	Enables the server to adjust its local clock. If not set, the local clock free-runs at its intrinsic time and frequency offset. This flag is useful in case the local clock is controlled by some other device or protocol and NTP is used only to provide synchronization to other clients.
monitor	disable	Enables the monitoring facility (see elsewhere).
stats	enable	Enables statistics facility filegen (see Monitoring Commands below).

```
slewalways [ yes|no ]
```

Force xntpd to always slew the time.

Authentication Commands

`keys filename` Specifies the name of a file which contains the encryption keys and key identifiers used by xntpd when operating in authenticated mode. The format of this file is described later in this document.

`trustedkey` `# [ # . . . ]` Specifies the encryption key identifiers which are trusted for the purposes of authenticating peers suitable for synchronization. The authentication procedures require that both the local and remote servers share the same key and key identifier, defined to be used for this purpose. However, different keys can be used with different servers. The arguments are 32 bit unsigned integers. Note, however, that key 0 is

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Access Control Commands

controlkey #	fixed and globally known. If meaningful authentication is to be performed, the 0 key should not be trusted. Specifies the key identifier to use with the ntpq(1M) program, which is useful to diagnose and repair problems that affect xntpd operation. The operation of the ntpq program and xntpd conform to those specified in <i>RFC 1305</i>. Requests from a remote ntpq program which affect the state of the local server must be authenticated. This requires that both the remote program and local server share a common key and key identifier. The argument to this command is a 32 bit unsigned integer. If no controlkey command is included in the configuration file, or if the keys don't match. These requests are ignored.				
restrictaddress [mask numeric_mask] [flag] [...]	xntpd implements a general purpose address-and-mask based restriction list. The list is sorted by IP address and mask, and the list is searched in this order for matches, with the last match found defining the restriction flags associated with the incoming packets. The source address of incoming packets is used for the match, with the 32 bit address being logically and'ed with the mask associated with the restriction entry and then compared with the entry's address (which has also been and'ed with the mask) to look for a match. The "mask" argument defaults to 255.255.255.255, meaning that the "address" is treated as the address of an individual host. A default entry (address 0.0.0.0, mask 0.0.0.0) is always included and, given the sort algorithm, is always the first entry in the list. Note that, while "address" is normally given in dotted-quad format, the text string "default", with no mask option, may be used to indicate the default entry. In the current implementation, flags always restrict access, i.e., an entry with no flags indicates that free access to the server is to be given. The flags are not orthogonal, in that more restrictive flags often make less restrictive ones redundant. The flags can generally be classed into two categories, those which restrict time service and those which restrict informational queries and attempts to do run time reconfiguration of the server. One or more of the following flags may be specified: <table> <tr> <td data-bbox="664 1535 756 1560">ignore</td><td data-bbox="1011 1535 1412 1654">Ignore all packets from hosts which match this entry. If this flag is specified neither queries nor time server polls will be responded to.</td></tr> <tr> <td data-bbox="664 1675 773 1701">noquery</td><td data-bbox="1011 1675 1412 1730">Ignore all NTP mode 7 packets (i.e., information queries and</td></tr> </table>	ignore	Ignore all packets from hosts which match this entry. If this flag is specified neither queries nor time server polls will be responded to.	noquery	Ignore all NTP mode 7 packets (i.e., information queries and
ignore	Ignore all packets from hosts which match this entry. If this flag is specified neither queries nor time server polls will be responded to.				
noquery	Ignore all NTP mode 7 packets (i.e., information queries and				

	configuration requests) from the source. Time service is not affected.
nomodify	Ignore all NTP mode 7 packets which attempt to modify the state of the server (i.e., run time reconfiguration). Queries which return information are permitted.
notrap	Decline to provide mode 6 control message trap service to matching hosts. The trap service is a subsystem of the mode 6 control message protocol which is intended for use by remote event logging programs.
lowpriotrap	Declare traps set by matching hosts to be low priority. The number of traps a server can maintain is limited. The current limit is 3. Traps are usually assigned on a first come, first served basis, with later trap requestors being denied service. This flag modifies the assignment algorithm by allowing low priority traps to be overridden by later requests for normal priority traps.
noserve	Ignore NTP packets whose mode is other than 7. In effect, time service is denied, though queries may still be permitted.
nopeer	Provide stateless time service to polling hosts, but do not allocate peer memory resources to these hosts even if they otherwise might be considered useful as future synchronization partners.
notrust	Treat these hosts normally in other respects, but never use them as synchronization sources.
limited	These hosts are subject to a limitation on number of clients from the same net that will be accepted. Net in this context refers

to the IP notion of net (class A, class B, class C, etc.). Only the first *client_limit* hosts that have shown up at the server and that have been active during the last *client_limit_period* seconds are accepted. Requests from other clients from the same net are rejected. Only time request packets are taken into account. "Private", "control", and "broadcast" packets are not subject to client limitation and therefore do not contribute to client count. A history of clients is kept using the monitoring capability of xntpd. Thus, monitoring is active as long as there is a restriction entry with the *limited* flag. The default value for *client_limit* is 3. The default value for *client_limit_period* is 3600 seconds. Currently both variables are not runtime configurable.

ntpport

This is actually a match algorithm modifier, rather than a restriction flag. Its presence causes the restriction entry to be matched only if the source port in the packet is the standard NTP UDP port (123). Both *ntpport* and *non-ntpport* may be specified. The *ntpport* is considered more specific and is sorted later in the list.

Default restriction list entries, with the flags, *ignore*, *ntpport*, for each of the local host's interface addresses are inserted into the table at startup to prevent the server from attempting to synchronize to its own time. A default entry is also always present, though if it is otherwise unconfigured no flags are associated with the default entry (i.e., everything besides your own NTP server is unrestricted).

Monitoring
Commands

	xntpd(1M)
	The restriction facility was added to allow the current access policies of the time servers running on the NSF net backbone to be implemented with xntpd as well. This facility may be useful for keeping unwanted or broken remote time servers from affecting your own. However, it should not be considered an alternative to the standard NTP authentication facility.
clientlimit limit	Sets <i>client_limit</i> to <i>limit</i> ; allows configuration of client limitation policy. This variable defines the number of clients from the same network that are allowed to use the server.
clientperiod period	Sets <i>client_limit_period</i> ; allows configuration of client limitation policy. This variable specifies the number of seconds after which a client is considered inactive and thus no longer is counted for client limit restriction.
statsdir /directory path/	Indicates the full path of a directory where statistics files should be created (see below). This keyword allows the (otherwise constant) filegen filename prefix to be modified for file generation sets used for handling statistics logs (see filegen statement below).
statistics name...	Enables writing of statistics records. Currently, three kinds of statistics are supported. Each type is described below by giving its <i>name</i> , a sample line of data, and an explanation of each field:
loopstats	enables recording of loop filter statistics information. Each update of the local clock outputs a line of the following form to the file generation set named "loopstats": 48773 10847.650 0.0001307 17.3478 2
Field No.	Description
1	The date (Modified Julian day)

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2	The time (seconds and fraction past UTC midnight)
3	Time offset in seconds
4	Frequency offset in parts-per-million
5	Time constant of the clock-discipline algorithm at each update of the clock
peerstats enables recording of peer statistics information. This includes statistics records of all peers of a NTP server and of the 1-pps signal, where present and configured. Each valid update appends a line similar to the one below, to the current element of a file generation set named "peerstats":	
<pre>48773 10847.650 127.127.4.1 9714 -0.001605 \ 0.00000 0.00142</pre>	
Field No. Description	
1	The date (Modified Julian Day)
2	The time (seconds and fraction past UTC midnight)
3	The peer address in dotted-quad notation
4	peer status. The status field is encoded in hex in the format described in Appendix A of the NTP specification, <i>RFC 1305</i> .
5	Offset in seconds
6	Delay in seconds
7	Dispersion in seconds
clockstats enables recording of clock driver statistics information. Each update received from a clock driver outputs a line of the following form to the file generation set named "clockstats":	
<pre>49213 525.624 127.127.4.1 93 226 \ 00:08:29.606 D</pre>	
Field No. Description	

- 1 The date (Modified Julian Day)
 - 2 The time (seconds and fraction past UTC midnight)
 - 3 The clock address in dotted-quad notation
 - 4 The last timecode received from the clock in decoded ASCII format, where meaningful
- In some clock drivers a good deal of additional information can be gathered and displayed as well.

Statistic files are managed using file generation sets (see `filegen` below). The information obtained by enabling statistics recording allows analysis of temporal properties of a `xntpd` server. It is usually only useful to primary servers or maybe main campus servers.

```
filegen name [ file filename ] [ type typename ] [ flag flagval ]
[ link | noline ] [ enable | disable ]
```

Configures setting of generation file set *name*. Generation file sets provide a means for handling files that are continuously growing during the lifetime of a server. Server statistics are a typical example for such files. Generation file sets provide access to a set of files used to store the actual data. At any time at most one element of the set is being written to. The *type* given specifies when and how data will be directed to a new element of the set. This way, information stored in elements of a file set that are currently unused are available for administrative operations without the risk of disturbing the operation of `xntpd`. (Most important: they can be removed to free space for new data produced.)

Filenames of set members are built from three elements:

prefix

This is a constant filename path. It is not subject to modifications via the `filegen` statement. It is defined by the server, usually specified as a compile time constant. It may, however, be configurable for individual file generation sets via other commands. For example, the prefix used with “loopstats” and “peerstats” filegens can be configured using the `statsdir` statement explained above.

filename

This string is directly concatenated to the *prefix* mentioned above (no intervening ‘/’ (slash)). This can be modified using the `file` argument to the `filegen` statement. No ‘.’ elements are allowed in this component to prevent filenames referring to parts outside the filesystem hierarchy denoted by *prefix*.

suffix

This part reflects individual elements of a file set. It is generated according to the type of a file set as explained below. A file generation set is characterized by

its type. The following types are supported:

none	The file set is actually a single plain file.
pid	One element of file set is used per incarnation of a xntpd server. This type does not perform any changes to file set members during runtime. However it provides an easy way of separating files belonging to different xntpd server incarnations. The set member filename is built by appending a '.' (dot) to concatenated <i>prefix</i> and <i>filename</i> strings, and appending the decimal representation of the process id of the xntpd server process.
day	One file generation set element is created per day. The term <i>day</i> is based on UTC . A day is defined as the period between 00:00 and 24:00 UTC . The file set member suffix consists of a '.' (dot) and a day specification in the form, <i>YYYYMMDD</i> . <i>YYYY</i> is a 4 digit year number (e.g., 1992). <i>MM</i> is a two digit month number. <i>DD</i> is a two digit day number. Thus, all information written at December 10th, 1992 would end up in a file named, <i>PrefixFilename.19921210</i> .
week	Any file set member contains data related to a certain week of a year. The term <i>week</i> is defined by computing "day of year" modulo 7. Elements of such a file generation set are distinguished by appending the following suffix to the file set filename base: a dot, a four digit year number, the letter 'W', and a two digit week number. For example, information from January, 5th 1992 would end up in a file with suffix ".1992W1".
month	One generation file set element is generated per month. The file name suffix consists of a dot, a four digit year number, and a two digit month.
year	One generation file element is generated per year. The filename suffix consists of a dot and a 4 digit year number.
age	This type of file generation sets changes to a new element of the file set every 24 hours of server operation. The filename suffix consists of a dot, the letter 'a', and an eight digit number. This number is taken to be the number of seconds the server is running at the start of the corresponding 24 hour period.

Information is only written to a file generation set when this set is enabled. Output is prevented by specifying, *disabled*.

It is convenient to be able to access the current element of a file generation set by a fixed name. This feature is enabled by specifying *link* and disabled using *nolink*. If *link* is specified, a hard link from the current file set element to a file without suffix is created. When there is already a file with this name and the number of links of this file is one, it is renamed appending a dot, the letter, 'C', and the pid of the xntpd server process. When the number of links is greater than one, the file is unlinked. This allows the current file to be accessed by a constant name.

**Miscellaneous
Commands****broadcastdelay** *seconds*

The broadcast and multicast modes require a special calibration to determine the network delay between the local and remote servers. Ordinarily, this is done automatically by the initial protocol exchanges between the local and remote servers. In some cases, the calibration procedure may fail due to, for example, network or server access controls. This command specifies the default delay to be used under these circumstances. Typically (for Ethernet), a number between 0.003 and 0.007 is appropriate for *seconds*. When this command is not used, the default is 0.004 seconds.

trap *host_address* [**port** *port_number*]
[**interface** *interface_address*]

Configures a trap receiver at the given *host_address* and *port_number* for sending messages with the specified local *interface_address*. If the port number is unspecified, a value of 18447 is used. If the interface address is not specified, the message is sent with the source address of the local interface the message is sent through. On a multi-homed host, the interface used may change with routing changes.

C information from the server in a log file. While such monitor programs may also request their own trap dynamically, configuring a trap receiver ensures that no messages are lost when the server is started.

setvar *variable* [*default*]

This command adds an additional system variable. Variables like this can be used to distribute additional information such as the access policy. If the variable of the form, *variable_name=value* is followed by the *default* keyword, the variable will be listed as one of the default system variables (see the `ntpq(1M)` command). Additional variables serve informational purposes only. They can be listed; but they are not related to the protocol. The known protocol variables always override any variables defined via the `setvar` mechanism.

Three special variables contain the names of all variable of the same group. *sys_var_list* holds the names of all system variables. *peer_var_list* holds the names of all peer variables. And *clock_var_list* hold the names of the reference clock variables.

monitor [**yes** | **no**]**authenticate** [**yes** | **no**]

These commands have been superseded by the `enable` and `disable` commands. They are listed here for historical purposes.

logconfig *configkeyword*

Controls the amount of output written to syslog or the logfile. By default all output is turned on. *configkeyword* is formed by concatenating the message class with the event class. It is permissible to use the prefix, `all`, instead of a message class. A message class may also be followed by the keyword, `all`, meaning to enable/disable all of the respective message class. All *configkeywords* can be prefixed with the symbols, '=', '+' and '-'. Here, '=' sets the syslogmask, '+' adds messages, and '-' removes messages. Syslog messages can be controlled in four classes: *sys*, *peer*, *clock*, *sync*. Within these classes four types of messages can be controlled. Each is described below, along with its *configkeyword*:

xntpd(1M)

Authentication Key File Format

Configkeyword
Message type

info
Informational messages control configuration information.

events
Event messages control logging of events (reachability, synchronization, alarm conditions).

statistics
Statistical messages control statistical output.

status
Status messages describe mainly the synchronization status.

A minimal log configuration might look like this:

```
logconfig =syncstatus +sysevents
```

A configuration like this lists, just the synchronization state of xntpd and the major system events. For a simple reference server, the following minimum message configuration could be useful:

```
logconfig =syncall +clockall
```

This configuration lists all clock information and synchronization information. All other events and messages about peers, system events and so on, is suppressed.

The NTP standard specifies an extension to allow verification of the authenticity of received NTP packets, and to provide an indication of authenticity in outgoing packets. This is implemented in xntpd using the DES or MD5 algorithms to compute a digital signature, or message-digest. The specification allows any one of possibly 4 billion keys, numbered with 32 bit key identifiers, to be used to authenticate an association. The servers involved in an association must agree on the key and key identifier used to authenticate their data. However they must each learn the key and key identifier independently. In the case of DES, the keys are 56 bits long with, depending on type, a parity check on each byte. In the case of MD5, the keys are 64 bits (8 bytes). xntpd reads its keys from a file specified using the -k command line option or the keys statement in the configuration file. While key number 0 is fixed by the NTP standard (as 56 zero bits) and may not be changed, one or more of the keys numbered 1 through 15 may be arbitrarily set in the keys file.

The key file uses the same comment conventions as the configuration file. Key entries use a fixed format of the form, *keyno type key*. Here, *keyno* is a positive integer, *type* is a single character which defines the format the key is given in, and *key* is the key itself.

The *key* may be given in one of several different formats, controlled by the *type* character. The different key types, and corresponding formats, are described below:

Key: S

Format: A 64 bit hexadecimal number in DES format

In this format, the high order 7 bits of each octet are used to form the 56 bit key while the low order bit of each octet is given a value such that odd parity is maintained for the octet. Leading zeroes must be specified (i.e., the key must be exactly 16 hex digits long) and odd parity must be maintained. Hence a zero key, in standard format, would be given as: 0101010101010101.

Key: N

Format: A 64 bit hexadecimal number in NTP format

This format is the same as the DES format except the bits in each octet have been rotated one bit right so that the parity bit is now the high order bit of the octet. Leading zeroes must be specified and odd parity must be maintained. A zero key in NTP format would be specified as: 8080808080808080.

Key: A

Format: A 1-to-8 character ASCII string

A key is formed from this by using the lower order 7 bits of the ASCII representation of each character in the string. Zeroes are added on the right when necessary to form a full width 56 bit key.

Key: M

Format: A 1-to-8 character ASCII string, using the MD5 authentication scheme.

Note that both the keys and the authentication schemes (DES or MD5) must be identical between a set of peers sharing the same key number.

Primary Clock Support

xntpd has been built to be compatible with all supported types of reference clocks. A reference clock is generally (though not always) a radio timecode receiver which is synchronized to a source of standard time such as the services offered by the NRC in Canada and NIST in the U.S. The interface between the computer and the timecode receiver is device dependent and will vary, but it is often a serial port.

For the purposes of configuration, xntpd treats reference clocks in a manner analogous to normal NTP peers as much as possible. Reference clocks are referred to by address, much as a normal peer is. However, an invalid IP address is used to distinguish them from normal peers. Reference clock addresses are of the form *127.127.t.u* where *t* is an integer denoting the clock type and *u* indicates the type-specific unit number. Reference clocks are configured using a *server* statement in the configuration file where the *host_address* is the clock address. The *key*, *version* and *ttl* options are not used for reference clock support. Some reference clocks require a *mode* option to further specify their operation. The *prefer* option can be useful to persuade the server to cherish a reference clock with somewhat more

enthusiasm than other reference clocks or peers. Clock addresses may generally be used anywhere in the configuration file that a normal IP address can be used. For example, they can be used in `restrict` statements, although such use would normally be considered strange.

Reference clock support provides the `fudge` command, which can be used to configure reference clocks in special ways. The generic format that applies to this command is,

```
fudge 127.127.t.u [ time1 secs ] [ time2 secs ] \
    [ stratum int ] [ refid int ] \
    [ flag1 0|1 ] [ flag2 0|1 ] [ flag3 0|1 ] [ flag4 0|1 ]
```

with options described as follows:

time1

time2

Are specified in fixed point seconds and used in some clock drivers as calibration constants. By convention, and unless indicated otherwise, *time1* is used as a calibration constant to adjust the nominal time offset of a particular clock to agree with an external standard, such as a precision PPS signal. The specified offset is in addition to the propagation delay provided by other means, such as internal DIP switches.

stratum

Is a number in the range zero to 15 and is used to assign a nonstandard operating stratum to the clock.

refid

Is an ASCII string in the range one to four characters and is used to assign a nonstandard reference identifier to the clock.

flag1

flag2

flag3

flag4

Are binary flags used for customizing the clock driver. The interpretation of these values, and whether they are used at all, is a function of the needs of the particular clock driver. However, by convention, and unless indicated otherwise, *flag3* is used to attach the `ppsclock` streams module to the configured driver, while *flag4* is used to enable recording verbose monitoring data to the `clockstats` file configured with the `filegen` command. Further information on the `ppsclock` streams module is in the `README` file in the `./kernel` directory in the current `xntp3` program distribution. Further information on this feature is available in the `./scripts/stats` directory in the same distribution.

Ordinarily, the stratum of a reference clock is zero, by default. Since the `xntpd` daemon adds one to the stratum of each peer, a primary server ordinarily displays stratum one. In order to provide engineered backups, it is often useful to specify the reference clock stratum as greater than zero. The `stratum` option is used for this

purpose. Also, in cases involving both a reference clock and a 1-pps discipline signal, it is useful to specify the reference clock identifier as other than the default, depending on the driver. The *refid* option is used for this purpose. Except where noted, these options apply to all clock drivers.

xntpd on Unix machines currently supports several different types of clock hardware. It also supports a special pseudo-clock used for backup or when no other clock source is available. In the case of most of the clock drivers, support for a 1-pps precision timing signal is available as described in the README file in the `./doc` directory of the xntp3 program distribution. The clock drivers, and the addresses used to configure them, are described in the file, `README.refclocks`, in the `doc` directory of the current program distribution.

Variables Most variables used by the NTP protocol can be examined with `ntpq` (mode 6 messages). Currently very few variables can be modified via mode 6 messages. These variables are either created with the `setvar` directive or the leap warning variables. The leap warning bits that can be set in the *leapwarning* variable (up to one month ahead). Both, the *leapwarning* and in the *leapindication* variable, have a slightly different encoding than the usual leap bits interpretation:

00	The daemon passes the leap bits of its synchronization source (usual mode of operation).
01/10	A leap second is added/deleted (operator forced leap second).
11	Leap information from the synchronization source is ignored (thus LEAP_NOWARNING is passed on).

FILES

<code>/etc/inet/ntp.conf</code>	Default name of the configuration file
<code>/etc/ntp/ntp.drift</code>	Conventional name of the drift file
<code>/etc/inet/ntp.keys</code>	Conventional name of the key file
<code>/etc/inet/ntp.server</code>	Sample server configuration file

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWntpu

SEE ALSO `ntpdate(1M)`, `ntpq(1M)`, `ntptrace(1M)`, `xntpd(1M)`, `rename(2)`, `attributes(5)`

xntpd(1M)

NAME	xntpd – special NTP query program												
SYNOPSIS	xntpd [-ilnps] [-c <i>command</i>] [<i>host</i>] [...]												
DESCRIPTION	xntpd queries the xntpd daemon about its current state and requests changes in that state. You can run xntpd in interactive mode or in controlled using command line arguments. Extensive state and statistics information is available through the xntpd interface. In addition, nearly all the configuration options which can be specified at start up using xntpd's configuration file may also be specified at run time using xntpd. If one or more request options is included on the command line when xntpd is executed, each of the requests is sent to the NTP servers running on each of the hosts given as command line arguments, or on the local host by default. If no request options are given, xntpd attempts to read commands from the standard input and execute these on the NTP server running on the first host specified on the command line, again defaulting to the local host when no other host is specified. xntpd prompts for commands if the standard input is a terminal device. xntpd uses NTP mode 7 packets to communicate with the NTP server, and can be used to query any compatible server on the network which permits it. As NTP is a UDP protocol, this communication is somewhat unreliable, especially over large distances. xntpd does not attempt to re-transmit requests, and times requests out if the remote host is not heard from within a suitable timeout time. The operation of xntpd is specific to the particular implementation of the xntpd daemon. You can expect xntpd to work only with this and maybe some previous versions of the daemon. Requests from a remote xntpd program that affect the state of the local server must be authenticated. This requires that both the remote program and local server share a common key and key identifier.												
OPTIONS	xntpd reads interactive format commands from the standard input. If you specify the -c, -l, -p or -s option, the specified queries are sent to the hosts immediately. The following command line options are supported: <table><tr><td>-c <i>command</i> . . .</td><td>Add <i>command</i> to the list of commands to execute on the specified hosts. <i>command</i> is interpreted as an interactive format command.</td></tr><tr><td></td><td>Multiple -c options may be specified.</td></tr><tr><td>-i</td><td>Force xntpd to operate in interactive mode.</td></tr><tr><td></td><td>Prompts are written to the standard output. Commands are read from the standard input.</td></tr><tr><td>-l</td><td>Obtain a list of peers which are known to the servers.</td></tr><tr><td></td><td>This option is equivalent to -c listpeers. See listpeers in Control Message Commands.</td></tr></table>	-c <i>command</i> . . .	Add <i>command</i> to the list of commands to execute on the specified hosts. <i>command</i> is interpreted as an interactive format command.		Multiple -c options may be specified.	-i	Force xntpd to operate in interactive mode.		Prompts are written to the standard output. Commands are read from the standard input.	-l	Obtain a list of peers which are known to the servers.		This option is equivalent to -c listpeers. See listpeers in Control Message Commands.
-c <i>command</i> . . .	Add <i>command</i> to the list of commands to execute on the specified hosts. <i>command</i> is interpreted as an interactive format command.												
	Multiple -c options may be specified.												
-i	Force xntpd to operate in interactive mode.												
	Prompts are written to the standard output. Commands are read from the standard input.												
-l	Obtain a list of peers which are known to the servers.												
	This option is equivalent to -c listpeers. See listpeers in Control Message Commands.												

	-n	Output all host addresses in dotted-quad numeric format rather than converting to the canonical host names.
	-p	Print a list of the peers known to the server as well as a summary of their state. This option is equivalent to -c peers. See peers in Control Message Commands.
	-s	Print a list of the peers known to the server as well as a summary of their state, but in a slightly different format than the -p option. This option is equivalent to -c dmpeers. See dmpeers in Control Message Commands.
OPERANDS	The following operands are supported:	
USAGE		
Interactive Commands	The interactive commands consist of a keyword (<i>command_keyword</i>) followed by zero to four arguments. You need to enter only enough characters of the <i>command_keyword</i> to uniquely identify it. The output of an interactive command is sent to the standard output by default. You can send the output of an interactive command to a file by appending a <, followed by a file name, to the command line. A number of interactive format commands are executed entirely within the xntpd program itself and do not result in NTP mode. The following interactive commands are supported:	
	? [<i>command_keyword</i>]	Without an argument, print a list of ntpq command keywords. If <i>command_keyword</i> is specified, print function and usage information about the <i>command_keyword</i> .
	delay <i>milliseconds</i>	Specify a time interval to add to timestamps included in requests which require authentication. This enables (unreliable) server reconfiguration over long delay network paths or between machines whose clocks are unsynchronized. Because the server no longer requires timestamps in authenticated requests, this command may be obsolete.
	help [<i>command_keyword</i>]	Without an argument, print a list of ntpq command keywords. If <i>command_keyword</i> is specified, print function and usage information about the <i>command_keyword</i> .

xntpd(1M)

	host <i>hostname</i>	Set the host (<i>hostname</i>) to which future queries are sent. Specify <i>hostname</i> as a host name or a numeric address.
	hostnames [yes no]	Print hostnames or numeric addresses in information displays. Specify <i>yes</i> to print host names. Specify <i>no</i> to print numeric addresses. The default is <i>yes</i> , unless the <i>-n</i> command line option is specified.
	keyid <i>keyid</i>	Enable specification of a key number (<i>keyid</i>) to authenticate configuration requests. <i>keyid</i> must correspond to a key number the server has been configured to use for this purpose.
	passwd	Prompt user to enter a password to authenticate configuration requests. The password is not displayed , and must correspond to the key configured for use by the NTP server for this purpose. If the password does not correspond to the key configured for use by the NTP server, requests are not successful.
	quit	Exit xntpd.
	timeout <i>milliseconds</i>	Specify a timeout period for responses to server queries. The default is approximately 8000 milliseconds. As xntpd retries each query once after a timeout, the total waiting time for a timeout is twice the timeout value set.
	Control Message Commands	Query commands result in NTP mode 7 packets containing requests for information being sent to the server. These control message commands are read-only commands in that they make no modification of the server configuration state. The following control message commands are supported:
	clkbug	Obtain debugging information for a reference clock driver. This information is provided only by some clock drivers.
	clockinfo <i>clock_peer_address</i> [...]	Obtain and print information concerning a peer clock.

The values obtained provide information on the setting of fudge factors and other clock performance information.

dmpeers

Obtain a list of peers for which the sserver is maintaining state, along with a summary of that state.

The peer summary list is identical to the output of the `peers` command, except for the character in the leftmost column. Characters only appear beside peers which were included in the final stage of the clock selection algorithm. A `.` indicates that this peer was cast off in the falseticker detection, while a `+` indicates that the peer made it through. A `*` denotes the peer with which the server is currently synchronizing.

iostats

Print statistics counters maintained in the input-output module.

kerninfo

Obtain and print kernel phase-lock loop operating parameters.

This information is available only if the kernel has been specially modified for a precision timekeeping function.

listpeers

Obtain and print a brief list of the peers for which the server is maintaining state.

These should include all configured peer associations as well as those peers whose stratum is such that they are considered by the server to be possible future synchronization candidates.

loopinfo [oneline | multiline]

Print the values of selected loop filter variables.

The loop filter is the part of NTP which deals with adjusting the local system clock.

The `oneline` and `multiline` options specify the format in which this information is printed. `multiline` is the default.

The `offset` is the last offset given to the loop filter by the packet processing code. The `frequency` is the frequency error of the local clock in parts-per-million (ppm). The `time_const` controls the stiffness of the phase-lock loop and thus the speed at which it can adapt to oscillator drift. The `watchdog` timer value is the number of seconds which have elapsed since the last sample offset was given to the loop filter.

memstats

Print statistics counters related to memory allocation code.

monlist [version]

Obtain and print traffic counts collected and maintained by the monitor facility. The version number should not normally need to be specified.

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peers

Obtain a list of peers for which the server is maintaining state, along with a summary of that state.

The following summary information is included:

- Address of the remote peer.
- Local interface address. If a local address has yet to be determined it is 0.0.0.0.
- Stratum of the remote peer. A stratum of 16 indicates the remote peer is unsynchronized.
- Polling interval, in seconds.
- Reachability register, in octal.
- Current estimated delay, offset and dispersion of the peer, in seconds.
- Mode in which the peer entry is operating.

This is represented by the character in the left margin. A + denotes symmetric active, a - indicates symmetric passive, a = means the remote server is being polled in client mode, a ^ indicates that the server is broadcasting to this address, a ~ denotes that the remote peer is sending broadcasts and a * marks the peer the server is currently synchronizing to.

- Host.

This field may contain a host name, an IP address, a reference clock implementation name with its parameter or REFCLK (implementation number, parameter). On hostnames no only IP-addresses is displayed.

stats *peer_address* [...]

Show the per-peer statistic counters associated with the specified peers.

reslist

Obtain and print the server's restriction list.

Generally, this list is printed in sorted order.

showpeer *peer_address* [...]

Show a detailed display of the current peer variables for one or more peers. Most of these values are described in the NTP Version 2 specification.

sysinfo

Print a variety of system state variables that are related to the local server.

The output from `sysinfo` is described in NTP Version 3 specification, RFC-1305. All except the last four lines are described in the NTP Version 3 specification, RFC-1305.

The `system flags` show various system flags, some of which can be set and cleared by the `enable` and `disable` configuration commands, respectively. These are the `auth`, `bclient`, `monitor`, `pll`, `pps` and `stats` flags. See the `xntpd`

**Runtime
Configuration
Requests**

documentation for the meaning of these flags. There are two additional flags which are read only, the `kernel_pll` and `kernel_pps`. These flags indicate the synchronization status when the precision time kernel modifications are in use. The `kernel_pll` indicates that the local clock is being disciplined by the kernel, while the `kernel_pps` indicates the kernel discipline is provided by the PPS signal. The `stability` is the residual frequency error remaining after the system frequency correction is applied and is intended for maintenance and debugging. In most architectures, this value initially decreases from as high as 500 ppm to a nominal value in the range .01 to 0.1 ppm. If it remains high for some time after starting the daemon, something may be wrong with the local clock, or the value of the `kernel` variable tick may be incorrect. The `broadcastdelay` shows the default broadcast delay, as set by the `broadcastdelay` configuration command. The `authdelay` shows the default authentication delay, as set by the `authdelay` configuration command.

sysstats

Print statistics counters maintained in the protocol module.

timerstats

Print statistics counters maintained in the timer/event queue support code.

The server authenticates all requests that cause state changes in the server. The server uses a configured NTP key to accomplish this. This facility can also be disabled by the server by not configuring a key).

You must make the key number and the corresponding key known to `xntpd`. Use the `keyid` or `passwd` commands to do so.

The `passwd` command prompts users for a password to use as the encryption key. It also prompts automatically for both the key number and password the first time a command which would result in an authenticated request to the server is given. Authentication provides verification that the requester has permission to make such changes. It also gives an extra degree of protection against transmission errors.

Authenticated requests always include a time stamp in the packet data. The time stamp is included in the computation of the authentication code. This timestamp is compared by the server to its receive time stamp. If the time stamps differ by more than a small amount the request is rejected.

Time stamps are rejected for two reasons. First, it makes simple replay attacks on the server, by someone who might be able to overhear traffic on your LAN, much more difficult. Second, it makes it more difficult to request configuration changes to your server from topologically remote hosts.

While the reconfiguration facility works well with a server on the local host, and may work adequately between time-synchronized hosts on the same LAN, it works very poorly for more distant hosts. If reasonable passwords are chosen, care is taken in the distribution and protection of keys and appropriate source address restrictions are applied, the run time reconfiguration facility should provide an adequate level of security.

The following commands make authenticated requests.

addpeer *peer_address* [*keyid*] [*version*] [*prefer*]

Add a configured peer association at the given address and operating in symmetric active mode. An existing association with the same peer may be deleted when this command is executed, or may simply be converted to conform to the new configuration, as appropriate.

If the optional *keyid* is a non-zero integer, all outgoing packets to the remote server will have an authentication field attached encrypted with this key. If the *keyid* is 0 or omitted, no authentication is done.

Specify *version* as 1, 2 or 3. The default is 3.

The *prefer* keyword indicates a preferred peer. This keyword is used primarily for clock synchronisation if possible. The preferred peer also determines the validity of the PPS signal - if the preferred peer is suitable for synchronisation so is the PPS signal.

addserver *peer_address* [*keyid*] [*version*] [*prefer*]

Identical to the **addpeer** command, except that the operating mode is client.

addtrap [*address* [*port*] [*interface*]

Set a trap for asynchronous messages.

authinfo

Return information concerning the authentication module, including known keys and counts of encryptions and decryptions which have been done.

broadcast *peer_address* [*keyid*] [*version*] [*prefer*]

Identical to the **addpeer** command, except that the operating mode is broadcast. In this case a valid key identifier and key are required. The *peer_address* parameter can be the broadcast address of the local network or a multicast group address assigned to NTP. If a multicast address, a multicast-capable kernel is required.

clrtrap [*address* [*port*] [*interface*]

Clear a trap for asynchronous messages.

delrestrict *address mask* [*ntpport*]

Delete the matching entry from the restrict list.

fudge *peer_address* [*time1*] [*time2*] [*stratum*] [*refid*]

Provide a way to set certain data for a reference clock.

readkeys

Cause the current set of authentication keys to be purged and a new set to be obtained by re-reading the keys file. The keys file must have been specified in the **xntpd** configuration file. This enables encryption keys to be changed without restarting the server.

restrict *address mask flag* [*flag*]

This command operates in the same way as the restrict configuration file commands of xntpd.

reset

Clear the statistics counters in various modules of the server.

traps

Display the traps set in the server.

trustkey *keyid* [...]

untrustkey *keyid* [...]

These commands operate in the same way as the trustedkey and untrustkey configuration file commands of xntpd.

unconfig *peer_address* [...]

Cause the configured bit to be removed from the specified peers. In many cases this causes the peer association to be deleted. When appropriate, however, the association may persist in an unconfigured mode if the remote peer is willing to continue on in this fashion.

unrestrict *address mask flag* [*flag*]

Unrestrict the matching entry from the restrict list.

ATTRIBUTES

See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWntpu

SEE ALSO

ntpd(1M), ntpq(1M), ntptrace(1M), xntpd(1M), rename(2), attributes(5)

ypbind(1M)

NAME	ypbind – NIS binder process		
SYNOPSIS	<code>/usr/lib/netsvc/yp/ypbind</code> [-broadcast -ypset -ypsetme]		
DESCRIPTION	NIS provides a simple network lookup service consisting of databases and processes. The databases are stored at the machine that runs an NIS server process. The programmatic interface to NIS is described in <code>ypclnt(3NSL)</code>. Administrative tools are described in <code>ypinit(1M)</code>, <code>ypwhich(1)</code>, and <code>ypset(1M)</code>. Tools to see the contents of NIS maps are described in <code>ypcat(1)</code>, and <code>ypmatch(1)</code>. <code>ypbind</code> is a daemon process that is activated at system startup time from the startup script <code>/etc/init.d/rpc</code>. By default, it is invoked as <code>ypbind -broadcast</code>. <code>ypbind</code> runs on all client machines that are set up to use NIS. See <code>sysidtool(1M)</code>. The function of <code>ypbind</code> is to remember information that lets all NIS client processes on a node communicate with some NIS server process. <code>ypbind</code> must run on every machine which has NIS client processes. The NIS server may or may not be running on the same node, but must be running somewhere on the network. If the NIS server is a NIS+ server in NIS (YP) compatibility mode, see the NOTES section of the <code>ypfiles(4)</code> man page for more information. The information <code>ypbind</code> remembers is called a <i>binding</i> — the association of a domain name with a NIS server. The process of binding is driven by client requests. As a request for an unbound domain comes in, if started with the <code>-broadcast</code> option, the <code>ypbind</code> process broadcasts on the net trying to find an NIS server, either a <code>ypserv</code> process serving the domain or an <code>rpc.nisd</code> process in "YP-compatibility mode" serving NIS+ directory with name the same as (case sensitive) the domain in the client request. Since the binding is established by broadcasting, there must be at least one NIS server on the net. If started without the <code>-broadcast</code> option, <code>ypbind</code> process steps through the list of NIS servers that was created by <code>ypinit -c</code> for the requested domain. There must be an NIS server process on at least one of the hosts in the NIS servers file. All the hosts in the NIS servers file must be listed in either the <code>/etc/hosts</code> or <code>/etc/inet/ipnodes</code> files along with their IP addresses. Once a domain is bound by <code>ypbind</code>, that same binding is given to every client process on the node. The <code>ypbind</code> process on the local node or a remote node may be queried for the binding of a particular domain by using the <code>ypwhich(1)</code> command. If <code>ypbind</code> is unable to speak to the NIS server process it is bound to, it marks the domain as unbound, tells the client process that the domain is unbound, and tries to bind the domain once again. Requests received for an unbound domain will wait until the requested domain is bound. In general, a bound domain is marked as unbound when the node running the NIS server crashes or gets overloaded. In such a case, <code>ypbind</code> will try to bind to another NIS server using the process described above. <code>ypbind</code> also accepts requests to set its binding for a particular domain. The request is usually generated by the <code>ypset(1M)</code> command. In order for <code>ypset</code> to work, <code>ypbind</code> must have been invoked with flags <code>-ypset</code> or <code>-ypsetme</code>.		
OPTIONS	<table><tr><td><code>-broadcast</code></td><td>Send a broadcast datagram using UDP/IP that requests the information needed to bind to a specific NIS server.</td></tr></table>	<code>-broadcast</code>	Send a broadcast datagram using UDP/IP that requests the information needed to bind to a specific NIS server.
<code>-broadcast</code>	Send a broadcast datagram using UDP/IP that requests the information needed to bind to a specific NIS server.		

ypbind(1M)

This option is analogous to ypbind with no options in earlier Sun releases and is recommended for ease of use.

-ypset

Allow users from any remote machine to change the binding by means of the ypset command. By default, no one can change the binding. This option is insecure.

-ypsetme

Only allow root on the local machine to change the binding to a desired server by means of the ypset command. ypbind can verify the caller is indeed a root user by accepting such requests only on the loopback transport. By default, no external process can change the binding.

FILES /var/yp/binding/ypdomain/ypservers
/etc/inet/hosts
/etc/inet/ipnodes

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO ypcat(1), ypmatch(1), ypwhich(1), ifconfig(1M), rpc.nisd(1M), ypinit(1M), ypset(1M), ypclnt(3NSL), hosts(4), ipnodes(4), ypfiles(4), attributes(5)

NOTES ypbind supports multiple domains. The ypbind process can maintain bindings to several domains and their servers, the default domain is the one specified by the domainname(1M) command at startup time.

The -broadcast option works only on the UDP transport. It is insecure since it trusts "any" machine on the net that responds to the broadcast request and poses itself as an NIS server.

ypinit(1M)

NAME	ypinit – set up NIS client						
SYNOPSIS	/usr/sbin/ypinit [-c] [-m] [-s <i>master_server</i>]						
DESCRIPTION	ypinit can be used to set up an NIS client system. You must be the superuser to run this command. This script need not be used at all if ypbind(1M) is started with the -broadcast option (it is invoked with this option from the start up script /etc/init.d/rpc). Normally, ypinit is run only once after installing the system. It may be run whenever a new NIS server is added to the network or an existing one is decommissioned. ypinit prompts for a list of NIS servers to bind the client to; this list should be ordered from the closest to the furthest server. Each of these NIS servers must be listed in either the /etc/hosts or the /etc/inet/ipnodes file along with its IP address. ypinit stores the list in file /var/yp/binding/domain/ypservers. This file is used by ypbind when run without the -broadcast option.						
OPTIONS	<table><tr><td>-c</td><td>Set up a ypclient system.</td></tr><tr><td>-m</td><td>Build a master ypserver data base.</td></tr><tr><td>-s <i>master_server</i></td><td>Slave data base. <i>master_server</i> must be the same master configured in the YP maps and returned by the ypwhich -m command.</td></tr></table>	-c	Set up a ypclient system.	-m	Build a master ypserver data base.	-s <i>master_server</i>	Slave data base. <i>master_server</i> must be the same master configured in the YP maps and returned by the ypwhich -m command.
-c	Set up a ypclient system.						
-m	Build a master ypserver data base.						
-s <i>master_server</i>	Slave data base. <i>master_server</i> must be the same master configured in the YP maps and returned by the ypwhich -m command.						
FILES	/etc/hosts /etc/inet/ipnodes /var/yp/binding/domain/ypservers						
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table><thead><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr></thead><tbody><tr><td>Availability</td><td>SUNWnisu</td></tr></tbody></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnisu		
ATTRIBUTE TYPE	ATTRIBUTE VALUE						
Availability	SUNWnisu						
SEE ALSO	ypbind(1M), sysinfo(2), hosts(4), ipnodes(4), attributes(5)						
BUGS	ypinit sets up the list of NIS servers only for the current domain on the system when it is run, that is, the domain returned by the SI_SRPC_DOMAIN command to sysinfo(2). Care should be taken to ensure that this is the same as the desired domain for NIS client processes.						

NAME	ypmake – rebuild NIS database								
SYNOPSIS	<code>cd /var/yp ; make [map]</code>								
DESCRIPTION	The file called Makefile in /var/yp is used by make(1) to build the Network Information Service (NIS) database. With no arguments, make creates dbm databases for any NIS maps that are out-of-date, and then executes yppush(1M) to notify slave databases that there has been a change. If you supply a <i>map</i> on the command line, make will update that map only. Typing <code>make passwd</code> will create and yppush the password database (assuming it is out of date). Likewise, <code>make ipnodes</code> and <code>make networks</code> will create and yppush the ipnodes and network files, <code>\$(INETDIR)/ipnodes</code> and <code>\$(DIR)/networks</code>. There are four special variables used by make: <code>DIR</code>, which gives the directory of the source files; <code>NOPUSH</code>, which when non-null inhibits doing a yppush of the new database files; <code>INETDIR</code>, which gives the directory of the ipnodes source file; and <code>DOM</code>, which is used to construct a domain other than the master's default domain. The default for <code>DIR</code> is <code>/etc</code>, and the default for <code>INETDIR</code> is <code>/etc/inet</code>. The default for <code>NOPUSH</code> is the null string. Refer to ypfiles(4) and ypserv(1M) for an overview of the NIS service. If a NIS to LDAP (N2L) configuration file, <code>/var/yp/NISLDAPmapping</code>, is present, the NIS server components run in N2L mode. In N2L mode, the server components use a new set of map files with an LDAP-prefix, based on the LDAP DIT. In N2L mode, authoritative NIS information is obtained from the DIT. The NIS source files and ypmake have no role, and they should not be used. If ypmake is accidentally run, then the server components will detect this, and will log a warning message. For additional information, see ypfiles(4).								
FILES	<table> <tr> <td><code>/var/yp</code></td><td>Directory containing NIS configuration files.</td></tr> <tr> <td><code>/etc/inet/hosts</code></td><td>System hosts file.</td></tr> <tr> <td><code>/etc/inet</code></td><td>Default directory for ipnodes source file.</td></tr> <tr> <td><code>/etc</code></td><td>Default directory for source files other than ipnodes.</td></tr> </table>	<code>/var/yp</code>	Directory containing NIS configuration files.	<code>/etc/inet/hosts</code>	System hosts file.	<code>/etc/inet</code>	Default directory for ipnodes source file.	<code>/etc</code>	Default directory for source files other than ipnodes.
<code>/var/yp</code>	Directory containing NIS configuration files.								
<code>/etc/inet/hosts</code>	System hosts file.								
<code>/etc/inet</code>	Default directory for ipnodes source file.								
<code>/etc</code>	Default directory for source files other than ipnodes.								
ATTRIBUTES	See attributes(5) for descriptions of the following attributes:								
	<table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWypu</td></tr> <tr> <td>Interface Stability</td><td>Evolving</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWypu	Interface Stability	Evolving		
ATTRIBUTE TYPE	ATTRIBUTE VALUE								
Availability	SUNWypu								
Interface Stability	Evolving								
SEE ALSO	make(1), nis+(1), makedbm(1M), rpc.nisd(1M), ypbind(1M), yppush(1M), ypserv(1M), ypclnt(3NSL), NISLDAPmapping(4), ipnodes(4), ypfiles(4), ypserv(4)								

ypmake(1M)

NOTES | The NIS makefile is only used when running the `ypserv(1M)` server to provide NIS services. If these are being provided by the NIS+ server running in NIS compatibility mode, see `rpc.nisd(1M)`; this makefile is not relevant. See `ypfiles(4)` for more details.

The Network Information Service (NIS) was formerly known as Sun Yellow Pages (YP). The functionality of the two remains the same. Only the name has changed. The name Yellow Pages is a registered trademark in the United Kingdom of British Telecommunications plc, and may not be used without permission.

NAME	ypmap2src – convert NIS maps to NIS source files
SYNOPSIS	<code>/usr/lib/netsvc/yp/ypmap2src [-t] [[-c <i>custom-map-name</i>] ...] [-d <i>domain</i>] -o <i>output-directory</i> [[<i>source-file</i>] ...]</code>
DESCRIPTION	Use the <code>ypmap2src</code> utility to convert standard NIS maps to approximations of the equivalent NIS source files. This utility functions like the reverse of <code>ypmake(1M)</code>. The primary use for <code>ypmap2src</code> is to convert from a NIS server that uses the NIS to LDAP(N2L) transition mechanism, which does not use NIS source files, to traditional NIS, where source files are required. The <code>ypmap2src</code> utility is also used by NIS administrators who wish to discover the contents of NIS maps for which the sources are not available. Generally, this operation is not necessary. More often, administrators will switch from traditional NIS to N2L in anticipation of the eventual transition to LDAP naming. When this switch is made, authoritative information is moved into the LDAP DIT, and the NIS sources have no further role. N2L supports NIS clients until such time as they can be converted to LDAP, and the NIS service suspended. The <code>ypmap2src</code> utility does not guarantee that the files that are generated are identical to the original NIS source files. Some information might have been thrown away by <code>ypmake</code> and cannot be recovered. N2L also might have updated the maps to reflect changes made by LDAP clients. It is essential that the sources generated are checked to confirm no problems have occurred. Per entry comment fields, from existing source files, are not merged into source files generated by <code>ypmap2src</code>. If a user wishes N2L to maintain comment information, then the <code>NISLDAPmapping</code> configuration file should be modified so that the comment fields are mapped into LDAP. This will ensure that the comments are visible to native LDAP clients and present in the N2L map files. When <code>ypmap2src</code> is run, it will take up-to-date comments from the map file and insert them into the NIS source file generated.
Handling Custom Maps	<code>ypmap2src</code> only knows about the standard NIS maps and standard source to map conversion. If an advanced user has changed these, that is, the user has modified the NIS makefile, the equivalent changes must also be made to the <code>ypmap2src</code> script.
OPTIONS	<code>ypmap2src</code> supports the following options: <code>-c</code> Specifies that <i>custom-map-name</i> should be converted to a source file by running <code>makedbm -u</code> on it. This is a short cut so that simple custom maps can be handled without editing <code>ypmap2src</code>. <code>-d domain-name</code> Specifies the domain to convert. The <i>domain-name</i> can be a fully qualified file path, such as <code>/var/yp/a.b.c</code>, or just a domain name, <code>a.b.c</code>. In the latter case, <code>ypmap2src</code> looks in <code>/var/yp</code> for the domain directory.

ypmap2src(1M)

- o dest** Specifies the destination directory for the converted files. A directory other than `/etc` should be specified. The maps generated are copied to the correct location, `/etc`, `/etc/security` or other source directory, as appropriate.
- t** Specifies that traditional NIS maps, without N2L's `LDAP_` prefix, should be converted. By default, maps with the `LDAP_` prefix are converted.

OPERANDS ypmap2src supports the following operands:

- source-file** Lists the standard source files to convert. If this option is not given, then all the standard source files, plus any custom files specified by the `-c` option, are converted.

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWypu
Interface Stability	Obsolete

SEE ALSO `ypmake(1M)`, `ypserv(1M)`, `NISLDAPmapping(4)`, `attributes(5)`

System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)

NAME	ypoll – return current version of a NIS map at a NIS server host				
SYNOPSIS	/usr/sbin/ypoll [-d <i>ypdomain</i>] [-h <i>host</i>] <i>mapname</i>				
DESCRIPTION	The <code>ypoll</code> command asks a <code>ypserv()</code> process what the order number is, and which host is the master NIS server for the named map.				
OPTIONS	-d <i>ypdomain</i> Use <i>ypdomain</i> instead of the default domain. -h <i>host</i> Ask the <code>ypserv</code> process at <i>host</i> about the map parameters. If <i>host</i> is not specified, the NIS server for the local host is used. That is, the default host is the one returned by <code>ypwhich(1)</code>.				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:				
	<table> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> <tr> <td>Availability</td><td>SUNWnisu</td></tr> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnisu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWnisu				
SEE ALSO	<code>ypwhich(1)</code> , <code>ypfiles(4)</code> , <code>attributes(5)</code>				

yppush(1M)

NAME	yppush – force propagation of changed NIS map								
SYNOPSIS	/usr/lib/netsvc/yp/yppush [-v] [-h <i>host</i>] [-d <i>domain</i>] [-p # <i>parallel-xfrs</i>] <i>mapname</i>								
DESCRIPTION	yppush copies a new version of a Network Information Service (NIS) map from the master NIS server to the slave NIS servers. It is normally run only on the master NIS server by the <code>Makefile</code> in <code>/var/yp</code> after the master databases are changed. It first constructs a list of NIS server hosts by reading the NIS <code>ypservers</code> map within the <i>domain</i>. Keys within the <code>ypservers</code> map are the ASCII names of the machines on which the NIS servers run. A “transfer map” request is sent to the NIS server at each host, along with the information needed by the transfer agent (the program that actually moves the map) to call back the <code>yppush</code>. When the attempt has completed (successfully or not), and the transfer agent has sent <code>yppush</code> a status message, the results can be printed to <code>stdout</code>. Messages are also printed when a transfer is not possible, for instance, when the request message is undeliverable, or when the timeout period on responses has expired. Refer to <code>ypfiles(4)</code> and <code>ypserv(1M)</code> for an overview of the NIS service.								
OPTIONS	The following options are supported: <table><tr><td>-d <i>domain</i></td><td>Specifies a <i>domain</i>.</td></tr><tr><td>-h <i>host</i></td><td>Propagates only to the named <i>host</i>.</td></tr><tr><td>-p #<i>parallel-xfrs</i></td><td>Allows the specified number of map transfers to occur in parallel.</td></tr><tr><td>-v</td><td>Verbose. This prints messages when each server is called, and for each response. If this flag is omitted, only error messages are printed.</td></tr></table>	-d <i>domain</i>	Specifies a <i>domain</i> .	-h <i>host</i>	Propagates only to the named <i>host</i> .	-p # <i>parallel-xfrs</i>	Allows the specified number of map transfers to occur in parallel.	-v	Verbose. This prints messages when each server is called, and for each response. If this flag is omitted, only error messages are printed.
-d <i>domain</i>	Specifies a <i>domain</i> .								
-h <i>host</i>	Propagates only to the named <i>host</i> .								
-p # <i>parallel-xfrs</i>	Allows the specified number of map transfers to occur in parallel.								
-v	Verbose. This prints messages when each server is called, and for each response. If this flag is omitted, only error messages are printed.								
FILES	<code>/var/yp</code> Directory where NIS configuration files reside. <code>/var/yp/domain/ypservers. {dir, pag }</code> Map containing list of NIS servers to bind to when running in server mode.								
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes: <table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWypu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWypu				
ATTRIBUTE TYPE	ATTRIBUTE VALUE								
Availability	SUNWypu								
SEE ALSO	<code>ypserv(1M)</code> , <code>ypxfr(1M)</code> , <code>ypfiles(4)</code> , <code>attributes(5)</code>								

- NOTES** The Network Information Service (NIS) was formerly known as Sun Yellow Pages (YP). The functionality of the two remains the same; only the name has changed. The name Yellow Pages is a registered trademark in the United Kingdom of British Telecommunications PLC, and must not be used without permission.
- BUGS** In the current implementation (version 2 NIS protocol), the transfer agent is `ypxfr(1M)`, which is started by the `ypserv` program. If `yppush` detects that it is speaking to a version 1 NIS protocol server, it uses the older protocol, sending a version 1 `YPPROC_GET` request and issues a message to that effect. Unfortunately, there is no way of knowing if or when the map transfer is performed for version 1 servers. `yppush` prints a message saying that an “old-style” message has been sent. The system administrator should later check to see that the transfer has actually taken place.

ypserv(1M)

NAME	ypserv, ypxfrd – NIS server and binder processes		
SYNOPSIS	/usr/lib/netsvc/yp/ypserv [-dv] [-i -I] [-r] /usr/lib/netsvc/yp/ypxfrd		
DESCRIPTION	The Network Information Service (NIS) provides a simple network lookup service consisting of databases and processes. The databases are ndbm files in a directory tree rooted at /var/yp. See ndbm(3C). These files are described in ypfiles(4). The processes are /usr/lib/netsvc/yp/ypserv, the NIS database lookup server, and /usr/lib/netsvc/yp/ypbind, the NIS binder. The programmatic interface to the NIS service is described in ypclnt(3NSL). Administrative tools are described in yppoll(1M), yppush(1M), ypset(1M), ypxfr(1M), and ypwhich(1). Tools to see the contents of NIS maps are described in ypcat(1), and ypmatch(1). Database generation and maintenance tools are described in ypinit(1M), ypmake(1M), and makedbm(1M). The ypserv utility is a daemon process typically activated at system startup from /etc/init.d/rpc. Alternatively, you can, as the root user, start NIS services using ypstart(1M) from the command-line. ypserv runs only on NIS server machines with a complete NIS database. You can halt all NIS services using the ypstop(1M) command. The ypxfrd utility transfers entire NIS maps in an efficient manner. For systems that use this daemon, map transfers are 10 to 100 times faster, depending on the map. To use this daemon, be sure ypxfrd is running on the master server. See /usr/lib/netsvc/yp/ypstart. ypxfr attempts to use ypxfrd first. If that fails, it prints a warning, then uses the older transfer method. The ypserv daemon's primary function is to look up information in its local database of NIS maps. The operations performed by ypserv are defined for the implementor by the <i>YP Protocol Specification</i>, and for the programmer by the header file <rpcsvc/yp_prot.h>. Communication to and from ypserv is by means of RPC calls. Lookup functions are described in ypclnt(3NSL), and are supplied as C-callable functions in the libnsl(3LIB) library. There are four lookup functions, all of which are performed on a specified map within some NIS domain: yp_match(3NSL), yp_first(3NSL), yp_next(3NSL), and yp_all(3NSL). The yp_match operation takes a key, and returns the associated value. The yp_first operation returns the first key-value pair from the map, and yp_next can be used to enumerate the remainder. yp_all ships the entire map to the requester as the response to a single RPC request. A number of special keys in the DBM files can alter the way in which ypserv operates. The keys of interest are: <table><tr><td>YP_INTERDOMAIN</td><td>The presence of this key causes ypserv to forward to a DNS server host lookups that cannot be satisfied by the DBM files.</td></tr></table>	YP_INTERDOMAIN	The presence of this key causes ypserv to forward to a DNS server host lookups that cannot be satisfied by the DBM files.
YP_INTERDOMAIN	The presence of this key causes ypserv to forward to a DNS server host lookups that cannot be satisfied by the DBM files.		

YP_SECURE	This key causes ypserv to answer only questions coming from clients on reserved ports.
YP_MULTI_hostname	This is a special key in the form, YP_MULTI_hostname addr1,...,addrN. A client looking for <i>hostname</i> receives the closest address.

Two other functions supply information about the map, rather than map entries: `yp_order(3NSL)`, and `yp_master(3NSL)`. In fact, both order number and master name exist in the map as key-value pairs, but the server will not return either through the normal lookup functions. If you examine the map with `makedbm(1M)`, however, they are visible. Other functions are used within the NIS service subsystem itself, and are not of general interest to NIS clients. These functions include `do_you_serve_this_domain?`, `transfer_map`, and `reinitialize_internal_state`.

On start up, ypserv checks for the existence of the NIS to LDAP (N2L) configuration file `/var/yp/NISLDAPmapping`. If it is present then a master server starts in N2L mode. If the file is not present it starts in "traditional" (non N2L) mode. Slave servers always start in traditional mode.

In N2L mode, a new set of map files, with an `LDAP_` prefix, are generated, based on the contents of the LDAP DIT. The old map files, NIS source files and `ypmake(1M)` are not used.

It is possible that `ypmake(1M)` can be accidentally run in N2L mode. If the occurs, the old style map files are overwritten. That the map files are overwritten is harmless. However, any resulting `yppush(1M)` operation will push information based on the DIT rather than the source files. The user may not expect information based on the DIT. ypserv keeps track of the last modification date of the old style map files. If the map files have been updated, a warning is logged that suggests that the user call `yppush` directly instead of `ypmake`.

If a server attempts to run in N2L mode and a LDAP server cannot be contacted, it behaves as follows:

1. When ypserv is started, a warning will be logged.
2. When a NIS read access is made and the TTL entry has expired, a warning is logged. Information that is returned from the cache has not been updated.
3. When a NIS write access is made, a warning is logged. The cache will not be updated, and a NIS failure will be returned.

If `ypxfrd` is running in N2L mode and is asked to transfer a map, `ypxfrd` first checks whether the map is out of date. If the map is out of date, `ypxfrd` initiates an update from the DIT. `ypxfrd` cannot wait for the update to complete. If `ypxfrd` waited, the client end `ypxfr` operation could time out. To prevent `ypxfrd` from timing out, the existing map is transferred from the cache. The most up to date map will be transferred on subsequent `ypxfrd` operations.

ypserv(1M)

OPTIONS

ypserv	-d	The NIS service should go to the DNS for more host information. This requires the existence of a correct <code>/etc/resolv.conf</code> file pointing at a machine running <code>in.named(1M)</code> . This option turns on DNS forwarding regardless of whether or not the <code>YP_INTERDOMAIN</code> flag is set in the <code>hosts</code> maps. See <code>makedbm(1M)</code> . In the absence of an <code>/etc/resolv.conf</code> file, <code>ypserv</code> complains, but ignores the <code>-d</code> option.
	-i	If in N2L mode, initialize the NIS related parts of the DIT based on the current, non <code>LDAP_</code> prefixed, map files. The <code>LDAP_</code> prefixed maps are not created or updated. If you require that <code>LDAP_</code> prefixed maps be updated or created, then use the <code>-ir</code> option. The <code>-i</code> option does not attempt to create any NIS domain or container objects. If any NIS domain or container objects have not already been created, then errors will occur, as entries are written to nonexistent containers.
	-I	Identical to <code>-i</code> , except that any missing domain and container objects are created.
	-r	If in N2L mode, then refresh the <code>LDAP_</code> prefixed map files based on the contents of the DIT.
	-ir	If both <code>-i</code> and <code>-r</code> are specified in N2L mode, then the DIT will first be initialized from the current non <code>LDAP_</code> prefixed map files. A new set of <code>LDAP_</code> prefixed maps will then be generated from the contents of the DIT. A new set of <code>LDAP_</code> prefixed maps is required when moving from traditional NIS to N2L mode NIS.
	-Ir	Identical to <code>-ir</code> , except that any missing domain and container objects are created.
	-v	Operate in the verbose mode, printing diagnostic messages to <code>stderr</code> .

When run with the `-i`, `-r`, `-I`, `-ir` or `-Ir` options, the `ypserv` command runs in the foreground and exits once map initialization has been completed. Once the `ypserv` command exits, the user knows the maps are ready and can restart `ypserv` and the other `yp` daemons by running `ypstart(1M)`.

If there is a requirement to initialize the DIT from the NIS source files, which may have been modified since the maps were last remade), run `ypmake` before running `ypserv -i` or `ypserv -ir`. `ypmake` regenerated old style NIS maps. Then `ypserv -ir` dumps them into the DIT. When the `-ir` option is used, the `LDAP_` prefixed maps are also generated or updated. Since these maps will be more recent than the old style maps, `ypmake` will not be reported as erroneous when it is run.

FILES	<code>/var/yp/securenets</code>	Defines the hosts and networks that are granted access to information in the served domain. It is read at startup time by both <code>ypserv</code> and <code>ypxfrd</code> .

ypserv(1M)

/etc/init.d/rpc

Startup file that starts up basic RPC services and NIS by calling ypstart(1M). If the /var/yp/ypserv.log file exists when ypserv starts up, log information is written to it when error conditions arise. The file /var/yp/binding/domainname/ypservers is used to list the NIS server hosts that ypbind can bind to.

ATTRIBUTES See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWypu

SEE ALSO ypcat(1), ypmatch(1), ypwhich(1), domainname(1M), in.named(1M), makedbm(1M), ypbind(1M), ypinit(1M), ypmake(1M), yppoll(1M), yppush(1M), ypset(1M), ypstart(1M), ypstop(1M), ypxfr(1M), ndbm(3C), ypc1nt(3NSL), libnsl(3LIB), NISLDAPmapping(4), securenets(4), ypfiles(4), ypserv(4), attributes(5)

Network Interfaces Programmer's Guide

System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)

NOTES ypserv supports multiple domains. The ypserv process determines the domains it serves by looking for directories of the same name in the directory /var/yp. It replies to all broadcasts requesting yp service for that domain.

The Network Information Service (NIS) was formerly known as Sun Yellow Pages (YP). The functionality of the two remains the same; only the name has changed. The name Yellow Pages is a registered trademark in the United Kingdom of British Telecommunications PLC, and must not be used without permission.

NIS uses ndbm () files to store maps. Therefore, it is subject to the 1024 byte limitations described in the USAGE and NOTES sections of the ndbm(3C) man page.

ypset(1M)

NAME	ypset – point ypbind at a particular server
SYNOPSIS	/usr/sbin/ypset [-d <i>ypdomain</i>] [-h <i>host</i>] <i>server</i>
DESCRIPTION	In order to run <i>ypset</i>, <i>ypbind</i> must be initiated with the <i>-ypset</i> or <i>-ypsetme</i> options. See <i>ypbind</i>(1M). <i>ypset</i> tells <i>ypbind</i> to get NIS services for the specified <i>ypdomain</i> from the <i>ypserv</i> process running on <i>server</i>. If <i>server</i> is down, or is not running <i>ypserv</i>, this might not be discovered until an NIS client process tries to obtain a binding for the domain. At this point, the binding set by <i>ypset</i> is tested by <i>ypbind</i>. If the binding is invalid, <i>ypbind</i> attempts to rebind for the same domain. <i>ypset</i> is useful for binding a client node that is not on a broadcast net, or is on a broadcast net that is not running an NIS server host. It is also useful for debugging NIS client applications, for instance, where an NIS map exists only at a single NIS server host. Where several hosts on the local net are supplying NIS services, <i>ypbind</i> can rebind to another host, even while you attempt to find out if the <i>ypset</i> operation succeeded. For example, if you enter the <i>ypset</i> command below, you might get the subsequent response from <i>ypwhich</i>: <pre>example% ypset host1 example% ypwhich host2</pre> The sequence shown above is a function of the NIS subsystem's attempt to load-balance among the available NIS servers, and occurs when <i>host1</i> does not respond to <i>ypbind</i> because it is not running <i>ypserv</i> (or is overloaded), and <i>host2</i>, running <i>ypserv</i>, obtains the binding. <i>server</i> indicates which NIS server to bind to, and must be specified as a name or an IP address. This works only if the node has a current valid binding for the domain in question and <i>ypbind</i> has been set to allow use of <i>ypset</i>. In most cases, <i>server</i> should be specified as an IP address. <i>ypset</i> tries to bind over a connectionless transport. The NIS library call, <i>yp_all()</i>, uses connection-oriented transport and derives the NIS server's address based on the connectionless address supplied by <i>ypset</i>. Refer to <i>ypfiles</i>(4) for an overview of the NIS name service.
OPTIONS	-d <i>ypdomain</i> Use <i>ypdomain</i>, instead of the default domain. -h <i>host</i> Set <i>ypbind</i>'s binding on <i>host</i>, instead of locally. Specify <i>host</i> as a name.
ATTRIBUTES	See <i>attributes</i> (5) for descriptions of the following attributes:

ypset(1M)

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWnisu

SEE ALSO ypwhich(1), ypfiles(4), attributes(5)

ypstart(1M)

NAME ypstart, ypstop – Start and stop NIS services

SYNOPSIS `/usr/lib/netsvc/yp/ypstart`
`/usr/lib/netsvc/yp/ypstop`

DESCRIPTION The `ypstart` command is used to start the Network Information Service (NIS). After the host has been configured using the `ypinit(1M)` command, `ypstart` automatically determines the NIS status of the machine and starts the appropriate daemons.

The `ypstop` command is used to stop the Network Information Service (NIS).

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWypu

SEE ALSO `ypinit(1M)`, `attributes(5)`

System Administration Guide: Basic Administration

NOTES The Network Information Service (NIS) was formerly known as Sun Yellow Pages (YP). The functionality of the two services remains the same; only the name has changed. The name Yellow Pages is a registered trademark in the United Kingdom of British Telecommunications PLC, and must not be used without permission.

NAME	ypxfr, ypxfr_1perday, ypxfr_1perhour, ypxfr_2perday – transfer NIS map from a NIS server to host
SYNOPSIS	<code>/usr/lib/netsvc/yp/ypxfr [-c] [-f] [-C <i>tid prog server</i>] [-d <i>ypdomain</i>] [-h <i>host</i>] [-s <i>ypdomain</i>] <i>mapname</i></code>
DESCRIPTION	The <code>ypxfr</code> command moves an NIS map in the default domain for the local host to the local host by making use of normal NIS services. It creates a temporary map in the directory <code>/var/yp/ypdomain</code> (this directory must already exist; <i>ypdomain</i> is the default domain for the local host), fills it by enumerating the map's entries, fetches the map parameters (master and order number), and loads them. It then deletes any old versions of the map and moves the temporary map to the real <i>name</i>. If run interactively, <code>ypxfr</code> writes its output to the terminal. However, if it is started without a controlling terminal, and if the log file <code>/var/yp/ypxfr.log</code> exists, it appends all its output to that file. Since <code>ypxfr</code> is most often run from the privileged user's <code>crontab</code> file, or by <code>ypserv</code>, the log file can retain a record of what was attempted, and what the results were. For consistency between servers, <code>ypxfr</code> should be run periodically for every map in the NIS data base. Different maps change at different rates: a map might not change for months at a time, for instance, and can therefore be checked only once a day. Some maps might change several times per day. In such a case, you might want to check hourly for updates. A <code>crontab(1)</code> entry can be used to automatically perform periodic updates. Rather than having a separate <code>crontab</code> entry for each map, you can group commands to update several maps in a shell script. Examples (mnemonically named) are in <code>/usr/sbin/yp: ypxfr_1perday</code>, <code>ypxfr_2perday</code>, and <code>ypxfr_1perhour</code>. Refer to <code>ypfiles(4)</code> for an overview of the NIS name service.
OPTIONS	<code>-c</code> Do not send a "Clear current map" request to the local <code>ypserv</code> process. Use this flag if <code>ypserv</code> is not running locally at the time you are running <code>ypxfr</code>. Otherwise, <code>ypxfr</code> complains that it cannot communicate with the local <code>ypserv</code>, and the transfer fails. <code>-f</code> Force the transfer to occur even if the version at the master is not more recent than the local version. <code>-C <i>tid prog server</i></code> This option is for use <i>only</i> by <code>ypserv</code>. When <code>ypserv</code> starts <code>ypxfr</code>, it specifies that <code>ypxfr</code> should call back a <code>yppush</code> process at the host <i>server</i>, registered as program number <i>prog</i>, and waiting for a response to transaction <i>tid</i>. <code>-d <i>ypdomain</i></code> Specify a domain other than the default domain. <code>-h <i>host</i></code> Get the map from <i>host</i>, regardless of the master. If <i>host</i> is not specified, <code>ypxfr</code> asks the NIS service for the name of the master, and tries to get the map from there. <i>host</i> must be a valid host name.

ypxfr(1M)

	-s <i>ypdomain</i>	Specify a source domain from which to transfer a map that should be the same across domains.				
FILES	<i>/var/yp/ypxfr.log</i> Log file <i>/usr/lib/netsvc/yp/ypxfr_1perday</i> Script to run one transfer per day, for use with <i>cron(1M)</i> <i>/usr/lib/netsvc/yp/ypxfr_2perday</i> Script to run two transfer per day, for use with <i>cron(1M)</i> <i>/usr/lib/netsvc/yp/ypxfr_1perhour</i> Script for hourly transfers of volatile maps <i>/var/yp/ypdomain</i> NIS domain <i>/usr/spool/cron/crontabs/root</i> Privileged user's crontab file					
ATTRIBUTES	See <i>attributes(5)</i> for descriptions of the following attributes:					
ypxfr Only	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWnisu</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWnisu
ATTRIBUTE TYPE	ATTRIBUTE VALUE					
Availability	SUNWnisu					
ypxfr_1perday, ypxfr_1perhour, ypxfr_2perday	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWypu</td></tr></table>		ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWypu
ATTRIBUTE TYPE	ATTRIBUTE VALUE					
Availability	SUNWypu					
SEE ALSO	<i>crontab(1)</i> , <i>cron(1M)</i> , <i>ypinit(1M)</i> , <i>yppush(1M)</i> , <i>ypserv(1M)</i> , <i>ypfiles(4)</i> , <i>attributes(5)</i>					

NAME	zdump – time zone dumper				
SYNOPSIS	zdump [-v] [-c <i>cutoffyear</i>] [<i>zonename</i> ...]				
DESCRIPTION	The zdump command prints the current time for each time zone (<i>zonename</i>) listed on the command line. Specify <i>zonename</i> as the name of the time zone database file relative to <code>/usr/share/lib/zoneinfo</code>. Specifying an invalid time zone (<i>zonename</i>) to zdump does not return an error, rather zdump uses GMT. This is consistent with the behavior of the library calls; zdump reflects the same behavior of the time routines in <code>libc</code>. See <code>ctime(3C)</code> and <code>mktime(3C)</code>.				
OPTIONS	The following options are supported: <table><tr><td>-v</td><td>Displays the entire contents of the time zone database file for <i>zonename</i>. Prints the time at the lowest possible time value; the time one day after the lowest possible time value; the times both one second before and exactly at each time at which the rules for computing local time change; the time at the highest possible time value; and the time at one day less than the highest possible time value. See <code>mktime(3C)</code> and <code>ctime(3C)</code> for information regarding time value (<code>time_t</code>). Each line of output ends with <code>isdst=1</code> if the given time is Daylight Saving Time, or <code>isdst=0</code> otherwise.</td></tr><tr><td>-c <i>cutoffyear</i></td><td>Cuts off the verbose output near the start of the year <i>cutoffyear</i>.</td></tr></table>	-v	Displays the entire contents of the time zone database file for <i>zonename</i> . Prints the time at the lowest possible time value; the time one day after the lowest possible time value; the times both one second before and exactly at each time at which the rules for computing local time change; the time at the highest possible time value; and the time at one day less than the highest possible time value. See <code>mktime(3C)</code> and <code>ctime(3C)</code> for information regarding time value (<code>time_t</code>). Each line of output ends with <code>isdst=1</code> if the given time is Daylight Saving Time, or <code>isdst=0</code> otherwise.	-c <i>cutoffyear</i>	Cuts off the verbose output near the start of the year <i>cutoffyear</i> .
-v	Displays the entire contents of the time zone database file for <i>zonename</i> . Prints the time at the lowest possible time value; the time one day after the lowest possible time value; the times both one second before and exactly at each time at which the rules for computing local time change; the time at the highest possible time value; and the time at one day less than the highest possible time value. See <code>mktime(3C)</code> and <code>ctime(3C)</code> for information regarding time value (<code>time_t</code>). Each line of output ends with <code>isdst=1</code> if the given time is Daylight Saving Time, or <code>isdst=0</code> otherwise.				
-c <i>cutoffyear</i>	Cuts off the verbose output near the start of the year <i>cutoffyear</i> .				
EXIT STATUS	The following exit values are returned: <table><tr><td>0</td><td>Successful completion.</td></tr><tr><td>1</td><td>An error occurred.</td></tr></table>	0	Successful completion.	1	An error occurred.
0	Successful completion.				
1	An error occurred.				
FILES	<table><tr><td><code>/usr/share/lib/zoneinfo</code></td><td>Standard zone information directory</td></tr></table>	<code>/usr/share/lib/zoneinfo</code>	Standard zone information directory		
<code>/usr/share/lib/zoneinfo</code>	Standard zone information directory				
ATTRIBUTES	See <code>attributes(5)</code> for descriptions of the following attributes:				
	<table><tr><th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr><tr><td>Availability</td><td>SUNWcsu</td></tr></table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWcsu
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWcsu				
SEE ALSO	<code>zic(1M)</code> , <code>ctime(3C)</code> , <code>mktime(3C)</code> , <code>attributes(5)</code> , <code>environ(5)</code>				

zic(1M)

NAME	zic – time zone compiler																		
SYNOPSIS	zic [-s] [-v] [-l <i>localtime</i>] [-p <i>posixrules</i>] [-d <i>directory</i>] [-y <i>yearistype</i>] [<i>filename...</i>]																		
DESCRIPTION	zic reads text from the file(s) named on the command line and creates the time conversion information files specified in this input. If a <i>filename</i> is '-', the standard input is read. Input lines are made up of fields. Fields are separated by any number of white space characters. Leading and trailing white space on input lines is ignored. A pound sign (#) indicates a comment that extends to the end of the line. White space characters and pound signs can be enclosed within double quotes (" ") if they are to be used as part of a field. Any line that is blank (after comment stripping) is ignored. Non-blank lines are expected to be of one of three types: rule lines, zone lines, or link lines.																		
Rule	A rule line has the form: For example: <pre>Rule NAME FROM TO TYPE IN ON AT SAVE LETTER/S</pre> The fields that make up a rule line are: <pre>Rule USA 1969 1973 - Apr lastSun 2:00 1:00 D</pre> <table><tr><td>NAME</td><td>Gives the (arbitrary) name of the set of rules this rule is part of.</td></tr><tr><td>FROM</td><td>Gives the first year in which the rule applies. The word minimum (or an abbreviation) means the minimum year with a representable time value. The word maximum (or an abbreviation) means the maximum year with a representable time value.</td></tr><tr><td>TO</td><td>Gives the final year in which the rule applies. In addition to minimum and maximum (as above), the word only (or an abbreviation) can be used to repeat the value of the FROM field.</td></tr><tr><td>TYPE</td><td>Gives the type of year in which the rule applies. If TYPE is: <table><tr><td>'-'</td><td>The rule applies in all years between FROM and TO, inclusive.</td></tr><tr><td>uspres</td><td>The rule applies in U.S. Presidential election years.</td></tr><tr><td>nonpres</td><td>The rule applies in years other than U.S. Presidential election years.</td></tr><tr><td>even</td><td>The rule applies to even-numbered years.</td></tr><tr><td>odd</td><td>The rule applies to odd-numbered years.</td></tr></table></td></tr></table>	NAME	Gives the (arbitrary) name of the set of rules this rule is part of.	FROM	Gives the first year in which the rule applies. The word minimum (or an abbreviation) means the minimum year with a representable time value. The word maximum (or an abbreviation) means the maximum year with a representable time value.	TO	Gives the final year in which the rule applies. In addition to minimum and maximum (as above), the word only (or an abbreviation) can be used to repeat the value of the FROM field.	TYPE	Gives the type of year in which the rule applies. If TYPE is: <table><tr><td>'-'</td><td>The rule applies in all years between FROM and TO, inclusive.</td></tr><tr><td>uspres</td><td>The rule applies in U.S. Presidential election years.</td></tr><tr><td>nonpres</td><td>The rule applies in years other than U.S. Presidential election years.</td></tr><tr><td>even</td><td>The rule applies to even-numbered years.</td></tr><tr><td>odd</td><td>The rule applies to odd-numbered years.</td></tr></table>	'-'	The rule applies in all years between FROM and TO, inclusive.	uspres	The rule applies in U.S. Presidential election years.	nonpres	The rule applies in years other than U.S. Presidential election years.	even	The rule applies to even-numbered years.	odd	The rule applies to odd-numbered years.
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odd	The rule applies to odd-numbered years.																		

If TYPE is something else, then `zic` will attempt to execute the command

```
yearistype year type
```

to check the type of a year: an exit status of 0 means that the year is of the given type; an exit status of 1 means that the year is not of the given type. The `yearistype` command is not currently provided in the Solaris environment.

IN	Names the month in which the rule takes effect. Month names can be abbreviated.										
ON	Gives the day on which the rule takes effect. Recognized forms include: <table> <tr> <td>5</td><td>the fifth day of the month</td></tr> <tr> <td>lastSun</td><td>The last Sunday in the month</td></tr> <tr> <td>lastMon</td><td>The last Monday in the month</td></tr> <tr> <td>Sun>=8</td><td>First Sunday on or after the eighth</td></tr> <tr> <td>Sun<=25</td><td>Last Sunday on or before the 25th</td></tr> </table> Names of days of the week can be abbreviated or spelled out in full. Note: There cannot be spaces within the ON field.	5	the fifth day of the month	lastSun	The last Sunday in the month	lastMon	The last Monday in the month	Sun>=8	First Sunday on or after the eighth	Sun<=25	Last Sunday on or before the 25th
5	the fifth day of the month										
lastSun	The last Sunday in the month										
lastMon	The last Monday in the month										
Sun>=8	First Sunday on or after the eighth										
Sun<=25	Last Sunday on or before the 25th										
AT	Gives the time of day at which the rule takes effect. Recognized forms include: <table> <tr> <td>2</td><td>Time in hours</td></tr> <tr> <td>2:00</td><td>Time in hours and minutes</td></tr> <tr> <td>15:00</td><td>24-hour format time (for times after noon)</td></tr> <tr> <td>1:28:14</td><td>Time in hours, minutes, and seconds, where hour 0 is midnight at the start of the day and hour 24 is midnight at the end of the day.</td></tr> </table> Any of these forms can be followed by the letter <code>w</code> if the given time is local “wall clock” time; <code>s</code> if the given time is local “standard” time; or <code>u</code> (or <code>g</code> or <code>z</code>) if the given time is universal time. In the absence of an indicator, wall clock time is assumed.	2	Time in hours	2:00	Time in hours and minutes	15:00	24-hour format time (for times after noon)	1:28:14	Time in hours, minutes, and seconds, where hour 0 is midnight at the start of the day and hour 24 is midnight at the end of the day.		
2	Time in hours										
2:00	Time in hours and minutes										
15:00	24-hour format time (for times after noon)										
1:28:14	Time in hours, minutes, and seconds, where hour 0 is midnight at the start of the day and hour 24 is midnight at the end of the day.										
SAVE	Gives the amount of time to be added to local standard time when the rule is in effect. This field has the same format as the AT field (without the <code>w</code> and <code>s</code> suffixes).										
LETTER/S	Gives the “variable part” (for example, the “S” or “D” in “EST” or “EDT” of time zone abbreviations to be used when this rule is in effect. If this field is ‘-’, the variable part is null.										

zic(1M)

Zone

A zone line has the form:

```
Zone  NAME                      GMTOFF  RULES/SAVE  FORMAT  [UNTIL]
```

For example:

```
Zone Australia/SouthWest  9:30      -          CST      1992 Mar 15 12:00
                        8:30      Aus         CST
```

The fields that make up a zone line are:

NAME	The name of the time zone. This is the name used in creating the time conversion information file for the zone.
GMTOFF	The amount of time to add to UTC to get standard time in this zone. This field has the same format as the AT and SAVE fields of rule lines; begin the field with a minus sign to subtract time from UTC.
RULES/SAVE	The name of the rule(s) that apply in the time zone or, alternately, an amount of time to add to local standard time. If this field is '-', then standard time always applies in the time zone.
FORMAT	The format for time zone abbreviations in this time zone. The pair of characters %s is used to show where the "variable part" of the time zone abbreviation goes. Alternately, a slash (/) separates standard and daylight abbreviations.
UNTIL	The time at which the UTC offset or the rule(s) change for a location. It is specified as a year, a month, a day, and a time of day. The time of day has the same format as the AT field of rule lines. If this is specified, the time zone information is generated from the given UTC offset and rule change until the time specified. The month, day, and time of day have the same format as the IN, ON, and AT columns of a rule; trailing columns can be omitted, and default to the earliest possible value for the missing columns. The next line must be a "continuation" line. This line has the same form as a zone line except that the string "Zone" and the name are omitted. The continuation line places information starting at the time specified as the UNTIL field in the previous line in the file used by the previous line. Continuation lines can contain an UNTIL field, just as zone lines do, indicating that the next line is a further continuation.

Link

A link line has the form:

```
Link  LINK-FROM  LINK-TO
```


For example:

```
Link    Europe/Istanbul Asia/Istanbul
```

The LINK-FROM field should appear as the NAME field in some zone line; the LINK-TO field is used as an alternate name for that zone.

Except for continuation lines, lines can appear in any order in the input.

OPTIONS

- d *directory* Creates time conversion information files in the directory *directory* rather than in the standard directory `/usr/share/lib/zoneinfo`.
- l *localtime* Uses the given time zone as local time *localtime*. `zic` acts as if the file contained a link line of the form:


```
Link    localtime    localtime
```
- p *posixrules* Uses the rules of the given time zone *posixrules* when handling POSIX-format time zone environment variables. `zic` acts as if the input contained a link line of the form:


```
Link    posixrules    posixrules
```


 This option is not used by `ctime(3C)` and `mktime(3C)` in the Solaris environment.
- s Limits time values stored in output files to values that are the same whether they are taken to be signed or unsigned. You can use this option to generate SVVS-compatible files.
- v Complains if a year that appears in a data file is outside the range of years representable by system time values (0:00:00 a.m. UTC, January 1, 1970, to 3:14:07 a.m. UTC, January 19, 2038).
- y *yearistype* Uses the given command *yearistype* rather than `yearistype` when checking year types (see Rules under DESCRIPTION).

OPERANDS

- filename* A file containing input lines that specify the time conversion information files to be created. If a *filename* is '-', the standard input is read.

FILES

- `/usr/share/lib/zoneinfo` Standard directory used for created files
- `/usr/share/lib/zoneinfo/src` Directory containing source files

zic(1M)

ATTRIBUTES See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWcsu

SEE ALSO `time(1)`, `zdump(1M)`, `ctime(3C)`, `mktime(3C)`, `attributes(5)`

NOTES For areas with more than two types of local time, you might need to use local standard time in the AT field of the earliest transition time's rule to ensure that the earliest transition time recorded in the compiled file is correct.

NAME	zuludaemon – load microcode for Sun XVR-4000 Graphics Accelerator device				
SYNOPSIS	/usr/sbin/zuludaemon [-dev <i>zulu_device</i>]				
DESCRIPTION	The zuludaemon is a daemon, started and stopped from a script in <code>/etc/init.d</code>, that loads the microcode and provides other support functions for the Sun XVR-4000 Graphics Accelerator device. Do not kill this process. This daemon is essential to the zulu(7D) driver. The zuludaemon process is not configurable.				
OPTIONS	-dev <i>zulu_device</i> name of the Sun XVR-4000 Graphics Accelerator device				
FILES	<code>/usr/sbin/zuludaemon</code> daemon executable <code>/usr/lib/zulu.unicode</code> file containing microcode used by zuludaemon <code>/etc/init.d/zuluinit</code> startup/kill script for zuludaemon				
ATTRIBUTES	See attributes(5) for descriptions of the following attributes: <table border="1"> <thead> <tr> <th>ATTRIBUTE TYPE</th><th>ATTRIBUTE VALUE</th></tr> </thead> <tbody> <tr> <td>Availability</td><td>SUNWzuluc</td></tr> </tbody> </table>	ATTRIBUTE TYPE	ATTRIBUTE VALUE	Availability	SUNWzuluc
ATTRIBUTE TYPE	ATTRIBUTE VALUE				
Availability	SUNWzuluc				
SEE ALSO	SUNWzulu_config(1M), attributes(5), zulu(7D)				

zuludaemon(1M)

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