Oracle® Solaris Cluster Reference Manual

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Contents

Preface

The *Oracle Solaris Cluster Reference Manual* provides reference information for commands, functions, and other public interfaces in Oracle Solaris Cluster software. This book is intended for experienced system administrators with extensive knowledge of Oracle software and hardware. This book is not to be used as a planning or presales guide. The information in this book assumes knowledge of the Oracle Solaris Operating System and expertise with the volume manager software that is used with Oracle Solaris Cluster software.

Both novice users and those familiar with the Oracle Solaris Operating System can use online man pages to obtain information about their SPARC based system or x86 based system and its features.

A man page is intended to answer concisely the question “What does this command do?“ The man pages in general comprise a reference manual. They are not intended to be a tutorial.

Note – Oracle Solaris Cluster software runs on two platforms, SPARC and x86. The information in this book pertains to both platforms unless otherwise specified in a special chapter, section, note, bulleted item, figure, table, or example.

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 1CL describes, in alphabetical order, commands that are used for the maintenance and administration of Oracle Solaris Cluster.
- Section 1HA describes describes, in alphabetical order, Oracle Solaris Cluster high availability (HA) commands.
- Section 1M describes, in alphabetical order, commands that are used chiefly for system maintenance and administration purposes.
- Section 3HA describes, in alphabetical order, Oracle Solaris Cluster HA and data services functions.

- Section 4 outlines the formats of various files. The C structure declarations for the file formats are given where applicable.
- Section 5 contains miscellaneous Oracle Solaris Cluster documentation such as descriptions of resource types.
- Section 5CL describes Oracle Solaris Cluster standards, environments, and macros.
- Section 7 describes Oracle Solaris Cluster device and network interfaces.
- Section 7P describes Oracle Solaris Cluster protocols.

The following 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 no bugs can be reported, no BUGS section is included. See the `intro` pages for more information and detail about each section, and `man(1)` for general information about man pages.

NAME	This section gives the names of the commands or functions that are documented, followed by a brief description of what they do.
SYNOPSIS	This section shows the syntax of commands or functions. If 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:

[ ]	Brackets. The option or argument that is 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. All characters within braces must be treated as a unit.

PROTOCOL	This section occurs only in subsection 3R and indicates the protocol description file.
DESCRIPTION	This section defines the functionality and behavior of the service. Thus it describes concisely what the command does. DESCRIPTION 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 `ioctl(2)` system call is called `ioctl` and generates its own heading. `ioctl` calls for a specific device are listed alphabetically (on the man page for that specific device). `ioctl` calls are used for a particular class of devices. All these calls have an `io` ending, such as `mtio(7I)`.
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 that are 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 `errno` that indicates 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 that are 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, which includes command-line entry and machine response, is shown. Whenever an example is given, the prompt is shown as `example%`, or if the user must be superuser, `example#`. 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 are returned for various error conditions.

FILES

This section lists all file names that are referred to by the man page, files of interest, and files created or required by commands. Each file name 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 `attributes(5)` 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 that caused the error.
WARNINGS	This section lists warnings about special conditions that could seriously affect your working conditions. WARNINGS is not a list of diagnostics.
NOTES	This section lists additional information that does not belong anywhere else on the page. NOTES covers points of special interest to the user. Critical information is never covered here.
BUGS	This section describes known bugs and, wherever possible, suggests workarounds.

REFERENCE

Introduction

Name Intro – introduction to Oracle Solaris Cluster maintenance commands

Description This section describes the object-oriented command set for Oracle Solaris Cluster. Although the original Oracle Solaris Cluster command set is still available, use the object-oriented commands for more intuitive configuration of your cluster. In addition, future new features might not be available in the original command set.

The object-oriented command set uses a common prefix `cl`. The original command set used the prefix `sc`. Both the `sc` and `cl` commands are located in `/usr/cluster/bin`.

Many commands in this command set have both a long form and a short form. For example, `clresource`(1CL) and `clrs`(1CL) are identical.

Each object-oriented command is designed to manage a single type of cluster object. The command name indicates the type of object that it manages. For example, the `clresource` command manages Oracle Solaris Cluster data service resources. Within a command, subcommands define operations that are allowed on the specific cluster object.

The general form of commands in the object-oriented command set is as follows:

cmdname [*subcommand*] [*option*…] [*operand* …]

Options that you use with the object-oriented commands also have a long form and a short form. You specify the short form of an option with a single dash (`-`) followed by a single character. You specify the long form of an option with two dashes (`--`) followed by an option word. For example, `-p` is the short form of the property option. `--property` is the long form.

Some options accept an option argument while others do not. If an option accepts an option argument, the option argument is required. The `-?` option requires no arguments. However, the `--property` option requires an option argument that identifies the property being operated on.

You can group the short form of options without arguments behind a single dash (`-`). For example, `-eM`. You must separate groups of option-arguments following an option either by commas, or by a tab or a space character. When using a tab or space, surround the option-arguments with quotation marks (-o xxx,z,yy or -o “xxx z yy”).

To specify option arguments with long option names, use either the `--input=`*configurationfile* format or the `--input` *configurationfile* format.

All commands in this command set accept the `-?` or `--help` option. If you provide these options without a subcommand, summary help for the command is displayed. If you provide a subcommand, help for that subcommand only is displayed.

Certain commands work in conjunction with a configuration file. For information on the required format of this file, see the `clconfiguration`(5CL) man page.

Many subcommands in this command set accept `+` as an operand to indicate all applicable objects.

List Of Commands This section describes, in alphabetical order, the object-oriented commands that are available with the Oracle Solaris Cluster product.

`claccess`(1CL)
: Manage Oracle Solaris Cluster access policies for adding nodes

`cldevice`(1CL), `cldev`(1CL)
: Manage Oracle Solaris Cluster devices

`cldevicegroup`(1CL), `cldg`(1CL)
: Manage Oracle Solaris Cluster device groups

`clinterconnect`(1CL), `clintr`(1CL)
: Manage the Oracle Solaris Cluster interconnect

`clnasdevice`(1CL), `clnas`(1CL)
: Manage access to NAS devices for Oracle Solaris Cluster

`clnode`(1CL)
: Manage Oracle Solaris Cluster nodes

`clpstring`(1CL)
: Manage Oracle Solaris Cluster private strings

`clquorum`(1CL), `clq`(1CL)
: Manage Oracle Solaris Cluster quorum

`clreslogicalhostname`(1CL), `clrslh`(1CL)
: Manage Oracle Solaris Cluster resources for logical host names

`clresource`(1CL), `clrs`(1CL)
: Manage resources for Oracle Solaris Cluster data services

`clresourcegroup`(1CL), `clrg`(1CL)
: Manage resource groups for Oracle Solaris Cluster data services

`clresourcetype`(1CL), `clrt`(1CL)
: Manage resource types for Oracle Solaris Cluster data services

`clressharedaddress`(1CL), `clrssa`(1CL)
: Manage Oracle Solaris Cluster resources for shared addresses

`clsetup`(1CL)
: Configure Oracle Solaris Cluster interactively

`clsnmphost`(1CL)
: Administer Oracle Solaris Cluster SNMP hosts

`clsnmpmib`(1CL), `clmib`(1CL)
: Administer Oracle Solaris Cluster SNMP MIB

`clsnmpuser`(1CL)
: Administer Oracle Solaris Cluster SNMP users

cltelemetryattribute(1CL)
Configure system resource monitoring

cluster(1CL)
Manage the global configuration and the global status of Sun Cluster

clzonecluster(1CL),clzc(1CL)
Manage zone clusters for Oracle Solaris Cluster

Mapping Original Oracle Solaris Cluster Commands to Object-Oriented Commands

Because the newer command set is object oriented, a clear one-to-one mapping from the original command set does not exist. The following list provides some common Oracle Solaris Cluster commands from the original set and their object-oriented set equivalents.

`scstat`
`cluster status`

You can also use the `status` subcommands that are available with many of the object-oriented commands.

`scinstall`
Use `cluster create` to create a cluster from an XML configuration file.

To create a cluster interactively, use `scinstall`.

`scrgadm`

- `clresource`
- `clresourcetype`
- `clresourcegroup`

`clressharedaddress` and `clreslogicalhostname` provide additional conveniences when you work with those particular resource types.

`scswitch`

- `clresource`
- `clresourcetype`
- `clresourcegroup`
- `clreslogicalhostname`
- `clressharedaddress`
- `clnode evacuate` (to move off a node all resource groups and device groups)

`scconf`

- `cldevicegroup`
- `clinterconnect`
- `clquorum`
- `clnode`
- `claccess`

	Use `cluster show` instead of `scconf -p`.
`sccheck`	`cluster check`
`scdidadm`	`cldevice`
`scgdevs`	`cldevice populate`
`scdpm`	`cldevice`
`scnas`, `scnasdir`	`clnasdevice`
`scsetup`	`clsetup`

Exit Status If an object-oriented Oracle Solaris Cluster command is successful for all specified operands, the command returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

These exit codes are shared across this set of commands.

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

`5 CL_ERECONF`
Cluster is reconfiguring

The cluster is reconfiguring.

`6 CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su(1M)` and `rbac(5)` man pages for more information.

`9 CL_ESTATE`
Object is in wrong state

You tried to modify a property, a resource group, or other object that you cannot modify at that particular time or at any time.

10 `CL_EMETHOD`
Resource method failed

A method of a resource failed. The method failed for one of the following reasons:

- The `validate` method failed when you tried to create a resource or modify the properties of a resource.
- A method other than `validate` failed when you tried to enable, disable, or delete a resource.

15 `CL_EPROP`
Invalid property

The property or value that you specified with the `-p`, `-y`, or `-x` option does not exist or is not allowed.

18 `CL_EINTERNAL`
Internal error was encountered

An internal error indicates a software defect or other defect.

35 `CL_EIO`
I/O error

A physical input/output error has occurred.

36 `CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

37 `CL_EOP`
Operation not allowed

You tried to perform an operation on an unsupported configuration, or you performed an unsupported operation.

38 `CL_EBUSY`
Object busy

You attempted to remove a cable from the last cluster interconnect path to an active cluster node. Or, you attempted to remove a node from a cluster configuration from which you have not removed references.

39 `CL_EEXIST`
Object exists

The device, device group, cluster interconnect component, node, cluster, resource, resource type, resource group, or private string that you specified already exists.

41 `CL_ETYPE`
Invalid type

The type that you specified with the `-t` or `-p` option does not exist.

50 `CL_ECLMODE`
Node is in cluster mode

You attempted to perform an operation on a node that is booted in cluster mode. However, you can perform this operation only on a node that is booted in noncluster mode.

51 `CL_ENOTCLMODE`
Node is not in cluster mode

You attempted to perform an operation on a node that is booted in noncluster mode. However, you can perform this operation only on a node that is booted in cluster mode.

See Also `getopt(1)`

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

REFERENCE

OSC4 1

Name libschost.so.1 – shared object to provide logical host name instead of a physical host name

Synopsis `libschost.so.1`

Description The `libschost.so.1` shared object provides a mechanism by which the physical host name can be selectively configured for launched processes and their descendants.

In the Oracle Solaris Cluster environment, an application might attempt to access the same host name after a failover or switchover. As a result, the failover or switchover fails because the name of the physical host changes after a failover or switchover. In such a scenario, the application data service can use the `libschost.so.1` shared object to provide a logical host name to the application rather than a physical host name.

To enable `libschost.so.1`, you need to set the `SC_LHOSTNAME` environment variable as well as the following two environment variables:

```
LD_PRELOAD_32=$LD_PRELOAD_32:/usr/cluster/lib/libschost.so.1
LD_PRELOAD_64=$LD_PRELOAD_64:/usr/cluster/lib/64/libschost.so.1
```

By setting both the `LD_PRELOAD_32` and `LD_PRELOAD_64` environment variables, you ensure that the `libschost.so.1` shared object works with both 32-bit and 64-bit applications.

Security The runtime linker accesses the default trusted directory `/usr/lib/secure` for 32-bit objects and `/usr/lib/secure/64` for 64-bit objects. If your secure applications use the `libschost.so.1` shared object, you need to ensure that the `libschost.so.1` shared object is accessed from a trusted directory.

To do so, create a symbolic link from `/usr/cluster/lib/libschost.so.1` to `/usr/lib/secure/libschost.so.1` for 32-bit applications or from `/usr/cluster/lib/64/libschost.so.1` to `/usr/lib/secure/64/libschost.so.1` for 64-bit applications.

After you create these symbolic links, the `LD_PRELOAD_32` and `LD_PRELOAD_64` environment variables use the `libschost.so.1` shared object from a trusted directory.

You can also use the `crle` command to specify additional trusted directories or to change the default trusted directory for secure applications. See the `crle(1)` man page.

Environment Variables Once preloaded, the `libschost.so.1` shared object reads the following environment variable and returns it as the host name.

`SC_LHOSTNAME=`*hostname*

`SC_LHOSTNAME` specifies the logical host name. The specified host name is available to all launched and descendant processes.

The *hostname* value can be a maximum of `MAXHOSTNAMELEN` characters long. The `MAXHOSTNAMELEN` constant is defined as 256 characters in the `netdb.h` header file.

Examples

EXAMPLE 1 Configuring a Logical Host Name With a Logical Host Name at Runtime in C

The C code in the following example configures a host name with a logical host name. This example includes a call to the `scds_get_rs_hostnames()` Oracle Solaris Cluster function and includes references to the `scds_handle_t` and `scds_net_resource_list_t` Oracle Solaris Cluster data structures.

The `scds_get_rs_hostnames()` function provides a list of host names that are used by a resource. The code assigns the first host name value in this list to the `SC_LHOSTNAME` environment variable.

Any application that starts after you execute the following code gets a logical host name rather than a physical host name.

```
/* 13 bytes to hold "SC_LHOSTNAME=" string */
#define HOSTLENGTH (MAXHOSTNAMELEN + 13)

/* 14 bytes to hold "LD_PRELOAD_XX=" string */
#define PATHLENGTH (MAXPATHLEN + 14)

char lhostname[HOSTLENGTH], ld_32[PATHLENGTH], \
     ld_64[PATHLENGTH];

scds_get_rs_hostnames(scds_handle, &snrlp);
if (snrlp != NULL && snrlp->num_netresources != 0) {
    snprintf(lhostname, HOSTLENGTH, "SC_LHOSTNAME=%s", \
        snrlp->netresources[0].hostnames[0]);
    putenv(lhostname);
}

/* Setting LD_PRELOAD_32 environment variable */
if (getenv("LD_PRELOAD_32") == NULL)
    snprintf(ld_32, PATHLENGTH, "LD_PRELOAD_32="
        "/usr/cluster/lib/libschost.so.1");
else
    snprintf(ld_32, PATHLENGTH, "LD_PRELOAD_32=%s:"
        "/usr/cluster/lib/libschost.so.1", \
         getenv("LD_PRELOAD_32"));

putenv(ld_32);

/* Setting LD_PRELOAD_64 environment variable */
if (getenv("LD_PRELOAD_64") == NULL)
    snprintf(ld_64, PATHLENGTH, "LD_PRELOAD_64="
        "/usr/cluster/lib/64/libschost.so.1");
else
    snprintf(ld_64, PATHLENGTH,
        "LD_PRELOAD_64=%s:/usr/cluster/lib/"
        "64/libschost.so.1", getenv("LD_PRELOAD_64"));
```

EXAMPLE 1 Configuring a Logical Host Name With a Logical Host Name at Runtime in C *(Continued)*

```
    putenv(ld_64);
```

EXAMPLE 2 Configuring a Logical Host Name With a Logical Host Name at Runtime With Shell Commands

The shell commands in the following example show how an application data service configures a host name with a logical host name by using the `gethostnames` command. The `gethostnames` command takes the following arguments:

- `-R` *resource-name*
- `-G` *resourcegroup-name*
- `-T` *resourcetype-name*

The `gethostnames` command returns all the logical host names that are associated with that resource, separated by a semicolon (;). The commands assign the first host name value in this list to the `SC_LHOSTNAME` environment variable.

```
phys-schost-1$ LD_PRELOAD_32=$LD_PRELOAD_32:/usr/cluster/lib/libschost.so.1
phys-schost-1$ LD_PRELOAD_64=$LD_PRELOAD_64:/usr/cluster/lib/64/libschost.so.1
phys-schost-1$ SC_LHOSTNAME=‘/usr/cluster/lib/scdsbuilder/src/scripts/gethostnames \
               -R nfs-r -G nfs-rg -T SUNW.nfs:3.1 |cut -f1 -d","‘
phys-schost-1$ export LD_PRELOAD_32 LD_PRELOAD_64 SC_LHOSTNAME
```

EXAMPLE 3 Configuring a Logical Host Name for Secure Applications With Shell Commands

The shell commands in the following example configure the logical host name. Any secure application that starts after you execute the following shell commands gets the value of the `SC_LHOSTNAME` environment variable (that is, a logical host name) rather than a physical host name.

```
phys-schost-1$ cd /usr/lib/secure
phys-schost-1$ ln -s /usr/cluster/lib/libschost.so.1 .
phys-schost-1$ cd /usr/lib/secure/64
phys-schost-1$ ln -s /usr/cluster/lib/64/libschost.so.1 .
phys-schost-1$ LD_PRELOAD_32=$LD_PRELOAD_32:/usr/lib/secure/libschost.so.1
phys-schost-1$ LD_PRELOAD_64=$LD_PRELOAD_64:/usr/lib/secure/64/libschost.so.1
phys-schost-1$ SC_LHOSTNAME=test
phys-schost-1$ export LD_PRELOAD_32 LD_PRELOAD_64 SC_LHOSTNAME
```

Files

`/usr/cluster/lib/libschost.so.1`
Default location of the shared object for 32-bit applications

`/usr/cluster/lib/64/libschost.so.1`
Default location of the shared object for 64-bit applications

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also crle(1), cut(1), hostname(1), ld(1), ld.so.1(1), proc(1), uname(1), exec(2), sysinfo(2), uname(2), gethostname(3C), putenv(3C), snprintf(3C), system(3C), proc(4)

Notes The logical host name is inherited.

User programs that fetch a host name by calling the following commands or functions can obtain a logical host name rather than a physical host name:

- `hostname` command
- `uname` command
- `uname()` function
- `sysinfo()` function
- `gethostname()` function

User programs that fetch a host name by other commands or functions cannot obtain a logical host name.

R E F E R E N C E

OSC4 1cl

Name claccess – manage Oracle Solaris Cluster access policies for nodes

Synopsis

```
/usr/cluster/bin/claccess -V

/usr/cluster/bin/claccess [subcommand] -?

/usr/cluster/bin/claccess subcommand [options] -v [hostname[,...]]

/usr/cluster/bin/claccess allow  -h hostname[,...]

/usr/cluster/bin/claccess allow-all

/usr/cluster/bin/claccess deny  -h hostname[,...]

/usr/cluster/bin/claccess deny-all

/usr/cluster/bin/claccess list

/usr/cluster/bin/claccess set  -p protocol=authprotocol

/usr/cluster/bin/claccess show
```

Description The `claccess` command controls the network access policies for machines that attempt to access the cluster configuration. The `claccess` command has no short form.

The cluster maintains a list of machines that can access the cluster configuration. The cluster also stores the name of the authentication protocol that is used for these nodes to access the cluster configuration.

When a machine attempts to access the cluster configuration, for example when it asks to be added to the cluster configuration (see `clnode`(1CL)), the cluster checks this list to determine whether the node has access permission. If the node has permission, the node is authenticated and allowed access to the cluster configuration.

You can use the `claccess` command for the following tasks:

- To allow any new machines to add themselves to the cluster configuration and remove themselves from the cluster configuration
- To prevent any nodes from adding themselves to the cluster configuration and removing themselves from the cluster configuration
- To control the authentication type to check

You can use this command only in the global zone.

The general form of the `claccess` command is as follows:

`claccess` [*subcommand*] [*options*]

You can omit *subcommand* only if *options* specifies the `-?` option or the `-V` option.

Each option of this command has a long form and a short form. Both forms of each option are provided with the description of the option in the “OPTIONS” section of this man page.

Subcommands

The following subcommands are supported:

`allow`
Allows the specified machine or machines to access the cluster configuration.

Users other than superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization to use this subcommand. See `rbac(5)`.

See also the description of the `deny` and the `allow-all` subcommands.

`allow-all`
Allows all machines to add themselves to access the cluster configuration.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See `rbac(5)`.

See also the description of the `deny-all` and the `allow` subcommands.

`deny`
Prevents the specified machine or machines from accessing the cluster configuration.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See `rbac(5)`.

See also the description of the `allow` and the `deny-all` subcommands.

`deny-all`
Prevents all machines from accessing the cluster configuration.

No access for any node is the default setting after the cluster is configured the first time.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See `rbac(5)`.

See also the description of the `allow-all` and the `deny` subcommands.

`list`
Displays the names of the machines that have authorization to access the cluster configuration. To see the authentication protocol as well, use the `show` subcommand.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See `rbac(5)`.

`set`
Sets the authentication protocol to the value that you specify with the `-p` option. By default, the system uses `sys` as the authentication protocol. See the `-p` option in “OPTIONS”.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See `rbac(5)`.

`show`
Displays the names of the machines that have permission to access the cluster configuration. Also displays the authentication protocol.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See `rbac(5)`.

Options The following options are supported:

`-?`
`--help`
Displays help information. When you use this option, no other processing is performed.

You can specify this option without a subcommand or with a subcommand. If you specify this option without a subcommand, the list of subcommands of this command is displayed. If you specify this option with a subcommand, the usage options for the subcommand are displayed.

`-h` *hostname*
`--host=`*hostname*
`--host` *hostname*
Specifies the name of the node being granted or denied access.

`-p` protocol=*authentication-protocol*
`--authprotocol=`*authentication-protocol*
`--authprotocol` *authentication-protocol*
Specifies the authentication protocol that is used to check whether a machine has access to the cluster configuration.

Supported protocols are `des` and `sys` (or `unix`). The default authentication type is `sys`, which provides the least amount of secure authentication. For more information on adding and removing nodes, see Chapter 8, "Adding and Removing a Node," in *Oracle Solaris Cluster System Administration Guide*. For more information on these authentication types, see Chapter 18, "Network Services Authentication (Tasks)," in *Oracle Solaris 11.1 Administration: Security Services*.

`-V`
`--version`
Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The `-V` option displays only the version of the command. No other processing is performed.

`-v`
`--verbose`
Displays verbose information to standard output (`stdout`).

Exit Status If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

The following exit codes can be returned:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

`6 CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su(1M)` and `rbac(5)` man pages for more information.

`18 CL_EINTERNAL`
Internal error was encountered

An internal error indicates a software defect or other defect.

`39 CL_EEXIST`
Object exists

The device, device group, cluster interconnect component, node, cluster, resource, resource type, resource group, or private string that you specified already exists.

Examples **EXAMPLE 1** Allow a New Host Access

The following `claccess` command allows a new host to access the cluster configuration.

```
# claccess allow -h phys-schost-1
```

EXAMPLE 2 Set the Authentication Type

The following `claccess` command sets the current authentication type to `des`.

```
# claccess set -p protocol=des
```

EXAMPLE 3 Deny Access to All Hosts

The following `claccess` command denies all hosts access to the cluster configuration.

```
# claccess deny-all
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

`Intro(1CL)`, `clnode(1CL)`, `cluster(1CL)`

Notes

The superuser user can run all forms of this command.

Any user can run this command with the following subcommands and options:

- `-?` option
- `-V` option

To run this command with other subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
`allow`	`solaris.cluster.modify`
`allow-all`	`solaris.cluster.modify`
`deny`	`solaris.cluster.modify`
`deny-all`	`solaris.cluster.modify`
`list`	`solaris.cluster.read`
`set`	`solaris.cluster.modify`
`show`	`solaris.cluster.read`

Name cldevice, cldev – manage Oracle Solaris Cluster devices

Synopsis

```
/usr/cluster/bin/cldevice  -V

/usr/cluster/bin/cldevice  [subcommand] -?

/usr/cluster/bin/cldevice  subcommand  [options]
 -v [+ |  device ...]

/usr/cluster/bin/cldevice check  [-n node[,...]]
 [+]

/usr/cluster/bin/cldevice clear  [-n node[,...]]
 [+]

/usr/cluster/bin/cldevice combine  -t replication-type
 -g replication-device-group -d destination-device
 device

/usr/cluster/bin/cldevice export  [-o {- |  configfile}]
 [-n node[,...]] [+ |  device ...]

/usr/cluster/bin/cldevice list  [-n node[,...]]
 [+ |  device ...]

/usr/cluster/bin/cldevice monitor  [-i {- |  clconfigfile} ]
 [-n node[,...] ] {+ |  disk-device ...}

/usr/cluster/bin/cldevice populate

/usr/cluster/bin/cldevice refresh  [-n node[,...]]
 [+]

/usr/cluster/bin/cldevice rename  -d destination-device
 device

/usr/cluster/bin/cldevice repair  [-n node[,...]]
 {+ |  device ...}

/usr/cluster/bin/cldevice replicate  -t replication-type [-S source-node]
 -D destination-node [+]

/usr/cluster/bin/cldevice set
 -p default_fencing={global | pathcount | scsi3 | nofencing | nofencing-noscrub}
 [-n node[,...]] device ...

/usr/cluster/bin/cldevice show  [-n node[,...]]
 [+ |  device ...]

/usr/cluster/bin/cldevice status  [-s state] [-n node[,...]]
 [+ |  [disk-device ]]

/usr/cluster/bin/cldevice unmonitor  [-i {- |  clconfigfile} ]
 [-n node[,...]] {+ |  disk-device ...}
```

Description The `cldevice` command manages devices in the Oracle Solaris Cluster environment. Use this command to administer the Oracle Solaris Cluster device identifier (DID) pseudo device driver and to monitor disk device paths.

- The DID driver provides a device with a unique device ID, even if multiple paths to the device are available. See the `did(7)` man page for more information.
- A disk path is the connection between a cluster node and a physical disk or LUN storage device. The disk path includes the Oracle Solaris kernel driver stack, Host Bus Adapter, and any intervening cables, switches, or network connectivity.

The `cldev` command is the short form of the `cldevice` command. You can use either form of the command.

With the exception of the `list` and `show` subcommands, you must run the `cldevice` command from a cluster node that is online and in cluster mode.

The general form of this command is as follows:

`cldevice` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the `-?` option or the `-V` option.

Each option of this command has a long form and a short form. Both forms of each option are given with the description of the option in the OPTIONS section of this man page.

See the `Intro(1CL)` man page for more information.

You can use this command only in the global zone.

Subcommands The following subcommands are supported:

`check`

Performs a consistency check to compare the kernel representation of the devices against the physical devices. On failing a consistency check, an error message is displayed. The process continues until all devices are checked.

By default, this subcommand affects only the current node. Use the `-n` option to perform the check operation for devices that are attached to another node.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`clear`

Removes all DID references to underlying devices that are no longer attached to the current node.

By default, this subcommand affects only the current node. Use the `-n` option to specify another cluster node on which to perform the clear operation.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`combine`

Combines the specified device with the specified destination device.

The `combine` subcommand combines the path for the source device with the path for the destination device. This combined path results in a single DID instance number, which is the same as the DID instance number of the destination device. Use this subcommand to combine DID instances with SRDF.

You can use the `combine` subcommand to manually configure DID devices for storage-based replication..

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`export`

Exports configuration information for a cluster device.

If you specify a file name with the `-o` option, the configuration information is written to that new file. If you do not supply the `-o` option, the configuration information is written to standard output.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`list`

Displays all device paths.

If you supply no operand, or if you supply the plus sign (+) operand, the report includes all devices.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`monitor`

Turns on monitoring for the specified disk paths.

The `monitor` subcommand works only on disk devices. Tapes or other devices are not affected by this subcommand.

You can use the `monitor` subcommand to tune the disk-path-monitoring daemon, `scdpmd`. See the `scdpmd.conf(4)` man page for more information on the configuration file.

By default, this subcommand turns on monitoring for paths from all nodes.

Use the `-i` option to specify a cluster configuration file from which to set the monitor property of disk paths. The `-i` option starts disk-path monitoring on those disk paths that are marked in the specified file as monitored. No change is made for other disk paths. See the `clconfiguration(5CL)` man page for more information about the cluster configuration file.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`populate`
Populates the global-devices namespace.

The global-devices namespace is mounted under the `/global` directory. The namespace consists of a set of logical links to physical devices. Because the `/dev/global` directory is visible to each node of the cluster, each physical device is visible across the cluster. This visibility means that any disk, tape, or CD-ROM that is added to the global-devices namespace can be accessed from any node in the cluster.

The `populate` subcommand enables the administrator to attach new global devices to the global-devices namespace without requiring a system reboot. These devices might be tape drives, CD-ROM drives, or disk drives.

You must execute the `devfsadm`(1M) command before you run the `populate` subcommand. Alternatively, you can perform a reconfiguration reboot to rebuild the global-devices namespace and to attach new global devices. See the `boot`(1M) man page for more information about reconfiguration reboots.

You must run the `populate` subcommand from a node that is a current cluster member.

The `populate` subcommand performs its work on remote nodes asynchronously. Therefore, command completion on the node from which you issue the command does not signify that the command has completed operation on all cluster nodes.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`refresh`
Updates the device configuration information that is based on the current device trees on a cluster node. The command conducts a thorough search of the `rdsk` and `rmt` device trees. For each device identifier that was not previously recognized, the command assigns a new DID instance number. Also, a new path is added for each newly recognized device.

By default, this subcommand affects only the current node. Use the `-n` option with the `refresh` subcommand to specify the cluster node on which to perform the refresh operation.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`rename`
Moves the specified device to a new DID instance number.

The command removes DID device paths that correspond to the DID instance number of the source device and recreates the device path with the specified destination DID instance number. You can use this subcommand to restore a DID instance number that has been accidentally changed.

After you run the `rename` subcommand on all cluster nodes that are connected to the shared storage, run the `devfsadm` and `cldevice populate` commands to update the global-devices namespace with the configuration change.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`repair`
Performs a repair procedure on the specified device.

By default, this subcommand affects only the current node. Use the `-n` option to specify the cluster node on which to perform the repair operation.

If you supply no operand, or if you supply the plus sign (+) operand, the command updates configuration information on all devices that are connected to the current node.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`replicate`
Configures DID devices for use with storage-based replication.

Note – The `replicate` subcommand is not a supported method for combining DID instances with EMC SRDF. Use `cldevice combine` to combine DID instances with SRDF.

The `replicate` subcommand combines each DID instance number on the source node with its corresponding DID instance number on the destination node. Each pair of replicated devices is merged into a single logical DID device.

By default, the current node is the source node. Use the `-S` option to specify a different source node.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`set`
Modifies the properties of the specified device.

Use the `-p` option to specify the property to modify.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`show`
Displays a configuration report for all specified device paths.

The report shows the paths to devices and whether the paths are monitored or unmonitored.

By default, the subcommand displays configuration information for all devices.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`status`

Displays the status of all specified disk-device paths.

By default, the subcommand displays the status of all disk paths from all nodes.

The `status` subcommand works only on disk devices. The report does not include tapes or other devices.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`unmonitor`

Turns off monitoring for the disk paths that are specified as operands to the command.

By default, the subcommand turns off monitoring for all paths from all nodes.

The `unmonitor` subcommand works only on disk devices. Tapes or other devices are not affected by this subcommand.

Use the `-i` option to specify a cluster configuration file from which to turn off monitoring for disk paths. Disk-path monitoring is turned off for those disk paths that are marked in the specified file as unmonitored. No change is made for other disk paths. See the `clconfiguration(5CL)` man page for more information.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

Options The following options are supported:

`-?`
`--help`

Displays help information.

This option can be used alone or with a subcommand.

- If you use this option alone, the list of available subcommands is printed.
- If you use this option with a subcommand, the usage options for that subcommand are printed.

When this option is used, no other processing is performed.

`-D` *destination-node*
`-destinationnode=` *destination-node*
`-destinationnode` *destination-node*

Specifies a destination node on which to replicate devices. You can specify a node either by its node name or by its node ID.

The `-D` option is only valid with the `replicate` subcommand.

`-d` *destination-device*
`--device=`*destination-device*
`--device` *destination-device*

Specifies the DID instance number of the destination device for storage-based replication.

Only use a DID instance number with the `-d` option. Do not use other forms of the DID name or the full UNIX path name to specify the destination device.

The `-d` option is only valid with the `rename` and `combine` subcommands.

`-g` *replication-device-group*

Specifies the replication device group. This option can be only be used with the `combine` subcommand.

`-i` {- | *clconfigfile*}
`--input={- |` *clconfigfile*`-}`
`--input {- |` *clconfigfile*`-}`

Specifies configuration information that is to be used for monitoring or unmonitoring disk paths. This information must conform to the format that is defined in the `clconfiguration`(5CL) man page. This information can be contained in a file or supplied through standard input. To specify standard input, specify the minus sign (-) instead of a file name.

The `-i` option is only valid with the `monitor` and `unmonitor` subcommands.

Options that you specify in the command override any options that are set in the configuration file. If configuration parameters are missing in the cluster configuration file, you must specify these parameters on the command line.

`-n` *node*[,…]
`--node=`*node*[,…]
`--node` *node*[,…]

Specifies that the subcommand includes only disk paths from nodes that are specified with the `-n` option. You can specify a node either by its node name or by its node ID.

`-o` {- | *configfile*}
`--output={- |` *configfile*`-}`
`--output {- |` *configfile*`-}`

Writes disk-path configuration information in the format that is defined by the `clconfiguration`(5CL) man page. This information can be written to a file or to standard output.

The `-o` option is only valid with the `export` subcommand.

If you supply a file name as the argument to this option, the command creates a new file and the configuration is printed to that file. If a file of the same name already exists, the command exits with an error. No change is made to the existing file.

If you supply the minus sign (-) as the argument to this option, the command displays the configuration information to standard output. All other standard output for the command is suppressed.

`-p default_fencing={global | pathcount | scsi3 | nofencing | nofencing-noscrub}`
`--property=default_fencing={global|pathcount|scsi3|nofencing|nofencing-noscrub}`
`--property default_fencing={global|pathcount|scsi3|nofencing|nofencing-noscrub}`
Specifies the property to modify.

Use this option with the `set` subcommand to modify the following property:

`default_fencing`
Overrides the global default fencing algorithm for the specified device. You cannot change the default fencing algorithm on a device that is configured as a quorum device.

You can set the default fencing algorithm for a device to one of the following values:

`global`
Uses the global default fencing setting. See the `cluster(1CL)` man page for information about setting the global default for fencing.

`nofencing`
After checking for and removing any Persistent Group Reservation (PGR) keys, turns off fencing for the specified device or devices.

Caution – If you are using a disk that does not support SCSI, such as a Serial Advanced Technology Attachment (SATA) disk, turn off fencing.

`nofencing-noscrub`
Turns off fencing for the specified device or devices *without* first checking for or removing PGR keys.

Caution – If you are using a disk that does not support SCSI, such as a Serial Advanced Technology Attachment (SATA) disk, turn off fencing.

`pathcount`
Determines the fencing protocol by the number of DID paths that are attached to the shared device.

- For a device that uses fewer than three DID paths, the command sets the SCSI-2 protocol.
- For a device that uses three or more DID paths, the command sets the SCSI-3 protocol

`scsi3`
Sets the SCSI-3 protocol. If the device does not support the SCSI-3 protocol, the fencing protocol setting remains unchanged.

`-S` *source-node*
`--sourcenode=`*source-node*
`--sourcenode` *source-node*
Specifies the source node from which devices are replicated to a destination node. You can specify a node either by its node name or by its node ID.

The `-S` option is only valid with the `replicate` subcommand.

`-s` *state*[,…]
`--state=`*state*[,…]
`--state` *state*[,…]
Displays status information for disk paths that are in the specified state.

The `-s` option is only valid with the `status` subcommand. When you supply the `-s` option, the status output is restricted to disk paths that are in the specified *state*. The following are the possible values of the *state*:

- `fail`
- `ok`
- `unknown`
- `unmonitored`

`-t`
Specifies the replication device type. This option can be used with the `replicate` and `combine` subcommands.

`-V`
`--version`
Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommand, operands, or other options are ignored. The `-V` option only displays the version of the command. No other operations are performed.

`-v`
`--verbose`
Displays verbose information to standard output.

You can specify this option with any form of this command.

Operands The following operands are supported:

device
Specifies the name of a device. The device can be, but is not limited to, disks, tapes, and CD-ROMs.

If the subcommand accepts more than one device, you can use the plus sign (+) to specify all devices.

All subcommands of the `cldevice` command except the `repair` subcommand accept device paths as operands. The `repair` subcommand accepts only device names as operands. The *device* name can be either the full global path name, the device name, or the DID instance number. Examples of these forms of a device name are `/dev/did/dsk/d3`, `d3`, and `3`, respectively. See the `did(7)` man page for more information.

The device name can also be the full UNIX path name, such as`/dev/rdsk/c0t0d0s0`.

A specified device can have multiple paths that connect the device to nodes. If the `-n` option is not used, all paths from all nodes to the specified device are selected.

The `monitor`, `unmonitor`, and `status` subcommands only accept disk devices as operands.

Exit Status The complete set of exit status codes for all commands in this command set are listed on the `Intro(1CL)` man page.

If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

`0 CL_NOERR`
  No error

`1 CL_ENOMEM`
  Not enough swap space

`3 CL_EINVAL`
  Invalid argument

`6 CL_EACCESS`
  Permission denied

`9 CL_ESTATE`
  Object is in wrong state

`15CL_EPROP`
  Invalid property

`35 CL_EIO`
  I/O error

`36 CL_ENOENT`
  No such object

`37 CL_EOP`
  Operation not allowed

Examples

EXAMPLE 1 Monitoring All Disk Paths in the Cluster

The following example shows how to enable the monitoring of all disk paths that are in the cluster infrastructure.

```
# cldevice monitor +
```

EXAMPLE 2 Monitoring a Single Disk Path

The following example shows how to enable the monitoring of the path to the disk `/dev/did/dsk/d3` on all nodes where this path is valid.

```
# cldevice monitor /dev/did/dsk/d3
```

EXAMPLE 3 Monitoring a Disk Path on a Single Node

The following examples show how to enable the monitoring of the path to the disks `/dev/did/dsk/d4` and `/dev/did/dsk/d5` on the node `phys-schost-2`.

The first example uses the `-n` option to limit monitoring to disk paths that are connected to the node `phys-schost-2`, then further limits monitoring to the specified devices `d4` and `d5`.

```
# cldevice monitor -n phys-schost-2 d4 d5
```

The second example specifies the disk paths to monitor by their *node*:*device* names, `phys-schost-2:d4` and `phys-schost-2:d5`.

```
# cldevice monitor phys-schost-2:d4 phys-schost-2:d5
```

EXAMPLE 4 Printing All Disk Paths and Their Status

The following example shows how to print all disk paths in the cluster and their status.

```
# cldevice status
Device Instance             Node               Status
---------------             ----               ------
/dev/did/rdsk/d1            phys-schost-2      Unmonitored

/dev/did/rdsk/d2            phys-schost-2      Unmonitored

/dev/did/rdsk/d3            phys-schost-1      Ok
                            phys-schost-2      Ok

/dev/did/rdsk/d4            phys-schost-1      Ok
                            phys-schost-2      Ok

/dev/did/rdsk/d5            phys-schost-1      Unmonitored
```

EXAMPLE 5 Printing All Disk Paths That Have the Status fail

The following example shows how to print all disk paths that are monitored on the node `phys-schost-2` and that have the status `fail`.

EXAMPLE 5 Printing All Disk Paths That Have the Status fail *(Continued)*

```
# cldevice status -s fail -n phys-schost-1
Device Instance             Node               Status
---------------             ----               ------
/dev/did/rdsk/d3            phys-schost-1      Fail

/dev/did/rdsk/d4            phys-schost-1      Fail
```

EXAMPLE 6 Printing the Status of All Disk Paths From a Single Node

The following example shows how to print the path and the status for all disk paths that are online on the node `phys-schost-2`.

```
# cldevice status -n phys-schost-1
Device Instance             Node               Status
---------------             ----               ------
/dev/did/rdsk/d3            phys-schost-1      Ok

/dev/did/rdsk/d4            phys-schost-1      Ok

/dev/did/rdsk/d5            phys-schost-1      Unmonitored
```

EXAMPLE 7 Adding New Devices to the Device Configuration Database

The following example shows how to update the CCR database with the current device configurations for the node `phys-schost-2`, from which the command is issued. This command does not update the database for devices that are attached to any other node in the cluster.

```
phys-schost-2# cldevice refresh
```

EXAMPLE 8 Combining Devices Under a Single DID

The following example shows how to combine the path for one device with the path for another device. This combined path results in a single DID instance number, which is the same as the DID instance number of the destination device.

```
# cldevice combine -t srdf -g devgrp1 -d 20 30
```

EXAMPLE 9 Listing the Device Paths For a Device Instance

The following example shows how to list the paths for all devices that correspond to instance `3` of the DID driver.

```
# cldevice list 3
d3
```

EXAMPLE 10 Listing all Device Paths in the Cluster

The following example shows how to list all device paths for all devices that are connected to any cluster node.

```
# cldevice list -v
DID Device          Full Device Path
----------          ----------------
d1                  phys-schost-1:/dev/rdsk/c0t0d0
d2                  phys-schost-1:/dev/rdsk/c0t1d0
d3                  phys-schost-1:/dev/rdsk/c1t8d0
d3                  phys-schost-2:/dev/rdsk/c1t8d0
d4                  phys-schost-1:/dev/rdsk/c1t9d0
d4                  phys-schost-2:/dev/rdsk/c1t9d0
d5                  phys-schost-1:/dev/rdsk/c1t10d0
d5                  phys-schost-2:/dev/rdsk/c1t10d0
d6                  phys-schost-1:/dev/rdsk/c1t11d0
d6                  phys-schost-2:/dev/rdsk/c1t11d0
d7                  phys-schost-2:/dev/rdsk/c0t0d0
d8                  phys-schost-2:/dev/rdsk/c0t1d0
```

EXAMPLE 11 Displaying Configuration Information About a Device

The following example shows how to display configuration information about device `c4t8d0`.

```
# cldevice show /dev/rdsk/c4t8d0

=== DID Device Instances ===

DID Device Name:                                /dev/did/rdsk/d3
  Full Device Path:                               phys-schost1:/dev/rdsk/c4t8d0
  Full Device Path:                               phys-schost2:/dev/rdsk/c4t8d0
  Replication:                                    none
  default_fencing:                                nofencing
```

EXAMPLE 12 Setting the SCSI Protocol for a Single Device

The following example sets the device `11`, specified by instance number, to the SCSI-3 protocol. This device is not a configured quorum device.

```
# cldevice set -p default_fencing=scsi3 11
```

EXAMPLE 13 Turning Fencing Off for a Device Without First Checking PGR Keys

The following example turns fencing off for disk `/dev/did/dsk/d5` on the device. This command turns fencing off for the device *without* first checking for and removing any Persistent Group Reservation (PGR) keys.

```
# cldevice set -p default_fencing=nofencing-noscrub d5
```

If you are using a disk that does not support SCSI, such as a Serial Advanced Technology Attachment (SATA) disk, turn off SCSI fencing.

EXAMPLE 14 Turning Fencing Off for All Devices in Two-Node Cluster phys-schost

The following example turns fencing off for all disks in two-node cluster named `phys-schost`.

```
# cluster set -p global_fencing=nofencing
# cldevice set -p default_fencing=global -n phys-schost-1,phys-schost-2 d5
```

For more information about the `cluster` command and the `global_fencing` property, see the `cluster(1CL)` man page.

If you are using a disk that does not support SCSI, such as a Serial Advanced Technology Attachment (SATA) disk, turn off SCSI fencing.

EXAMPLE 15 Performing a Repair Procedure By Using the Device Name

The following example shows how to perform a repair procedure on the device identifier that was associated with the device `/dev/dsk/c1t4d0`. This device was replaced with a new device to which a new device identifier is now associated. In the database, the `repair` subcommand records that instance number now corresponds to the new device identifier.

```
# cldevice repair c1t4d0
```

EXAMPLE 16 Performing a Repair Procedure By Using the Instance Number

The following example shows how to provide an alternate method to perform a repair procedure on a device identifier. This example specifies the instance number that is associated with the device path to the replaced device. The instance number for the replaced device is `2`.

```
# cldevice repair 2
```

EXAMPLE 17 Populating the Global-Devices Namespace

The following example shows how to populate the global-devices namespace after adding new global devices or moving a DID device to a new instance number.

```
# devfsadm
# cldevice populate
```

EXAMPLE 18 Moving a DID Device

The following example moves the DID instance on the source instance, `15`, to a new DID instance, `10`, then updates the global-devices namespace with the configuration change.

```
# cldevice rename 15:10
# devfsadm
# cldevice populate
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Interface Stability	Evolving

See Also `Intro(1CL)`, `cluster(1CL)`, `boot(1M)`, `devfsadm(1M)`, `clconfiguration(5CL)`, `rbac(5)`, `did(7)`

Notes The superuser can run all forms of this command.

Any user can run this command with the following options:

- `-?` (help) option
- `-V` (version) option

To run this command with other subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
`check`	`solaris.cluster.read`
`clear`	`solaris.cluster.modify`
`combine`	`solaris.cluster.modify`
`export`	`solaris.cluster.read`
`list`	`solaris.cluster.read`
`monitor`	`solaris.cluster.modify`
`populate`	`solaris.cluster.modify`
`refresh`	`solaris.cluster.modify`
`rename`	`solaris.cluster.modify`
`repair`	`solaris.cluster.modify`
`replicate`	`solaris.cluster.modify`
`set`	`solaris.cluster.modify`
`show`	`solaris.cluster.read`
`status`	`solaris.cluster.read`
`unmonitor`	`solaris.cluster.modify`

Disk-path status changes are logged by using the `syslogd` command.

Each multiported tape drive or CD-ROM drive appears in the namespace once per physical connection.

Name cldevicegroup, cldg – manage Oracle Solaris Cluster device groups

Synopsis

```
/usr/cluster/bin/cldevicegroup -V

/usr/cluster/bin/cldevicegroup [subcommand] -?

/usr/cluster/bin/cldevicegroup subcommand [options]
 -v [devicegroup ...]

/usr/cluster/bin/cldevicegroup add-device -d device[,...]
 devicegroup

/usr/cluster/bin/cldevicegroup add-node -n node[,...]
 [-t devicegroup-type[,...] ] {+ | devicegroup ...}

/usr/cluster/bin/cldevicegroup create -n node[,...]
 -t devicegroup-type [-d device[,...] ]
 [-p name=value] devicegroup ...

/usr/cluster/bin/cldevicegroup create -i {- | clconfigfile}
 [-d device[,...] ] [-n node[,...] ] [-p name=value]
 [-t devicegroup-type[,...]] {+ | devicegroup ...}

/usr/cluster/bin/cldevicegroup delete [-t devicegroup-type[,...] ]
 {+ | devicegroup ...}

/usr/cluster/bin/cldevicegroup disable [-t devicegroup-type[,...] ]
 {+ | devicegroup ...}

/usr/cluster/bin/cldevicegroup enable [-t devicegroup-type[,...] ]
 {+ | devicegroup ...}

/usr/cluster/bin/cldevicegroup export [-n node[,...] ]
 [-o {- | clconfigfile}] [-t devicegroup-type[,...] ]
 {+ | devicegroup ...}

/usr/cluster/bin/cldevicegroup list [-n node[,...] ]
 [-t devicegroup-type[,...] ] [+ | devicegroup ...]

/usr/cluster/bin/cldevicegroup offline [ -t devicegroup-type[,...] ]
 {+ | devicegroup ...}

/usr/cluster/bin/cldevicegroup online [-e] [-n node ]
 [-t devicegroup-type[,...] ] {+ | devicegroup ...}

/usr/cluster/bin/cldevicegroup remove-device
 -d device[,...] devicegroup

/usr/cluster/bin/cldevicegroup remove-node
 -n node[,...] [-t devicegroup-type[,...] ]
 {+ | devicegroup ...}

/usr/cluster/bin/cldevicegroup set -p name=value
 [-p name=value]... [-d device[,...] ] [-n node[,...] ]
 [-t devicegroup-type[,...] ] {+ | devicegroup ...}
```

/usr/cluster/bin/cldevicegroup show [-n *node*[,...]]
 [-t *devicegroup-type*[,...]] [+ | *devicegroup* ...]

/usr/cluster/bin/cldevicegroup status [-n *node*[,...]]
 [-t *devicegroup-type*[,...]] [+ | *devicegroup* ...]

/usr/cluster/bin/cldevicegroup switch -n *node* [-t *devicegroup-type*[,...]]
 {+ | *devicegroup* ...}

/usr/cluster/bin/cldevicegroup sync [-t *devicegroup-type*[,...]]
 {+ | *devicegroup* ...}

Description

The `cldevicegroup` command manages Oracle Solaris Cluster device groups. The `cldg` command is the short form of the `cldevicegroup` command. These two commands are identical. You can use either form of the command.

The general form of this command is as follows:

`cldevicegroup` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the `-?` option or the `-V` option.

Each option of this command has a long form and a short form. Both forms of each option are given with the description of the option in the OPTIONS section of this man page.

With the exception of `list`, `show`, and `status`, most subcommands require at least one operand. Many subcommands accept the plus sign (+) as an operand to indicate `all` applicable objects. Refer to the SYNOPSIS and other sections of this man page for details.

Each subcommand can be used for all device-group types, except for the following subcommands:

- The `add-device` and `remove-device` subcommands are only valid for the `rawdisk` type.
- The `add-node`, `create`, `delete`, and `remove-node` subcommands are only valid for the `rawdisk` and `vxvm` types.

For more information about valid uses of this command, see the descriptions of the individual subcommands. For ease of administration, use this command in the global zone.

Subcommands

The following subcommands are supported:

`add-device`

Adds new member disk devices to an existing raw-disk device group.

You can use this subcommand only in the global zone.

You can only use the `add-device` subcommand on existing device groups of the type `rawdisk`. For more information about device-group types, see the description of the `-t` option.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

For information about how to remove disk devices from a raw-disk device group, see the description of the `remove-device` subcommand.

`add-node`
Adds new nodes to an existing device group.

You can use this subcommand only in the global zone.

This subcommand supports only the `rawdisk` and `vxvm` device-group types. You cannot add a node to an `svm` or `sds` device group by using Oracle Solaris Cluster commands. Instead, use Solaris Volume Manager commands to add nodes to Solaris Volume Manager disk sets. Disk sets are automatically registered with Oracle Solaris Cluster software as `svm` or `sds` device groups. For more information about device-group types, see the description of the `-t` option.

You cannot use this subcommand on a device group if the `preferenced` property for the device group is set to `true`.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

For information about how to remove nodes from a device group, see the description of the `remove-node` subcommand.

`create`
Creates a new device group.

You can use this subcommand only in the global zone.

This subcommand supports only the `rawdisk` and `vxvm` device-group types. You cannot create an `svm` or `sds` device group by using Oracle Solaris Cluster commands. Instead, use Solaris Volume Manager commands to create Solaris Volume Manager disk sets. Disk sets are automatically registered with Oracle Solaris Cluster software as `svm` or `sds` device groups. For more information about device-group types, see the description of the `-t` option.

If you specify a configuration file with the `-i` option, you can supply a plus sign (+) as the operand. When you use this operand, the command creates all device groups that are specified in the configuration file that do not already exist.

For device groups of type `rawdisk`, use the `-d` option with the `create` subcommand to specify one or more devices to the device group. When you specify devices, use one `-d` option per command invocation. You cannot create multiple raw-disk device groups in one command invocation unless you use the `-i` option.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

For information about how to delete device groups, see the description of the `delete` subcommand.

`delete`

Deletes device groups.

You can use this subcommand only in the global zone.

This subcommand supports only the `rawdisk` and `vxvm` device-group types.

You cannot delete `svm` or `sds` device groups by using Oracle Solaris Cluster commands. To delete `svm` or `sds` device groups, instead use Solaris Volume Manager commands to delete the underlying Solaris Volume Manager disk sets.

Device groups must be offline before you can delete them.

If you specify the + operand, only device groups that have the `autogen` property set to `false` are affected. To apply the command to device groups that are automatically created by the system at boot time, which have the `autogen` property set to `true`, you must explicitly specify each device group.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

For information about how to create device groups, see the description of the `create` subcommand.

`disable`

Disables offline device groups.

You can use this subcommand only in the global zone.

The disabled state of device groups survives reboots.

Before you can take an enabled device group offline, you must first clear the enabled state of the device group by using the `disable` subcommand.

If a device group is currently online, the `disable` action fails and does not disable the specified device groups.

You cannot bring a disabled device group online by using the `switch` subcommand or the `online` subcommand. You must first use the `enable` subcommand to clear the disabled state of the device group.

If you specify the + operand, only device groups that have the `autogen` property set to `false` are affected. To apply the command to device groups that are automatically created by the system at boot time, which have the `autogen` property set to `true`, you must explicitly specify each device group.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

For information about how to enable device groups, see the description of the `enable` subcommand.

`enable`

Enables device groups.

You can use this subcommand only in the global zone.

The disabled state of device groups survives reboots.

Before you can bring a disabled device group online, you must first clear the disabled state of the device group by using the `enable` subcommand.

If you specify the + operand, only device groups that have the `autogen` property set to `false` are affected. To apply the command to device groups that are automatically created by the system at boot time, which have the `autogen` property set to `true`, you must explicitly specify each device group.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

For information about how to disable device groups, see the description of the `disable` subcommand.

`export`

Exports the device-group configuration information.

You can use this subcommand only in the global zone.

If you specify a file name with the `-o` option, the configuration information is written to that new file. If you do not supply the `-o` option, the output is written to standard output.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`list`

Displays a list of device groups.

You can use this subcommand in the global zone.

By default, this subcommand lists all device groups in the cluster for which the `autogen` property is set to `false`. To display all device groups in the cluster, also specify the `-v` option.

If you specify the + operand, only device groups that have the `autogen` property set to `false` are affected. To apply the command to device groups that are automatically created by the system at boot time, which have the `autogen` property set to `true`, you must explicitly specify each device group.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`offline`

Takes device groups offline.

You can use this subcommand only in the global zone.

If a device group is enabled, you must disable it by running the `disable` subcommand before you run the `offline` subcommand.

To start an offline device group, you can perform any of the following actions:

- Issue an explicit `online` subcommand or `switch` subcommand.
- Access a device within the device group.
- Mount a file system that depends on the device group.

If you specify the + operand, only device groups that have the `autogen` property set to `false` are affected. To apply the command to device groups that are automatically created by the system at boot time, which have the `autogen` property set to `true`, you must explicitly specify each device group.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

For information about how to bring device groups online, see the description of the `online` subcommand.

`online`

Brings device groups online on a predesignated node.

You can use this subcommand only in the global zone.

If a device group is disabled, you must enable it in one of the following ways before you can bring the device group online:

- Use the `-e` option with the `online` subcommand.
- Run the `enable` subcommand before you run the `online` subcommand.

If you specify the + operand, only device groups that have the `autogen` property set to `false` are affected. To apply the command to device groups that are automatically created by the system at boot time, which have the `autogen` property set to `true`, you must explicitly specify each device group.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

For information about how to take device groups offline, see the description of the `offline` subcommand.

`remove-device`

Removes member disk devices from a raw-disk device group.

You can use this subcommand only in the global zone.

The `remove-device` subcommand is only valid with device groups of type `rawdisk`. This subcommand is not valid with `svm`, `sds`, and `vxvm` device-group types.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

For information about how to add disk devices to a raw-disk device groups, see the description of the `add-device` subcommand.

`remove-node`

Removes nodes from existing device groups.

You can use this subcommand only in the global zone.

This subcommand supports only the `rawdisk` and `vxvm` device-group types. You cannot remove a node from an `svm` or `sds` device group by using Oracle Solaris Cluster commands. Instead, use Solaris Volume Manager commands to remove nodes from Solaris Volume Manager disk sets. Disk sets are automatically registered with Oracle Solaris Cluster software as `svm` or `sds` device groups. For more information about device-group types, see the description of the `-t` option.

You cannot use the `remove-node` subcommand on a device group if the `preferenced` property is set to `true`.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

For information about how to add nodes to a device group, see the description of the `add-node` subcommand.

`set`

Modifies attributes that are associated with a device group.

You can use this subcommand only in the global zone.

For device groups of type `rawdisk`, use the `-d` option with the `set` subcommand to specify a new list of member disk devices for the specified device group.

If you specify the `+` operand, only device groups that have the `autogen` property set to `false` are affected. To apply the command to device groups that are automatically created by the system at boot time, which have the `autogen` property set to `true`, you must explicitly specify each device group.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`show`

Generates a configuration report for device groups.

You can use this subcommand only in the global zone.

By default, this subcommand reports on all device groups in the cluster for which the `autogen` property is set to `false`. To display all device groups in the cluster, also specify the `-v` option.

If you specify the `+` operand, only device groups that have the `autogen` property set to `false` are affected. To apply the command to device groups that are automatically created by the system at boot time, which have the `autogen` property set to `true`, you must explicitly specify each device group.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`status`

Generates a status report for device groups.

You can use this subcommand in the global zone.

By default, this subcommand reports on all device groups in the cluster for which the `autogen` property is set to `false`. To display all device groups in the cluster, also specify the `-v` option.

If you specify the `+` operand, only device groups that have the `autogen` property set to `false` are affected. To apply the command to device groups that are automatically created by the system at boot time, which have the `autogen` property set to `true`, you must explicitly specify each device group.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`switch`

Transfers device groups from one primary node in an Oracle Solaris Cluster configuration to another node.

You can use this subcommand only in the global zone.

If you specify the `+` operand, only device groups that have the `autogen` property set to `false` are affected. To apply the command to device groups that are automatically created by the system at boot time, which have the `autogen` property set to `true`, you must explicitly specify each device group.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`sync`

Synchronizes device-group information with the clustering software.

You can use this subcommand only in the global zone.

Use this subcommand whenever you change any volume attribute, such as owner, group, or access permissions.

Also use the `sync` subcommand to change a device-group configuration to a replicated or non-replicated configuration.

After you create a Solaris Volume Manager disk set that contain disks that are configured for replication, you must run the `sync` subcommand for the corresponding `svm` or `sds` device group. A Solaris Volume Manager disk set is automatically registered with Oracle Solaris Cluster software as an `svm` or `sds` device group, but replication information is not synchronized at that time.

For newly created `rawdisk` device-group types, you do not need to manually synchronize replication information for the disks. When you register a raw-disk device group with Oracle Solaris Cluster software, the software automatically discovers any replication information on the disks.

If you specify the + operand, only device groups that have the `autogen` property set to `false` are affected. To apply the command to device groups that are automatically created by the system at boot time, which have the `autogen` property set to `true`, you must explicitly specify each device group.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

Options The following options are supported:

`-?`
`--help`
Displays help information.

You can use this option either alone or with a subcommand.

- If you use this option alone, the list of available subcommands is printed.
- If you use this option with a subcommand, the usage options for that subcommand are printed.

When you use this option, no other processing is performed.

`-d` *device*[,…]
`--device=`*device*[,…]
`--device` *device*[,…]
Specifies the list of disk devices to be members of the specified raw-disk device group.

The `-d` option is only valid with the `create` and `set` subcommands for device groups of type `rawdisk`. You must always supply the entire node list. You cannot use this option to add or remove individual disks from the member disk list.

Specify disks only by the DID global device name, for example, `d3`. See the `did(7)` man page for more information.

`-e`
`--enable`
Enables a device group. This option is only valid when used with the `online` subcommand.

If the specified device group is already enabled, the `-e` option is ignored and the command proceeds to bring the device group online.

`-i` {`-` | *clconfigfile*}
`--input`={`-` | *clconfigfile*}
`--input` {`-` | *clconfigfile*}
Specifies configuration information that is to be used for creating device groups. This information must conform to the format that is defined in the `clconfiguration`(5CL) man page. This information can be contained in a file or supplied through standard input. To specify standard input, supply the minus sign (`-`) instead of a file name.

The `-i` option affects only those device groups that you include in the fully qualified device-group list.

Options that you specify in the command override any options that are set in the configuration file. If configuration parameters are missing in the cluster configuration file, you must specify these parameters on the command line.

`-n` *node*[,…]
`--node`=*node*[,…]
`--node` *node*[,…]
Specifies a node or a list of nodes.

By default, the order of the node list indicates the preferred order in which nodes attempt to take over as the primary node for a device group. The exception is for local-only disk groups which are outside Oracle Solaris Cluster control and therefore the concept of primary and secondary nodes does not apply.

If the `preferenced` property of the device group is set to `false`, the order of the node list is ignored. Instead, the first node to access a device in the group automatically becomes the primary node for that group. See the `-p` option for more information about setting the `preferenced` property for a device-group node list.

You cannot use the `-n` option to specify the node list of an `svm` or `sds` device group. You must instead use Solaris Volume Manager commands or utilities to specify the node list of the underlying disk set.

The `create` and `set` subcommands use the `-n` option to specify a list of potential primary nodes only for a device group of type `rawdisk` and `vxvm`. You must specify the entire node list of the device group. You cannot use the `-n` option to add or remove an individual node from a node list.

The `switch` subcommand uses the `-n` option to specify a single node as the new device-group primary.

The `export`, `list`, `show`, and `status` subcommands use the `-n` option to exclude from the output those device groups that are not online on the specified nodes.

The concept of primary and secondary nodes does not apply to `localonly` disk groups, which are outside the control of Oracle Solaris Cluster.

`-o` {`-` | *clconfigfile*}
`--output=`{`-` | *clconfigfile*}
`--output` {`-` | *clconfigfile*}
Displays the device-group configuration in the format that is described by the `clconfiguration(5CL)` man page. This information can be written to a file or to standard output.

If you supply a file name as the argument to this option, the command creates a new file and the configuration is printed to that file. If a file of the same name already exists, the command exits with an error. No change is made to the existing file.

If you supply the minus sign (`-`) as the argument to this option, the command displays the configuration information to standard output. All other standard output for the command is suppressed.

The `-o` option is only valid with the `export` subcommand.

`-p` *name*=*value*
`--property=`*name*=*value*
`--property` *name*=*value*
Sets the values of device-group properties.

The `-p` option is only valid with the `create` and `set` subcommands. Multiple instances of `-p` *name*`-=`*value* are allowed.

The following properties are supported:

`autogen`
The `autogen` property can have a value of `true` or `false`. The default is `false` for manually created device groups. For system-created device groups, the default is `true`.

The `autogen` property is an indicator for the `list`, `show`, and `status` subcommands. These subcommands do not list devices that have the `autogen` property set to `true` unless you use the `-v` option.

This property is valid only for device groups of type `rawdisk`. See the `-t` option for more information about device-group types.

`failback`
The `failback` property can have a value of `true` or `false`. The default is `false`.

The `failback` property specifies the behavior of the system if a device-group primary node leaves the cluster membership and later returns.

When the primary node of a device group leaves the cluster membership, the device group fails over to the secondary node. When the failed node rejoins the cluster membership, the device group can either continue to be mastered by the secondary node or fail back to the original primary node.

- If the `failback` property is set to `true`, the device group becomes mastered by the original primary node.
- If the `failback` property is set to `false`, the device group continues to be mastered by the secondary node.

By default, the `failback` property is disabled during device group creation. The `failback` property is not altered during a `set` operation.

`localonly`

The `localonly` property can have a value of `true` or `false`. The default is `false`.

The `localonly` property is only valid for disk groups of type `rawdisk` and `vxvm`.

If you want a disk group to be mastered only by a particular node, configure the disk group with the property setting `localonly=true`. A local-only disk group is outside the control of Oracle Solaris Cluster software. You can specify only one node in the node list of a local-only disk group. When you set the `localonly` property for a disk group to `true`, the node list for the disk group must contain only one node.

`numsecondaries`

The `numsecondaries` property must have an integer value greater than `0` but less than the total number of nodes in the node list. The default is `1`.

This property setting can be used to dynamically change the desired number of secondary nodes for a device group. A secondary node of a device group can take over as the primary node if the current primary node fails.

You can use the `numsecondaries` property to change the number of secondary nodes for a device group while maintaining a given level of availability. If you remove a node from the secondary-nodes list of a device group, that node can no longer take over as a primary node.

The `numsecondaries` property only applies to the nodes in a device group that are currently in cluster mode . The nodes must also be capable of being used together with the device group's `preferenced` property. If a group's `preferenced` property is set to `true`, the nodes that are least preferred are removed from the secondary-nodes list first. If no node in a device group is flagged as preferred, the cluster randomly picks the node to remove.

When a device group's actual number of secondary nodes drops to less that the desired level, each eligible node that was removed from the secondary-nodes list is added back to the list. Each node must meet all of the following conditions to be eligible to add back to the secondary-nodes list:

- The node is currently in the cluster.
- The node belongs to the device group
- The node is not currently a primary node or a secondary node.

The conversion starts with the node in the device group that has the highest preference. More nodes are converted in order of preference until the number of desired secondary nodes is matched.

If a node joins the cluster and has a higher preference in the device group than an existing secondary node, the node with the lesser preference is removed from the secondary-nodes list. The removed node is replaced by the newly added node. This replacement only occurs when more actual secondary nodes exist in the cluster than the desired level.

See the `preferenced` property for more information about setting the `preferenced` property for a device-group node list.

`preferenced`

The `preferenced` property can have a value of `true` or `false`. The default is `true`.

During the creation of a device group, if the `preferenced` property is set to `true`, the node list also indicates the preferred-node order. The preferred-node order determines the order in which each node attempts to take over as the primary node for a device group.

During the creation of a device group, if this property is set to `false`, the first node to access a device in the group automatically becomes the primary node. The order of nodes in the specified node list is not meaningful. Setting this property back to `true` without also re-specifying the node list does not reactivate node ordering.

The preferred-node order is not changed during a `set` operation unless both specify the `preferenced=true` property and use the `-n` option to supply the entire node list for the device group, in the preferred order.

`-t` *devicegroup-type*[,…]
`--type=`*devicegroup-type*[,…]
`--type` *devicegroup-type*[,…]

Specifies a device-group type or a list of device-group types.

For the `create` subcommand, you can specify only one device-group type. The device group is then created for the type that you specify with this option.

For all other subcommands that accept the `-t` option, the device-group list that you supply to the command is qualified by this option to include only device groups of the specified type.

Not all subcommands and options are valid for all device-group types. For example, the `create` subcommand is valid only for the `rawdisk` and `vxvm` device-group types, but not for the `svm` or `sds` device-group type.

The `-t` option supports the following device-group types:

`rawdisk`
Specifies a raw-disk device group.

A raw disk is a disk that is not part of a volume-manager volume or metadevice. Raw-disk device groups enable you to define a set of disks within a device group. By default, at system boot a raw-disk device group is created for every device ID pseudo driver (DID) device in the configuration. By convention, the raw-disk device group names are assigned at initialization. These names are derived from the DID device names. For every node that you add to a raw-disk device group, the `cldevicegroup` command verifies that every device in the group is physically ported to the node.

The `create` subcommand creates a raw-disk device group and adds multiple disk devices to the device group. Before you can create a new raw-disk device group, you must remove each device that you want to add to the new group from the device group that was created for the device at boot time. Then you can create a new raw-disk device group that contains these devices. You specify the list of these devices with the `-d` option as well as specify the potential-primary node-preference list with the `-n` option.

To master a device group on a single specified node, use the `-p` option to configure the device group with the property setting `localonly=true`. You can specify only one node in the node list when you create a local-only device group.

The `delete` subcommand removes the device-group name from the cluster device-group configuration.

The `set` subcommand makes the following changes to a raw-disk device group:

- Changes the preference order of the potential primary node
- Specifies a new node list
- Enables or disables failback
- Sets the desired number of secondaries
- Adds more global devices to the device group

If a raw-disk device name is registered in a raw-disk device group, you cannot also register the raw-disk device name in a Solaris Volume Manager device group.

All disks in a disk group should be either replicated or non-replicated, but not a mixture of both.

`sds`
Specifies a device group that was originally created with Solstice DiskSuite software. With the exception of multi-owner disk sets, this device-group type is equivalent to the Solaris Volume Manager device-group type, `svm`. See the description of the `svm` device-group type for more information.

`svm`

Specifies a Solaris Volume Manager device group.

A Solaris Volume Manager device group is defined by the following components:

- A name
- The nodes upon which the group can be accessed
- A global list of devices in the disk set
- A set of properties that control actions such as potential primary preference and failback behavior

Solaris Volume Manager has the concept of a multi-hosted or shared disk set. A shared disk set is a grouping of two or more hosts and disk drives. The disk drives are accessible by all hosts and have the same device names on all hosts. This identical-device-naming requirement is achieved by using the raw-disk devices to form the disk set. The device ID pseudo driver (DID) allows multi-hosted disks to have consistent names across the cluster. Only hosts that are already configured as part of a disk set can be configured into the node list of a Solaris Volume Manager device group. When you add drives to a shared disk set, the drives must not belong to any other shared disk set.

The Solaris Volume Manager `metaset` command creates the disk set and automatically registers the disk set with Oracle Solaris Cluster software as a Solaris Volume Manager device group. After you create the device group, you must use the `set` subcommand of the `cldevicegroup` command to set the node preference list and the `preferenced`, `failback`, and `numsecondaries` properties.

You can assign only one Solaris Volume Manager disk set to a device group. The device-group name must always match the name of the disk set.

You cannot use the `add-node` or `remove-node` subcommands to add or remove nodes in a Solaris Volume Manager device group. Instead, use the Solaris Volume Manager `metaset` command to add or remove nodes in the underlying Solaris Volume Manager disk set.

You cannot use the `delete` subcommand to remove a Solaris Volume Manager device group from the cluster configuration. Instead, use the Solaris Volume Manager `metaset` command to remove the underlying Solaris Volume Manager disk set.

Only the `export`, `list`, `show`, `status`, and `sync` subcommands work on Solaris Volume Manager multi-owner disk sets. You must use Solaris Volume Manager commands or utilities to create and delete the underlying disk set of a Solaris Volume Manager device group.

All disks in a disk set should be either replicated or non-replicated, but not a mixture of both.

`-V`
`--version`
Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The `-V` option only displays the version of the command. No other operations are performed.

`-v`
`--verbose`
Displays verbose messages to standard output.

You can use this option with any form of the command.

Operands The following operand is supported:

devicegroup Specifies a device group.

The `cldevicegroup` command accepts only Oracle Solaris Cluster device-group names as operands. For most forms of the command that accept more than one device-group name, you can use the plus sign (+) to specify all possible device groups.

Note – The + operand includes only manually created device groups, but ignores all automatically created device groups, which have the `autogen` property set to `true`. Oracle Solaris Cluster software automatically creates such device groups at each system boot. To apply a command these "hidden" device groups, you must specify each device group explicitly.

Exit Status The complete set of exit status codes for all commands in this command set are listed on the `Intro`(1CL) man page.

If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

`0 CL_NOERR`
No error

`1 CL_ENOMEM`
Not enough swap space

`3 CL_EINVAL`
Invalid argument

6 `CL_EACCESS`
Permission denied

35 `CL_EIO`
I/O error

36 `CL_ENOENT`
No such object

39 `CL_EEXIST`
Object exists

Examples

EXAMPLE 1 Modifying a Device Group

The following example shows how to set the `preference` property of device group `devgrp1` to `true` and set the `numsecondaries` property to `2`. The command also specifies the desired node list, `phys-schost-1,phys-schost-2,phys-schost-3`.

```
# cldevicegroup set -p preferenced=true -p numsecondaries=2 \\
-n phys-schost-1,phys-schost-2,phys-schost-3 devgrp1
```

EXAMPLE 2 Modifying a Raw-Disk Device Group

The following example shows how to modify the existing raw-disk device group `rawdevgrp1`. The command specifies devices `d3` and `d4` in a new-member device list and sets the `localonly` attribute to `true`. The node `phys-schost-1` is the only primary node that is allowed for the local-only raw-disk device group.

```
# cldevicegroup set -d d3,d4 \\
-p localonly=true -n phys-schost-1 rawdevgrp1
```

EXAMPLE 3 Resetting the numsecondaries Attribute of a Device Group

The following example shows how to reset the `numsecondaries` attribute of device group `devgrp1` to the appropriate system default value by specifying no value for that attribute.

```
# cldevicegroup set -p numsecondaries= devgrp1
```

EXAMPLE 4 Switching Over a Device Group

The following example shows how to switch over the device group `devgrp1` to a new master node, `phys-schost-2`.

```
# cldevicegroup switch -n phys-schost-2 devgrp1
```

EXAMPLE 5 Disabling a Device Group

The following example shows how to disable the device group `devgrp1`.

```
# cldevicegroup disable devgrp1
```

EXAMPLE 6 Taking Offline a Device Group

The following example shows how to disable and take offline the device group `devgrp1`.

```
# cldevicegroup disable devgrp1
# cldevicegroup offline devgrp1
```

EXAMPLE 7 Bringing a Device Group Online on its Primary Node

The following example shows how to bring online the device group `devgrp1` on its default primary node. The command first enables the device group.

```
# cldevicegroup online -e devgrp1
```

EXAMPLE 8 Bringing a Device Group Online on a Specified Node

The following example shows how to bring online the device group `devgrp1` on `phys-schost-2` as its new primary node.

```
# cldevicegroup switch -n phys-schost-2 devgrp1
```

EXAMPLE 9 Adding New Nodes to a Device Group

The following example shows how to add a new node, `phys-schost-3`, to the device group `devgrp1`. This device group is not of the device-group type `svm`.

```
# cldevicegroup add-node -n phys-schost-3 devgrp1
```

EXAMPLE 10 Deleting a Device Group

The following example shows how to delete the device group `devgrp1` from the Oracle Solaris Cluster configuration. This device group is not of the device-group type `svm`.

```
# cldevicegroup delete devgrp1
```

EXAMPLE 11 Synchronizing Replication Information With the Device-Group Configuration

The following example shows how to make Oracle Solaris Cluster software aware of the replication configuration that is used by the disks in the device group `devgrp1`.

```
# cldevicegroup sync devgrp1
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also `Intro`(1CL), `cldevice`(1CL), `cluster`(1CL), `metaset`(1M), `clconfiguration`(5CL), `rbac`(5), `did`(7)

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Notes The superuser can run any forms of this command.

Any user can also run this command with the following options:

- `-?` (help) option
- `-V` (version) option

To run this command with other subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
`add-device`	`solaris.cluster.modify`
`add-node`	`solaris.cluster.modify`
`create`	`solaris.cluster.modify`
`delete`	`solaris.cluster.modify`
`disable`	`solaris.cluster.modify`
`enable`	`solaris.cluster.modify`
`export`	`solaris.cluster.read`
`list`	`solaris.cluster.read`
`offline`	`solaris.cluster.admin`
`online`	`solaris.cluster.admin`
`remove-device`	`solaris.cluster.modify`
`remove-node`	`solaris.cluster.modify`
`set`	`solaris.cluster.modify`
`show`	`solaris.cluster.read`
`status`	`solaris.cluster.read`
`switch`	`solaris.cluster.modify`
`sync`	`solaris.cluster.admin`

Name clinterconnect, clintr – manage the Oracle Solaris Cluster interconnect

Synopsis

```
/usr/cluster/bin/clinterconnect  -V

/usr/cluster/bin/clinterconnect  [subcommand] -?

/usr/cluster/bin/clinterconnect  subcommand  [options]
 -v  [endpoint[,endpoint] ...]

/usr/cluster/bin/clinterconnect add  [-d] endpoint[,endpoint] ...

/usr/cluster/bin/clinterconnect add  -i {- |  clconfigfile}
 [-d] [-n node[,...] ] {+ |  endpoint[,endpoint] ...}

/usr/cluster/bin/clinterconnect disable  [-n node[,...] ]
 {+ |  endpoint[,endpoint] ...}

/usr/cluster/bin/clinterconnect enable  [-n node[,...] ]
 {+ |  endpoint[,endpoint] ...}

/usr/cluster/bin/clinterconnect export  [-o  {-
 |  configfile}] [-n node[,...] ] [+ |  endpoint[,endpoint] ...]

/usr/cluster/bin/clinterconnect remove  [-l] endpoint[,endpoint] ...

/usr/cluster/bin/clinterconnect show  [-n node[,...] ]
 [+ |  endpoint[,endpoint] ...]

/usr/cluster/bin/clinterconnect status  [-n node[,...] ]
 [+ |  endpoint[,endpoint] ...]
```

Description The `clinterconnect` command manages configuration of the cluster interconnect and displays configuration and status information. The `clintr` command is the short form of the `clinterconnect` command. The `clinterconnect` command and the `clintr` command are identical. You can use either form of the command.

The cluster interconnect consists of two endpoints which are connected with cables. An endpoint can be an adapter on a node or a switch, also called a junction. A cable can connect an adapter and a switch or connect two adapters in certain topologies. The cluster topology manager uses available cables to build end-to-end interconnect paths between nodes. The names of cluster interconnect components that are supplied to this command should accurately reflect the actual physical configuration. Failure to do so will prevent the system from building end-to-end cluster interconnect paths. This lack of functional cluster interconnects would result in cluster nodes that are unable to communicate with each other, nodes that panic, and similar conditions.

You must run the `clinterconnect` command from a cluster node that is online and is in cluster mode.

The general form of this command is as follows:

`clinterconnect` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the `-?` option or the `-V` option.

Each option of this command has a long form and a short form. Both forms of each option are given with the description of the option in the OPTIONS section of this man page.

For more information about valid uses of this command, see the descriptions of the individual subcommands. For ease of administration, use this command in the global zone.

Subcommands The following subcommands are supported:

`add`

Adds the new cluster interconnect components that are specified as operands to the command.

You can use this subcommand only in the global zone.

The syntax of the operand determines whether you are adding a cable, a switch, or an adapter. Refer to the OPERANDS section of this man page for more information.

Use the `add` subcommand to configure an interconnect cable between an adapter and either an adapter on another node or an interconnect switch. The adapter or switch endpoints that constitute the cable do not need to already exist. You can also use this subcommand to add adapters or switches to the configuration.

When you add an adapter or a switch to the configuration, the command also enables the adapter or switch. When you add a cable, the command also enables each of the cable's endpoints, if the endpoints are not already enabled.

In a two-node cluster, if you add a cable with an adapter at each endpoint, a virtual switch is also created.

Use the `-d` option to add an endpoint in the disabled state.

If you specify a configuration file with the `-i` option, you can specify the plus sign (+) as the operand. When you use this operand, the command creates all interconnect components that are specified in the configuration file which do not already exist in the cluster.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

For information about removing interconnect components, see the description of the `remove` command.

`disable`

Disables the interconnect components that are specified as operands to the command.

You can use this subcommand only in the global zone.

The syntax of the operand determines whether you are disabling a cable, a switch, or an adapter. Refer to the OPERANDS section of this man page for more information.

If you attempt to disable an adapter or a switch that is connected to an enabled cable, the operation results in an error. You must first disable the cable before you attempt to disable the connected adapter or switch.

When you disable a cable, the command also disables each endpoint that is associated with the cable, which can be an adapter or a switch port. The command also disables the switch if all of the switch ports are in a disabled state.

If you attempt to disable the cable or an endpoint of the last cluster interconnect path of an active cluster node, the operation results in an error.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

For information about enabling interconnect components, see the description of the `enable` subcommand.

`enable`

Enables the interconnect components that are specified as operands to the command.

You can use this subcommand only in the global zone.

The syntax of the operand determines whether you are enabling a cable, a switch, or an adapter. Refer to the OPERANDS section of this man page for more information.

When you enable a cable, the command also enables each endpoint that is associated with the cable, which can be an adapter or a switch port.

For information about disabling interconnect components, see the description of the `disable` subcommand.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`export`

Exports the cluster interconnect configuration information.

You can use this subcommand only in the global zone.

If you supply a file name with the `-o` option, the configuration information is written to that new file. If you do not use the `-o` option, the output is written to standard output.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`remove`

Removes the cluster interconnect components that are specified as operands to the command.

You can use this subcommand only in the global zone.

The syntax of the operand determines whether you are removing a cable, a switch, or an adapter. Refer to the OPERANDS section of this man page for more information.

The following behaviors apply when you remove a cable:

- You must first disable a cable before you can remove the cable.
- If you attempt to remove a cable that is enabled, the remove operation results in an error.
- If you remove a disabled cable, the cable's endpoints are also removed except in the following circumstances:
  - The switch is in use by another cable.
  - You also specify the `-l` option.

The following behaviors apply when you remove an adapter or switch endpoint:

- If you remove an endpoint that is not associated with a cable, the specified endpoint is removed.
- If you attempt to remove an endpoint that is associated with a cable, the remove operation results in an error. This occurs regardless of whether the cable is enabled or disabled.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

For information about adding interconnect components, see the description of the `add` subcommand.

`show`
Displays the configuration of the interconnect components that are specified as operands to the command.

You can use this subcommand in a global zone or a zone cluster.

The configuration information includes whether the component is enabled or disabled. By default, the configuration of all interconnect components is printed.

The `show` subcommand accepts the plus sign (+) as an operand to specify all components. You can use the `-Z` option to see private network configuration information for the exclusive-IP zone cluster you specify.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`status`
Displays the status of the interconnect paths. By default, the report displays the status of all interconnect paths in the system. You can use the `-Z` option to display the status of private network configuration information for the exclusive-IP zone cluster you specify.

You can use this subcommand in a global zone or an exclusive-IP zone cluster.

The following are the possible states of an interconnect path.

`faulted`	The interconnect path has encountered an error that prevents it from functioning.
`Path online`	The interconnect path is online and is providing service.
`waiting`	The interconnect path is in transition to the `Path online` state.

To determine whether an interconnect component is enabled or disabled, use the `show` subcommand.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

Options The following options are supported:

`-?`
`--help`
Displays help information. When this option is used, no other processing is performed.

You can use this option either alone or with a subcommand.

- If you specify this option alone, the list of available subcommands is printed.
- If you specify this option with a subcommand, the usage options for that subcommand are printed.

`-d`
Specifies that the endpoint is added in the disabled state.

`-i` {- | *clconfigfile*}
`--input={- |` *clconfigfile*`-}`
`--input {- |` *clconfigfile*`-}`
Specifies configuration information that is to be used for adding or modifying cables. This information must conform to the format that is defined in the `clconfiguration`(5CL) man page. This information can be contained in a file or supplied through standard input. To specify standard input, supply the minus sign (`-`) instead of a file name.

Options that you specify in the command override any options that are set in the cluster configuration file. If required elements are missing from a cluster configuration file, you must specify these elements on the command line.

You can use the minus sign (`-`) argument with this option to specify that the configuration is supplied as standard input.

`-l`
`--limited`

Specifies that the cable removal operation removes only the cable but not any of its endpoints.

The `-l` option is only valid with the `remove` subcommand. If you do not specify this option with the `remove` subcommand, the command removes the specified cables as well as any associated adapters. In addition, if the cable removal operation removes the last connection to a switch, the command also removes the switch from the configuration.

`-n` *node*[,…]
`--node=`*node*[,…]
`--node` *node*[,…]

Specifies a node or list of nodes. Use this option to limit the operation to adapters and cables that are attached only to the specified node.

You can specify a node either by its node name or by its node ID.

`-o` {- | *clconfigfile*}
`--output=`{- | *clconfigfile*}
`--output` {- | *clconfigfile*}

Displays the interconnect configuration in the format that is described by the `clconfiguration`(5CL) man page.

Only the `export` subcommand accepts the `-o` option.

If you supply a file name as the argument to this option, the command creates a new file and the configuration is printed to that file. If a file of the same name already exists, the command exits with an error. No change is made to the existing file.

If you supply the minus sign (`-`) as the argument to this option, the command displays the configuration information to standard output. All other standard output for the command is suppressed.

`-V`
`--version`

Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The `-V` option only displays the version of the command. No other operations are performed.

`-v`
`--verbose`

Displays verbose messages to standard output. By default, the `show` and `status` commands display verbose output.

You can use this option with any form of the command.

`-Z` {*zoneclustername*}
`--zoneclustername=`{*zoneclustername*}
`--zoneclustername` {*zoneclustername*}

Specifies the cluster or clusters where you want to operate.

This option is supported by the `show` and `status` subcommands.

If you specify this option, you must also specify one argument from the following list:

zoneclustername	Specifies that the command with which you use this option is to operate in only the zone cluster named *zoneclustername*.
`global`	Specifies that the command with which you use this option is to operate in the global cluster only.

Operands This command accepts interconnect endpoints or pairs of comma-separated endpoints as operands. An endpoint can be an adapter or a switch. A comma-separated pair of endpoints indicates a cable.

For those forms of the command that accept more than one interconnect component, you can use the plus sign (+) argument to specify all possible components.

The following operands are supported:

node:*adapter*
Specifies an adapter endpoint.

An adapter endpoint has a node name and an adapter name. The adapter name is constructed from an interconnect name that is immediately followed by a physical-unit number, such as `net0`. The node that hosts the adapter does not need to be active in the cluster for these operations to succeed.

The following types of adapters can be configured as cluster transport adapters:

Ethernet	You can connect an Ethernet adapter to another Ethernet adapter or to an Ethernet switch.
InfiniBand	You can connect an InfiniBand adapter only to an InfiniBand switch.

By default, adapters are configured as using the `dlpi` transport type.

To specify a tagged-VLAN adapter, use the tagged-VLAN adapter name that is derived from the physical device name and the VLAN instance number. The VLAN instance number is the VLAN ID multiplied by 1000 plus the original physical-unit number. For example, a VLAN ID of `11` on the physical device `net2` translates to the tagged-VLAN adapter name `net11002`.

switch[@*port*]
Specifies a switch endpoint.

Each interconnect switch name must be unique across the namespace of the cluster. You can use letters, digits, or a combination of both. The first character of the switch name must be a letter.

If you do not supply a *port* component for a switch endpoint, the command assumes the default port name. The default port name is equal to the node ID of the node that is attached to the other end of the cable.

You can configure the following types of switches as cluster transport switches:

Ethernet — Use the Ethernet switch with Ethernet adapters.

InfiniBand — Use the InfiniBand switch with InfiniBand adapters.

By default, switches are configured as using the `switch` type.

node:*adapter*,*node*:*adapter*
node:*adapter*,*switch*[@*port*]
Specifies a cable.

A cable is a comma-separated pair of adapter or switch endpoints. The order of endpoints is not important. Use cable operands to add a complete cluster interconnect. Because the `clinterconnect` command automatically creates both endpoints when you add a cable, you do not need to separately create adapter or switch endpoints.

Exit Status

The complete set of exit status codes for all commands in this command set are listed on the `Intro(1CL)` man page.

If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

`0 CL_NOERR`
No error

`1 CL_ENOMEM`
Not enough swap space

`3 CL_EINVAL`
Invalid argument

`6 CL_EACCESS`
Permission denied

`35 CL_EIO`
I/O error

`36 CL_ENOENT`
No such object

`37CL_EOP`
Operation not allowed

38 `CL_EBUSY`
Object busy

39 `CL_EEXIST`
Object exists

Examples

EXAMPLE 1 Creating a Direct-Connect Cluster Interconnect Cable

The following example shows how to add a cable that connects ports between the adapter `net0` on the node `phys-schost-1` and the adapter `net0` on the node `phys-schost-2`.

```
# clinterconnect add phys-schost-1:net0,phys-schost-2:net0
```

EXAMPLE 2 Creating a Cable Between a Switch and an Adapter

The following example shows how to add a cable between the adapter `net0` on the node `phys-schost-1` and the switch `ether_switch`.

```
# clinterconnect add phys-schost-1:net0,ether_switch
```

EXAMPLE 3 Disabling a Cable

The following example shows how to disable the cable that is connected between the adapter `net0` on the node `phys-schost-1` and the switch `ether_switch`.

```
# clinterconnect disable phys-schost-1:net0,ether_switch
```

EXAMPLE 4 Removing a Cluster Interconnect Cable

The following example shows how to remove the cable that is connected between the adapter `net0` on the node `phys-schost-1` and the switch `ether_switch`.

```
# clinterconnect remove phys-schost-1:net0,ether_switch
```

EXAMPLE 5 Creating a Cable Between a Tagged-VLAN Adapter and a Switch

The following example shows how to add a cable between the tagged VLAN adapter `net73002` on the node `phys-schost-1` and the VLAN-capable switch `switch1`. The physical name of the adapter is `net2` and the VLAN ID is `73`.

```
# clinterconnect add phys-schost-1:net73002,switch1
```

EXAMPLE 6 Enabling a Switch

The following example shows how to enable the switch endpoint `switch1`.

```
# clinterconnect enable switch1
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also `Intro`(1CL), `cluster`(1CL), `clconfiguration`(5CL), `rbac`(5)

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Notes The superuser can run all forms of this command.

Any user can run this command with the following options.

- `-?` (help) option
- `-V` (version) option

To run this command with other subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
`add`	`solaris.cluster.modify`
`disable`	`solaris.cluster.modify`
`enable`	`solaris.cluster.modify`
`export`	`solaris.cluster.read`
`remove`	`solaris.cluster.modify`
`show`	`solaris.cluster.read`
`status`	`solaris.cluster.read`

Name clnasdevice, clnas – manage access to NAS devices for Oracle Solaris Cluster

Synopsis

/usr/cluster/bin/clnasdevice -V

/usr/cluster/bin/clnasdevice [*subcommand*] -?

/usr/cluster/bin/clnasdevice *subcommand* [*options*] -v [*nasdevice*[...]]

/usr/cluster/bin/clnasdevice add -t *type* {-p *name*=*value*[,...] | -u *userid*} [-f *passwdfile*] [-Z {*zoneclustername* | global}] *nasdevice*

/usr/cluster/bin/clnasdevice add -i {- | *clconfigfile*}[-t *type*] [-p *name*=*value* | -u *userid*] {-f *passwdfile*} [-Z {*zoneclustername* | global}] {*nasdevice*

/usr/cluster/bin/clnasdevice add-dir -d *directory*[,...] [-Z {*zoneclustername* | global}] *nasdevice*

/usr/cluster/bin/clnasdevice add-dir -i {- | *clconfigfile*} [-d all | *directory* [,...]] [-f *passwordfile*] [-Z {*zoneclustername* | global}] {*nasdevice*

/usr/cluster/bin/clnasdevice export [-o {- | *clconfigfile*}] [-t *type*[,...]] [-d all | *directory*[,...]] [+ | *nasdevice*[...]]

/usr/cluster/bin/clnasdevice find-dir [-d {all |directory[,...] [-t *type*[,...]] [-Z {*zoneclustername*[,...] | global | all}] [+ | *nasdevice*[...]]

/usr/cluster/bin/clnasdevice list [-t *type*[,...]] [-Z {*zoneclustername*[,...] | global | all}] [+ | *nasdevice*[...]]

/usr/cluster/bin/clnasdevice remove [-t *type*[,...]] [-Z {*zoneclustername* | global}] [-F] {+ | *nasdevice*[...]}

/usr/cluster/bin/clnasdevice remove-dir -d all | *directory*[,...] [-Z {*zoneclustername* | global}] *nasdevice*

/usr/cluster/bin/clnasdevice set {-p *name*=*value*[,...] | -u *userid*} [-f *passwdfile*] [-Z {*zoneclustername* | global}] *nasdevice*

/usr/cluster/bin/clnasdevice show [-d {all | *directory*[,...] [-t *type*[,...]] [-Z {*zoneclustername*[,...] | global | all}] [+ | *nasdevice*[...]]

Description The clnasdevice command manages Oracle Solaris Cluster configuration information for NAS devices and their directories or projects.

The clnas command is the short form of the clnasdevice command. The clnas and clnasdevice commands are identical. You can use either form of the command.

The general form of this command is as follows:

clnasdevice [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the -? option or the -V option.

Each option of this command has a long form and a short form. Both forms of each option are provided with the description of the option in the “OPTIONS” section of this man page.

Before you use the `clnasdevice` command to configure a NAS device in the cluster, your NAS device must conform to the following conditions:

- The NAS device must be set up and operating.
- The NAS device must be booted and running.
- The NAS device's directories must be created and made available to the cluster nodes.
- If the NAS device will be a quorum device, the LUN for the quorum device must be created. For information on configuring a NAS quorum device, see the `clquorum`man page.

Depending on the NAS device vendor, you might need to perform additional tasks before you configure the device into the cluster. For details about these tasks, see the `-t` option in "OPTIONS". Refer to the documentation for your particular NAS device for procedures about setting up a NAS device and exporting the directories.

After the NAS device is fully operational and ready to provide storage for the cluster, use the `clnasdevice` command to manage the NAS device configuration information in the cluster. Otherwise, the cluster cannot detect the NAS device and its exported directories. Consequently, the cluster cannot protect the integrity of the information in these directories.

Use the `clnasdevice` command for these administrative tasks:

- To create the NAS device configuration
- To update NAS type-specific properties
- To remove the NAS device's directories from the cluster configuration
- To remove the NAS device from the cluster configuration

The `clnasdevice` command can be run only on an active cluster node. The result of running the command is always the same, regardless of the node on which you run it.

You can use the `clnasdevice` command with all subcommands (except `export`) in a zone cluster. You can also use the `-Z` option with all subcommands (except `export`) to specify the name of a particular zone cluster to which you want to restrict an operation.

You can access all zone cluster information from a global-cluster node, but a particular zone cluster is not aware of other zone clusters. If you do not restrict an operation to a particular zone cluster, the subcommand you use operates in the current cluster only.

Subcommands The following subcommands are supported:

`add`

Adds a NAS device to the Oracle Solaris Cluster configuration.

Use the `-t` option to specify the vendor of the NAS device. For details, see the `-t` option description in the "OPTIONS" section.

Depending on the type of your NAS device, you might have to set additional properties. These required properties are also explained in the `-t` option description in the "OPTIONS" section.

Users other than the superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization to use this command. See `rbac(5)`.

See also the description of the `remove` subcommand.

`add-dir`

Adds the specified directories or projects of an already configured NAS device to the cluster configuration. You must have created these directories or projects on the device and made them available to the cluster before using this subcommand. For information about creating directories or projects, see the documentation for your NAS device.

You can add NAS device directories or projects using one of the following methods:

- Use the `clnasdevice add` command to configure the NAS device in the cluster. Then use the `clnasdevice add-dir` command to configure that device's directories or projects in the cluster.
- Use the `clnasdevice add-dir -i` *configurationfile* form of the command to add the device and configure its directories or projects in a single step. To add directories or projects using this method, provide the password file using the `-f` option. For details on this option, see the Options section. See the `clconfiguration(5CL)` man page for more information.

Whenever you create a new directory or project on the NAS device and make it available to the cluster nodes, you need to use this `add-dir` subcommand to add the directories or projects to the cluster configuration. You can use the `find-dir` subcommand to list the available directories or projects that can be added to the cluster with the `add-dir` subcommand.

Users other than the superuser require `solaris.cluster.modify` RBAC authorization to use this command. See `rbac(5)`.

See also the description of the `remove-dir` subcommand.

`export`

Exports the cluster NAS device configuration information. If you specify a file with the `-o` option, the configuration information is written to that file. If you do not use the `-o` option, the output is written to standard output (`stdout`).

The `export` subcommand does not modify cluster configuration information.

Users other than the superuser require `solaris.cluster.read` RBAC authorization to use this command. See `rbac(5)`.

`find-dir`

Displays the sun_uss projects that are set up on the NAS devices that might be used by the cluster. These projects have not yet been added to the cluster configuration with the `add-dir` subcommand. The projects listed in the output can be candidates for the `-d` option when you use the `add-dir` subcommand.

To display a particular type of NAS device, specify the `-t` option.

To display the sun_uss projects and file systems inside those projects, specify the `-v` option.

To display specific sun_uss NAS device projects, specify the `-d` option.

To display specific sun_uss NAS device projects and the file systems inside those projects, specify the `-v` and `-d` options.

The `find-dir` subcommand does not modify cluster configuration information.

Users other than the superuser require `solaris.cluster.read` RBAC authorization to use this command. See `rbac(5)`.

`list`

Displays the NAS devices configured in the cluster.

To display the device's directories that are configured in the cluster and the device type, use the verbose option `-v`.

To display NAS devices of a particular type, use the `-t` option.

Users other than the superuser require `solaris.cluster.read` RBAC authorization to use this command. See `rbac(5)`.

`remove`

Removes the specified NAS device or devices from the Oracle Solaris Cluster configuration.

If you do not specify the force option, `-F`, you must have already removed the NAS device directories from the configuration by using the `remove-dir` subcommand.

If you specify the force option, `-F`, the command removes the NAS device and its directories from the cluster configuration. See `-F` in *OPTIONS*.

Users other than the superuser require `solaris.cluster.modify` RBAC authorization to use this command. See `rbac(5)`.

See also the description of the `add` subcommand.

`remove-dir`

Removes the specified NAS directory or project from the Oracle Solaris Cluster configuration.

The `remove-dir` subcommand removes the exported directories or projects specified by the `-d` option. When you use `-d all`, the subcommand removes all the directories or projects of the specified NAS device.

Whenever a directory or project is removed from the NAS device, you need to use this `remove-dir` subcommand to remove the directories or projects from the cluster configuration. The NAS directories or projects in the cluster configuration must match the existing directories or projects that are exported from the NAS device.

Users other than the superuser require `solaris.cluster.modify` RBAC authorization to use this command. See `rbac(5)`.

See also the description of the `add-dir` subcommand.

`set`

Sets specified properties of a specific NAS device.

Users other than the superuser require `solaris.cluster.modify` RBAC authorization to use this command. See `rbac(5)`.

`show`

When no options are provided, displays the following information:

- A listing of all the current NAS devices configured in Oracle Solaris Cluster
- The available directories of each NAS device
- All properties associated with each NAS device

To display a particular type of NAS device, specify the `-t` option. To display information about a particular device, pass the NAS device's hostname as the operand to the command.

To display the file systems contained in the specified projects, use the `-d` and `-v` options with the `show` subcommand. You can use the `all` keyword to display all the projects of a NAS device, or just individual projects.

Users other than the superuser require `solaris.cluster.read` RBAC authorization to use this command. See `rbac(5)`.

Options The following options are supported:

`-?`
`--help`

Displays help information. When this option is used, no other processing is performed for any other options.

You can specify this option with or without a subcommand.

If you specify this option without a subcommand, the list of subcommands for this command is displayed.

If you specify this option with a subcommand, the usage options for the subcommand are displayed.

`-d` *directory*[,…]
`--directory=`*directory*`-[,...]`
`--directory` *directory*`-[,...]`
`-d` *project*[,…]
`--directory=`*project*`-[,...]`
`--directory` *project*`-[,...]`

Specifies the projects of the `sun_uss` NAS devices. For `sun_uss` NAS devices, you must create the project on the NAS device before you create a file system. The project name cannot start with a `/`. File systems must be created within a project. A *project* is a `sun_uss` NAS device term, and you can create as many file systems as you want in a project. Use this option only with the `add-dir`, `remove-dir`, `export`, and `show` subcommands.

This option accepts a special keyword, `all`. When you use the `-d all` option, you specify all directories on the specified NAS devices.

- With the `remove-dir` subcommand, all directories on the specified devices are removed.
- With the `export` subcommand, the configuration information of all directories on the specified devices is displayed to the specified output.
- With the `add-dir` subcommand and the `-i` *configfile* option, all directories on the specified NAS device that are listed in the configuration file are added.
- When the `show` and `find-dir` subcommands are used with the `-v` option for the sun_uss NAS device, the file systems contained in the specified projects in the `-d` option are displayed. You can use the `all` keyword to display all the projects of a NAS device, or just individual projects.

`-F`
`--force`

Forces the removal of the specified NAS device.

The force option is available only with the `remove` subcommand. When you use this force option with the `remove` subcommand, it removes the NAS device and its configured directories from the Oracle Solaris Cluster configuration.

`-f` *passwd-file*
`--passwdfile=`*passwd-file*
`--passwdfile` *passwd-file*

Specifies the password file that contains the password to use when logging in to the NAS device.

For security reasons, the password cannot be specified in command-line options. To keep the password secure, place it in a text file and specify the file by using the `-f` option. If you do not specify an input file for the password, the command prompts for the password.

Set permissions of the input file to readable by root and prohibit access by either group or world.

When using `clnasdevice add` with the `-i` option, if your *clconfigfile* does not contain the password the `-f` *passwdfile* option is required.

In the input file, observe the following restrictions:

- Specify passwords on a single line. Do not type passwords across multiple lines.
- Leading white spaces and tabs are ignored.
- Comments begin with an unquoted # sign. Comments continue to the next new line.

  The parser ignores all comments.
- If you use an input file for the device user password, the # sign cannot be part of the password.

`-i` *clconfigfile*
`--input={- |` *clconfigfile*`-}`
`--input {- |` *clconfigfile*`-}`

Specifies the configuration information that is used to create or modify the NAS device. This information must conform to the format that is defined in the `clconfiguration`(5CL) man page. This information can be contained in a file or through the standard input (`stdin`). To specify the standard input, specify `-` instead of a file name.

If you specify the same properties on the command line and in the *clconfigfile* file, the properties that you set on the command-line prevail.

When using `clnasdevice add` with the `-i` option, the `-f` *passwdfile* option is required.

`-o` {- | *clconfigfile*}
`--output={- |` *clconfigfile*`-}`
`--output {- |` *clconfigfile*`-}`

Writes the NAS device configuration information in the format that is defined in the `clconfiguration`(5CL) man page. You can write this information to a file or to the standard output (`stdout`). To specify the standard output, specify `-` instead of a file name.

`-p` *name*=*value*[,…]
`--property=`*name*`-=`*value*`-[,...]`
`--property` *name*`-` *value*`-[,...]`

Specifies the properties that are specific to a NAS device type.

You must specify this option when you use the `add` subcommand to add a new NAS device to a cluster configuration. You also must specify this option when you modify the properties of a NAS device with the `set` subcommand. See the description of the `-t` option for more information.

`-t` *nas-device-type*
`--type=`*nas-device-type*
`--type` *nas-device-type*

Specifies the NAS device type. You must specify this option when you add a NAS device to the Oracle Solaris Cluster configuration. The NAS device type is identified by the vendor name. For example, Oracle's Sun ZFS Storage Appliance NAS device type is `sun_uss`.

Different types of NAS devices have different or in some cases, no properties.

`sun_uss`

Specifies Oracle's Sun ZFS Storage Appliance NAS device.

`-p userid=osc_agent [-f passwd-file]` or `-u userid [-f passwdfile]`

The userid must be `osc_agent`. Before using sun_uss, you must download the client code and install it on all cluster nodes. This `osc_agent` userid is created by running one of the workflows on the device. The userid must have been created on the device before you use the `clnasdevice` subcommands that take userid as input.

The userid and the password properties are required.

`-p "nodeIPs{`*node*`}"=[`*IP*`]`

This property specifies an IP for each node. If you are using an IP other than the IP of the cluster node name to access the NAS device, you can specify this IP using the `nodeIPs`*node* property. This property is optional. If you do not specify an IP, the system uses the IP of the cluster node name. These IPs must match the IPs specified in the `NFS Access Mode` of the projects on the NAS device.

If you do not specify a property value, (for example, `-p "nodeIPs{`*node*`}"=`), the IP for the specified node is removed from the cluster configuration and the system uses the IP of the cluster node name.

Before adding a sun_uss NAS device and its projects, you must perform the necessary setup. Setup tasks include downloading and installing the client code on the cluster nodes. Run the `Configure for Oracle Solaris Cluster NFS` workflow to create the userid `osc_agent` and its password on the device. Create projects, whose `Share Mode` is none or read-only (the read-write mode is supported but not recommended). The `NFS Access Mode` must use the Network notion and grant read-write access to the IPs of the cluster nodes.

Before adding a NAS device and its exported directories into the cluster configuration, you must have already performed the following tasks:

- Set up the NAS device.
- Set up directories and made them available to the cluster nodes.
- Determined the user ID and password to use for administrative tasks on the device.

The NAS device must also be up and running. For more information, see *Oracle Solaris Cluster With Network-Attached Storage Device Manual*.

`-u` *userid*
`--userid=`*userid*
`--userid` *userid*

Specifies the user ID that is used to log in to the NAS device.

The cluster needs to know the user ID to log in and perform administrative duties on the device.

Alternatively, you can specify the user ID with the `-p` option. See `-p` for details.

You can use this option only with the `add` and `set` subcommands.

`-V`
`--version`

Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The version of the command is displayed. No other processing is performed.

`-v`
`--verbose`

Displays verbose information to standard output (`stdout`).

`-Z` {*zoneclustername* **| global | all**}
`--zoneclustername=`{*zoneclustername* **| global |all**}

Specifies the cluster where the nas-device-type is registered and where you want to operate.

This option is supported by all subcommands except the `export` command.

If you specify this option, you must also specify one of the following arguments:

zoneclustername	Specifies that the command with which you use this option will operate on all specified nas-device-types only in the zone cluster named *zoneclustername*.
`global`	Specifies that the command with which you use this option will operate on all specified nas-device-types only in the global cluster.

`all` If you use this argument in the global cluster, it specifies that the command with which you use it will operate on all specified nas-device-types in all clusters (including the global cluster and all zone clusters).

If you use this argument in a zone cluster, it specifies that the command with which you use it will operate on all specified nas-device-types only in that zone cluster.

Operands The following operands are supported:

nasdevice
The name of a NAS device. The NAS device name is the hostname by which the NAS device communicates over the network. The cluster needs the NAS hostname of the NAS device to communicate with the NAS device. If the subcommand accepts more than one NAS device, you can use the plus sign (+) to specify all NAS devices. For the `add` and `add-dir` subcommands, the plus sign operand indicates all NAS devices in the specified configuration file.

Exit Status If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

The following exit values can be returned:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

`6 CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su`(1M) and `rbac`(5) man pages for more information.

`15 CL_EPROP`
Invalid property

The property or value that you specified with the `-p`, `-y`, or `-x` option does not exist or is not allowed.

18 `CL_EINTERNAL`
Internal error was encountered

An internal error indicates a software defect or other defect.

36 `CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

39 `CL_EEXIST`
Object exists

The device, device group, cluster interconnect component, node, cluster, resource, resource type, resource group, or private string that you specified already exists.

41 `CL_ETYPE`
Invalid type

The type that you specified with the `-t` or `-p` option does not exist.

Examples

EXAMPLE 1 Adding NAS Devices From Oracle's Sun ZFS Storage Appliance to a Cluster or Zone Cluster

The following `clnasdevice` command adds the Sun ZFS Storage Appliance `uss7110-01` of type `sun_uss` to the configuration.

```
# clnasdevice add -t sun_uss -p userid=osc_agent -f passwd-file uss7110-01
```

EXAMPLE 2 Adding NAS Projects to a Cluster

The following `clnasdevice` command adds two projects to the already-configured NAS device `uss7110-01`.

```
# clnasdevice add-dir -d pool-0/local/nassa-pl,pool-0/local/nassa-p2 uss7110-01
```

EXAMPLE 3 Removing a NAS Device From a Cluster or Zone Cluster

The following `clnasdevice` command removes the NAS device `uss7110-01` and all of its remaining projects, if any, from the cluster `sun` configuration.

```
# clnasdevice remove -F uss7110-01
```

The following `clnasdevice` command removes the NAS device `uss7110-01` and all of its remaining projects, if any, from the zone cluster ZC configuration.

EXAMPLE 3 Removing a NAS Device From a Cluster or Zone Cluster *(Continued)*

```
# clnasdevice remove -Z ZC -F uss7110-01
```

The following example shows how to update the nodeIPs property.

```
# clnasdevice set -p "nodeIPs{cluster-1}"= 10.155.55.145 -p
 "nodeIPs{cluster-2}"=10.155.55.146 uss7110-01
```

The following example removes the current setting of the IPs from the cluster configuration, so that the system uses the IPs of the cluster node names.

```
# clnasdevice set -p "nodeIPs{cluster-1}"= -p "nodeIPs{cluster-2}"= uss7110-01
```

EXAMPLE 4 Displaying NAS Device Projects That Have Not Been Added to the Cluster

The following `clnasdevice` command displays the NAS device project names that have not yet been added to the cluster.

```
# clnasdevice find-dir uss7110-01
Nas Device:            uss7110-01
Type:                  sun_uss
Unconfigured Project: pool-0/local/nassa-p2
Unconfigured Project: pool-0/local/nassa-p1
```

EXAMPLE 5 Displaying the NAS Devices Configured in the Cluster or Zone Cluster

The following `clnasdevice` command displays the names of all NAS devices that are configured in the cluster. To see a list of the devices and their directories, use the verbose option or the `show` subcommand.

```
# clnasdevice list
uss7110-01
```

The following `clnasdevice` command displays the names of all NAS devices that are configured in the zone cluster ZC. To see a list of the devices and their directories, use the verbose option or the `show` subcommand.

```
# clnasdevice list -Z ZC
ZC:uss7110-01
```

The following `clnasdevice` command displays the names of all NAS devices that are configured in the zone cluster ZC. To see a list of the devices and their directories, use the verbose option or the `show` subcommand.

```
# clnasdevice list -Z all
global:uss7110-01
ZC:uss7110-01
```

EXAMPLE 6 Display the NAS Devices and Their Projects

The following `clnasdevice` command displays the names of all NAS devices that are configured in the cluster, along with the project file systems.

```
# clnasdevice show -v -d all uss7110-01
Nas Device:       uss7110-01
Type:             sun_uss
Project:          pool-0/local/nassa-p1
  File System:    /export/nassa-p1/nassa-p1-fs1
  File System:    /export/nassa-p1/nassa-p1-fs2
  File System:    /export/nassa-p1/nassa-p1-fs3
Project:          pool-0/local/nassa-p2
  File System:    /export/nassa-p2/nassa-p2-fs1
  File System:    /export/nassa-p2/nassa-p2-fs2
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

`Intro(1CL)`, `cluster(1CL)`

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Notes

The superuser can run all forms of this command.

Any user can run this command with the following subcommands and options:

- `-?` option
- `-V` option

To run this command with other subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
`add`	`solaris.cluster.modify`
`add-dir`	`solaris.cluster.modify`
`export`	`solaris.cluster.read`
`find-dir`	`solaris.cluster.read`
`list`	`solaris.cluster.read`
`set`	`solaris.cluster.modify`

Subcommand	RBAC Authorization
`remove`	`solaris.cluster.modify`
`remove-dir`	`solaris.cluster.modify`
`show`	`solaris.cluster.read`

Name clnode – manage Oracle Solaris Cluster nodes

Synopsis

```
/usr/cluster/bin/clnode -V

/usr/cluster/bin/clnode [subcommand] -?

/usr/cluster/bin/clnode subcommand [options] -v [node ...]

/usr/cluster/bin/clnode add  -n sponsornode
[-i  {- | clconfigfile}] -c clustername] [-G globaldevfs]
[-e endpoint,endpoint] node

/usr/cluster/bin/clnode create-loadlimit -p limitname=value
[-p softlimit=value] [-p hardlimit=value] {+ | node[:zone] ...}

/usr/cluster/bin/clnode clear  [-F] node...

/usr/cluster/bin/clnode delete-loadlimit -p limitname=value
{+ | node[:zone] ...}

/usr/cluster/bin/clnode evacuate  [-T seconds] node

/usr/cluster/bin/clnode export [-o  {- | clconfigfile}]
[+ | node ...]

/usr/cluster/bin/clnode list
[-Z {zoneclustername | global | all}] [+ | node ...]

/usr/cluster/bin/clnode rename -n newnodename
[node]

/usr/cluster/bin/clnode remove  [-n sponsornode]
[-G globaldevfs] [-F] [node]

/usr/cluster/bin/clnode set [-p name=value] [...] {+ |  node ...}

/usr/cluster/bin/clnode set-loadlimit -p limitname=value
[-p softlimit=value] [-p hardlimit=value] {+ | node[:zone] ...}

/usr/cluster/bin/clnode show [-p name[,...]][-Z {zoneclustername
 |global | all}][+ | node ...]

/usr/cluster/bin/clnode show-rev [node]

/usr/cluster/bin/clnode status  [ -m][-Z {zoneclustername
| global | all}][+ | node ...]
```

Description This command does the following:

- Adds a node to the cluster
- Removes a node from the cluster
- Attempts to switch over all resource groups and device groups
- Modifies the properties of a node
- Manage load limits on nodes
- Reports or exports the status and configuration of one or more nodes

Most of the subcommands for the `clnode` command operate in cluster mode. You can run most of these subcommands from any node in the cluster. However, the `add` and `remove` subcommands are exceptions. You must run these subcommands in noncluster mode.

When you run the `add` and `remove` subcommands, you must run them on the node that you are adding or removing. The `clnode add` command also initializes the node itself for joining the cluster. The `clnode remove` command also performs cleanup operations on the removed node.

You can omit *subcommand* only if *options* is the `-?` option or the `-V` option.

Each option has a long and a short form. Both forms of each option are given with the description of the option in OPTIONS.

The `clnode` command does not have a short form.

For more information about valid uses of this command, see the descriptions of the individual subcommands. For ease of administration, use this command in the global zone.

You can use some forms of this command in a zone cluster. For more information about valid uses of this command in clusters, see the descriptions of the individual subcommands.

Subcommands The following subcommands are supported:

`add`

Configures and adds a node to the cluster.

You can use this subcommand only in the global zone. You can use this subcommand only in the global cluster.

You must run this subcommand in noncluster mode.

To configure and add the node, you must use the `-n` *sponsornode* option. This option specifies an existing active node as the sponsor node. The sponsor node is always required when you configure nodes in the cluster.

If you do not specify `-c` *clustername*, this subcommand uses the name of the first node that you add as the new cluster name.

The operand *node* is optional. However, if you specify an operand, it must be the host name of the node on which you run the subcommand.

Note – Run the `pkg install` command to install the Oracle Solaris Cluster software. Then run the `scinstall` utility to create a new cluster or add a node to an existing cluster. See the *Oracle Solaris Cluster Software Installation Guide* for instructions.

Users other than superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization to use this subcommand. See the `rbac(5)` man page.

`clear`

Cleans up or clears any remaining information about cluster nodes after you run the `remove` subcommand.

You can use this subcommand only in the global zone. You can use this subcommand only in the global cluster.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`create-loadlimit`

Adds a load limit on a node.

You can use this subcommand in the global zone or in a zone cluster.

See the `-p` option in OPTIONS.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`delete-loadlimit`

Removes an existing load limit on a node.

You can use this subcommand in the global zone or in a zone cluster.

See the `-p` option in OPTIONS.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`evacuate`

Attempts to switch over all resource groups and device groups from the specified node to a new set of primary nodes.

You can use this subcommand in a global zone or in a zone cluster node.

The system attempts to select new primary nodes based on configured preferences for each group. All evacuated resource groups are not necessarily re-mastered by the same primary node. If one or more resource groups or device groups cannot be evacuated from the specified node, this subcommand fails. If this subcommand fails, it issues an error message and exits with a nonzero exit code. If this subcommand cannot change primary ownership of a device group to another node, the original node retains primary ownership of that device group. If the RGM is unable to start an evacuated resource group on a new primary, the evacuated resource group might end up offline.

You can use the `-T` option with this subcommand to specify the number of seconds to keep resource groups from switching back. If you do not specify a value, 60 seconds is used by default.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`export`
Exports the node configuration information to a file or to the standard output (`stdout`).

You can use this subcommand only in the global zone. You can use this subcommand only in the global cluster.

If you specify the `-o` option and the name of a file, the configuration information is written to that file.

If you do not provide the `-o` option and a file name, the output is written to the standard output.

This subcommand does not modify cluster configuration data.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`list`
Displays the names of nodes that are configured in the cluster.

If you specify the `-Z` option with this subcommand, it lists the names of nodes in the particular cluster or clusters that you specify, as follows:

- All global-cluster nodes and zone-cluster nodes
- All global-cluster nodes only
- Only the zone-cluster node whose name you specify

You can use this subcommand in the global zone. You can use this subcommand in the global cluster or in a zone cluster.

If you do not specify the `node` operand, or if you specify the plus sign operand (+), this subcommand displays all node members.

You must run this subcommand in cluster mode.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand option. See the `rbac(5)` man page.

`remove`
Removes a node from the cluster.

You can use this subcommand only in the global zone. You can use this subcommand only in the global cluster.

You must run this subcommand in noncluster mode.

To remove a node from a cluster, observe the following guidelines. If you do not observe these guidelines, your removing a node might compromise quorum in the cluster.

- Unconfigure the node to be removed from any quorum devices, unless you also specify the `-F` option.
- Ensure that the node to be removed is not an active cluster member.
- Do not remove a node from a three-node cluster unless at least one shared quorum device is configured.

The subcommand attempts to remove a subset of references to the node from the cluster configuration database. If you specify the `-F` option, this subcommand attempts to remove all references to the node from the cluster configuration database.

Note – You must run the `scinstall -r` command to remove cluster software from the node. See the *Oracle Solaris Cluster Software Installation Guide* for more information.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`rename`

Renames a node to a new nodename.

You can use this subcommand only in the global zone. You must run this subcommand in noncluster mode.

Note – You must run this command on the same node where the Oracle Solaris hostname was changed.

To rename the node to a *newnodename*, you must use the `-n` *newnodename* option. The current active Oracle Solaris node must be renamed from the *oldnodename*. All nodes in the cluster must be in noncluster mode for this command to run successfully.

The operand is optional and it must be the hostname of the node where you run the subcommand.

Note – Before you can rename a node, you must first run the Oracle Solaris hostname change procedure to rename the cluster nodes in the cluster. For instructions, see "How to Change a System's Identity" in *Managing System Information, Processes, and Performance in Oracle Solaris 11.1*.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`set`

Modifies the properties that are associated with the node that you specify.

You can use this subcommand only in the global zone. You can use this subcommand only in the global cluster.

See the `-p` option in OPTIONS.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`set-loadlimit`

Modifies an existing load limit on a node.

You can use this subcommand in the global zone or in a zone cluster.

See the `-p` option in OPTIONS.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`show`

Displays the configuration of, or information about the properties on, the specified node or nodes.

If you specify the `-Z` option with this subcommand, it displays configuration or property information for the node or nodes in the particular cluster or clusters that you specify, as follows:

- All global-cluster nodes and zone-cluster nodes
- All global-cluster nodes only
- Only the zone-cluster node whose name you specify

You can use this subcommand only in the global zone. You can use this subcommand in the global cluster or in a zone cluster.

If you do not specify operands or if you specify the plus sign (+), this subcommand displays information for all cluster nodes.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`show-rev`

Displays the names of and release information about the Solaris Cluster packages that are installed on a node.

You can use this subcommand in the global zone. You can use this subcommand only in the global cluster.

You can run this subcommand in noncluster mode and cluster mode. If you run it in noncluster mode, you can only specify the name of and get information about the node on which you run it. If you run it in cluster mode, you can specify and get information about any node in the cluster.

When you use this subcommand with `-v`, this subcommand displays the names of packages, their versions, and patches that have been applied to those packages.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`status`

Displays the status of the node or nodes that you specify or Internet Protocol (IP) network multipathing (IPMP) groups.

You can use this subcommand in the global zone. You can use this subcommand in the global cluster or in a zone cluster.

If you do not specify operands or if you specify the plus sign (+), this subcommand displays the status of all cluster nodes. The status of a node can be `Online` or `Offline`.

If you specify the `-m` option with this subcommand, it displays only Oracle Solaris IPMP groups.

If you specify the verbose option `-v` with this subcommand, it displays both the status of cluster nodes and Oracle Solaris IPMP groups.

If you specify the `-Z` option with this subcommand, it displays status information for the node or nodes in the particular cluster or clusters that you specify, as follows:

- All global-cluster nodes and zone-cluster nodes
- All global-cluster nodes only
- Only the zone-cluster node whose name you specify

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

Options

Note – Both the short and long form of each option is shown in this section.

The following options are supported:

`-?`
`--help`

Displays help information.

You can specify this option with or without a *subcommand*.

If you do not specify a *subcommand*, the list of all available subcommands is displayed.

If you specify a *subcommand*, the usage for that subcommand is displayed.

If you specify this option and other options, the other options are ignored.

`-c` *clustername*
`--clustername=`*clustername*
`--clustername` *clustername*

Specifies the name of the cluster to which you want to add a node.

Use this option only with the `add` subcommand.

If you specify this option, the *clustername* that you specify must match the name of an existing cluster. Otherwise, an error occurs.

`-e` *endpoint*`-,`*endpoint*
`--endpoint=`*endpoint*`-,`*endpoint*
`--endpoint` *endpoint*`-,`*endpoint*

Specifies transport connections.

Use this option only with the `add` subcommand. You specify this option to establish the cluster transport topology. You establish the topology by configuring the cables that connect the adapters and the switches. You can specify an adapter or a switch as the endpoint. To indicate a cable, you specify a comma separated pair of endpoints. The cable establishes a connection from a cluster transport adapter on the current node to one of the following:

- A port on a cluster transport switch, also called a transport junction.
- An adapter on another node that is already included in the cluster.

If you do not specify the `-e` option, the `add` subcommand attempts to configure a default cable. However, if you configure more than one transport adapter or switch within one instance of the `clnode` command, `clnode` cannot construct a default. The default is to configure a cable from the singly configured transport adapter to the singly configured, or default, transport switch.

You must always specify two endpoints that are separated by a comma every time you specify the `-e` option. Each pair of endpoints defines a cable. Each individual endpoint is specified in one of the following ways:

- Adapter endpoint:

  node:*adapter*

- Switch endpoint:

  switch[@*port*]

To specify a tagged-VLAN adapter, use the tagged-VLAN adapter name that is derived from the physical device name and the VLAN instance number. The VLAN instance number is the VLAN ID multiplied by 1000 plus the original physical-unit number. For example, a VLAN ID of 11 on the physical device `bge2` translates to the tagged-VLAN adapter name `bge11002`.

If you do not specify a port component for a switch endpoint, a default port is assigned.

`-F`
`--force`

Forcefully removes or clears the specified node without verifying that global mounts remain on that node.

Use this option only with the `clear` or the `remove` subcommand.

`-G {lofi |` *special* `|` *mount-point*`}`
`--globaldevfs={lofi |` *special* `|` *mount-point*`}`
`--globaldevfs {lofi |` *special* `|` *mount-point*`}`

Specifies a `lofi` device, a raw *special* disk device, or a dedicated file system for the global-devices mount point.

Use this option only with the `add` or `remove` subcommand.

Each cluster node must have a local file system that is mounted globally on `/global/.devices/node@`*nodeID* before the node can successfully participate as a cluster member. However, the node ID is unknown until the `clnode` command runs. By default, the `clnode add` command looks for an empty file system that is mounted on `/globaldevices` or on the mount point that is specified to the `-G` option. If such a file system is provided, the `clnode add` command makes the necessary changes to the `/etc/vfstab` file. The file system that you specify is remounted at `/globaldevices`. The `clnode` command attempts to add the entry to the `vfstab` file when the command cannot find a node ID mount. See the `vfstab`(4) man page.

If `/global/.devices/node@`*nodeID* is not mounted and an empty `/globaldevices` file system is not provided, the command fails.

If `-G lofi` is specified, a `/.globaldevices` file is created. A `lofi` device is associated with that file, and the global-devices file system is created on the `lofi` device. No `/global/.devices/node@`*nodeID* entry is added to the `/etc/vfstab` file. For more information about `lofi` devices, see the `lofi`(7D)man page.

If a raw *special* disk device name is specified and `/global/.devices/node@`*nodeID* is not mounted, a file system is created on the device by using the `newfs` command. It is an error to supply the name of a device with an already-mounted file system.

As a guideline, a dedicated file system must be at least 512 Mbytes in size. If this partition or file system is not available or is not large enough, you might need to reinstall the Oracle Solaris OS.

For a namespace that is created on a `lofi` device, 100 MBytes of free space is needed in the root file system.

Use this option with the `remove` subcommand to specify the new mount point name to use to restore a former `/global/.devices` mount point.

When used with the `remove` subcommand, if the global-devices namespace is mounted on a dedicated partition, this option specifies the new mount point name to use to restore the former `/global/.devices` mount point. If you do not specify the `-G` option and the global-devices namespace is mounted on a dedicated partition, the mount point is renamed `/globaldevices` by default.

`-i` {`-` | *clconfigfile*}
`--input={- |` *clconfigfile*`-}`
`--input {- |` *clconfigfile*`-}`
Reads node configuration information from a file or from the standard input (`stdin`). The format of the configuration information is described in the `clconfiguration(5CL)` man page.

If you specify a file name with this option, this option reads the node configuration information in the file. If you specify `-` with this option, the configuration information is read from the standard input (`stdin`).

`-m`
Specifies IPMP groups. Use with the `status` subcommand to display only the status of IPMP groups.

`-n`
`--newnodename=`*newnodename*
`--newnodename`*newnodename*
Specifies the new node name.

This option can be used only with the `rename` subcommand.

You can specify a new node name for the current node. When you rename a node to the *newnodename* using the `rename` subcommand, the current node hostname must already be changed to the *newnodename*.

`-n` *sponsornode*
`--sponsornode=`*sponsornode*
`--sponsornode` *sponsornode*
Specifies the name of the sponsor node.

You can specify a name or a node identifier for *sponsornode*. When you add a node to the cluster by using the `add` subcommand, the sponsor node is the first active node that you add to the cluster. From that point, that node remains the *sponsornode* for that cluster. When you remove a node by using the `remove` subcommand, you can specify any active node other than the node to be removed as the sponsor node.

By default, whenever you specify *sponsornode* with a subcommand, the cluster to which *sponsornode* belongs is the cluster that is affected by that subcommand.

`-o` {`-` | *clconfigfile*}
`--output={- |` *clconfigfile*`-}`
`--output {- |` *clconfigfile*`-}`

Writes node configuration information to a file or to the standard output (`stdout`). The format of the configuration information is described in the `clconfiguration(5CL)` man page.

If you specify a file name with this option, this option creates a new file. Configuration information is then placed in that file. If you specify `-` with this option, the configuration information is sent to the standard output (`stdout`). All other standard output for the command is suppressed.

You can use this option only with the `export` subcommand.

`-p` *name*
`--property=`*name*
`--property` *name*
Specifies the node properties about which you want to display information with the `show` subcommand.

For information about the properties that you can add or modify with the `set` subcommand, see the description of the `-p` *name*=*value* option.

You can specify the following properties with this option:

`defaultpsetmin`
This property specifies the minimum number of CPUs that are available in the default processor set resource. You can set this property to any value between 1 and the number of CPUs on the machine (or machines) on which this property is set.

`globalzoneshares`
This property specifies the number of shares that are assigned to the global zone. You can set this property to any value between 1 and 65535, inclusive.

`privatehostname`
The private host name is used for IP access of a given node over the private cluster interconnect. By default, when you add a node to a cluster, this option uses the private host name `clusternode`*nodeid*`-priv`.

`reboot_on_path_failure`
Values to which you can set this property are `enabled` and `disabled`.

`-p` *name*=*value*
`--property=`*name*`-=`*value*
`--property` *name*`-=`*value*
Specifies the node properties that you want to add or modify with the `set` subcommand.

Multiple instances of `-p` *name*=*value* are allowed.

For information about the properties about which you can display information with the `show` subcommand, see the description of the `-p` *name* option.

You can modify the following properties with this option:

`defaultpsetmin`
Sets the minimum number of CPUs that are available in the default processor set resource.

The default value is 1 and the minimum value is 1. The maximum value is the number of CPUs on the machine (or machines) on which you are setting this property.

`globalzoneshares`
Sets the number of shares that are assigned to the global zone.

You can specify a value between 1 and 65535, inclusive. To understand this upper limit, see the `prctl(1)` man page for information about the `zone.cpu-shares` attribute. The default value for `globalzoneshares` is 1.

`hardlimit`
Defines a mandatory upper boundary for resource group load on a node. The total load on the node is never permitted to exceed the hard limit.

The `hardlimit` property is an unsigned integer. The `softlimit` property is an unsigned integer. The default value of the `hardlimit` property is *null*. A null or empty value indicates that the corresponding `limitname` is unlimited on the node. If a non-empty value is specified, it must not exceed 10 million.

`limitname`
The `limitname` property is a string. The name is associated with two values, a hard load limit and a soft load limit, specified by the `hardlimit` and `softlimit` properties, respectively.

For information on how to assign a load factor for each`limitname` property, see the `clresourcegroup(1CL)` man page. You can also use the `clresourcegroup` command to determine priority and preemption mode. For information on how to distribute resource group load across all nodes, see the `cluster(1CL)` man page.

`privatehostname`
Is used for IP access of a given node over the private cluster transport. By default, when you add a node to a cluster, this option uses the private host name `clusternode`*nodeid*`-priv`.

Before you modify a private host name, you must disable, on all nodes, all resources or applications that use that private host name. See the example titled "Changing the Private Hostname" in "How to Change the Node Private Hostname" in *Oracle Solaris Cluster System Administration Guide*.

Do *not* store private host names in the `hosts` database or in any naming services database. See the `hosts(4)` man page. A special `nsswitch` command performs all host name lookups for private host names. See the `nsswitch.conf(4)` man page.

If you do not specify a *value*, this option uses the default private host name `clusternode`*nodeid*`-priv`.

`reboot_on_path_failure`

Enables the automatic rebooting of a node when all monitored shared-disk paths fail, provided that the following conditions are met:

- All monitored shared-disk paths on the node fail.
- At least one of the disks is accessible from a different node in the cluster. The `scdpm` daemon uses the private interconnect to check if disks are accessible from a different node in the cluster. If the private interconnect is disabled, the `scdpm` daemon cannot obtain the status of the disks from another node.

You can use only the `set` subcommand to modify this property. You can set this property to `enabled` or to `disabled`.

Rebooting the node restarts all resource groups and device groups that are mastered on that node on another node.

If all monitored shared-disk paths on a node remain inaccessible after the node automatically reboots, the node does not automatically reboot again. However, if any monitored shared-disk paths become available after the node reboots but then all monitored shared-disk paths again fail, the node automatically reboots again.

When you enable the `reboot_on_path_failure` property, the states of local-disk paths are not considered when determining if a node reboot is necessary. Only monitored shared disks are affected.

If you set this property to `disabled` and all monitored shared-disk paths on the node fail, the node does *not* reboot.

`softlimit`

Defines an advisory upper boundary for a resource group load on a node. The total load on the node can exceed the soft limit, for example, when there is insufficient cluster capacity to distribute the load. When a soft load limit is exceeded, the condition is flagged in commands or tools that display cluster status.

The `softlimit` property is an unsigned integer. The default value of the `softlimit` property is *0*. A value of *0* for the soft limit means that no soft limit is imposed; there will be no *Softlimit exceeded* warnings from status commands. The maximum value for the `softlimit` property is 10 million. The `softlimit` property for a specific load limit must be less than or equal to the `hardlimit` value.

`-T` *seconds*
`--time=`*seconds*
`--time` *seconds*

Specifies the number of seconds to keep resource groups from switching back onto a node after you have evacuated resource groups from the node.

You can use this option only with the `evacuate` subcommand. You must specify an integer value between 0 and 65535 for *seconds*. If you do not specify a value, 60 seconds is used by default.

Resource groups are prevented from failing over, or automatically being brought online, on the evacuating node for 60 seconds or the specified number of seconds after the evacuation completes.

If, however, you use the `switch` or `online` subcommand to switch a resource group online, or the evacuated node reboots, the evacuation timer immediately expires and automatic failovers are again allowed.

`-v`
`--verbose`
Displays verbose information on the standard output (`stdout`).

`-V`
`--version`
Displays the version of the command.

If you specify this option with other options, with subcommands, or with operands, they are all ignored. Only the version of the command is displayed. No other processing occurs.

`-Z` {*zoneclustername* | `global` | `all`}
`--zonecluster=`{*zoneclustername* | `global` | `all`}
`--zonecluster` {*zoneclustername* | `global` | `all`}
Specifies the cluster or clusters in which the node or nodes about which you want information are located.

If you specify this option, you must also specify one argument from the following list:

zoneclustername	Specifies that information about only the zone-cluster node named *zoneclustername* is to be displayed.
`global`	Specifies that information about only global-cluster nodes is to be displayed.
`all`	Specifies that information about *all* global-cluster and zone-cluster nodes is to be displayed.

Operands The following operands are supported:

node	The name of the node that you want to manage. When you use the `add` subcommand, you specify the host name for *node*. When you use another subcommand, you specify the node name or node identifier for *node*.
`+`	All nodes in the cluster.

Exit Status The complete set of exit status codes for all commands in this command set are listed on the Intro(1CL) man page.

If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

`6 CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the su(1M) and rbac(5) man pages for more information.

`15 CL_EPROP`
Invalid property

The property or value that you specified with the `-p`, `-y`, or `-x` option does not exist or is not allowed.

`35 CL_EIO`
I/O error

A physical input/output error has occurred.

`36 CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

37 `CL_EOP`
Operation not allowed

You tried to perform an operation on an unsupported configuration, or you performed an unsupported operation.

Examples

EXAMPLE 1 Adding a Node to a Cluster

The following command configures and adds the node on which you run the command into an existing cluster. By default, this example uses `/globaldevices` as the global devices mount point. By default, this example also uses `clusternode1-priv` as the private host name.

This command names the cluster `cluster-1` and specifies that the sponsor node is `phys-schost-1`. This command also specifies that adapter `bge1` is attached to transport switch `switch1`. Finally, this command specifies that adapter `bge2` is attached to transport switch `switch2`.

```
# clnode add -c cluster-1 -n phys-schost-1 \
-e phys-schost-2:bge1,switch1 -e phys-schost-2:bge2,switch2
```

EXAMPLE 2 Removing a Node From a Cluster

The following command removes a node from a cluster. This command removes the node on which you run this command. The node is in noncluster mode.

```
# clnode remove
```

EXAMPLE 3 Changing the Private Host Name That Is Associated With a Node

The following command changes the private host name for node `phys-schost-1` to the default setting.

```
# clnode set -p privatehost=phys-schost-1
```

EXAMPLE 4 Changing Private Host Name Settings for All Nodes

The following command changes the private host name settings for all nodes to default values. In this case, you *must* insert a space between the equal sign (=) and the plus sign (+) to indicate that the + is the plus sign operand.

```
# clnode set -p privatehost= +
```

EXAMPLE 5 Setting Load Limits on Global-Cluster Nodes and Zone-Cluster Nodes

The following command modifies an existing load limit on all nodes in a global cluster. The example defines three load limits (`mem_load`, `disk_load`, and `cpu_load`) and sets soft and hard limits for each one. The `mem_load` load limit has a soft limit of 11, while `disk_load` has no soft limit, and `cpu_load` has no hard limit. The + operand in the examples modifies the load limit on all nodes.

```
# clnode set-loadlimit -p limitname=mem_load -p softlimit=11 -p hardlimit=20 +
```

EXAMPLE 5 Setting Load Limits on Global-Cluster Nodes and Zone-Cluster Nodes *(Continued)*

```
# clnode set-loadlimit -p limitname=disk_load -p hardlimit=20 +
```

```
# clnode set-loadlimit -p limitname=cpu_load -p softlimit=8 node1:zone1 node2:zone2
```

From the global zone, the following command modifies load limits on a zone cluster node. The example defines a load limit with a hard limit for the zone cluster node.

```
# clnode set-loadlimit -Z zoneclustername -p limitname=zc_disk_load -p hardlimit=15
zc-node1
```

EXAMPLE 6 Displaying the Status of All Nodes in a Cluster

The following command displays the status of all nodes in a cluster.

```
# clnode status
=== Cluster Nodes ===

--- Node Status ---

Node Name                                        Status
---------                                        ------
phys-schost-1                                    Online
phys-schost-2                                    Online
```

EXAMPLE 7 Displaying the Verbose Status of All Nodes in a Cluster

The following command displays the verbose status of all nodes in a cluster.

```
# clnode status -v
=== Cluster Nodes ===

--- Node Status ---

Node Name                                                        Status
---------                                                        ------
phys-schost-1                                                    Online
phys-schost-2                                                    Online

--- Node IPMP Group Status ---

Node Name        Group Name        Status        Adapter        Status
---------        ----------        ------        -------        ------
phys-schost-1    sc_ipmp0          Online        bge0           Online
phys-schost-2    sc_ipmp0          Online        bge0           Online

--- Load Limit Status ---

Node Name      Load Limit Name   Soft Limit/Hard Limit   Load   Status
```

EXAMPLE 7 Displaying the Verbose Status of All Nodes in a Cluster *(Continued)*

```
phys-schost-1  mem_load          30/50                 23     OK
               disk_load         10/15                 14     Softlimit Exceeded
               cpu_load          2/unlimited           1      OK
phys-schost-2  disk_load         90/97                 11     OK
               cpu_load          unlimited/unlimited   0      OK
```

EXAMPLE 8 Displaying the Load Limit Status of All Nodes

The following command displays the load limit status of all nodes in a cluster.

```
# clnode status -l

--- Load Limit Status ---

Node Name      Load Limit Name   Soft Limit/Hard Limit   Load   Status

phys-schost-1  mem_load          30/50                 23     OK
               disk_load         10/15                 14     Softlimit Exceeded
               cpu_load          2/unlimited           1      OK
phys-schost-2  disk_load         90/97                 11     OK
               cpu_load          unlimited/unlimited   0      OK
```

EXAMPLE 9 Displaying the Status of All Global-Cluster Nodes and Zone-Cluster Nodes in a Cluster

The following command displays the status of all global-cluster nodes and zone-cluster nodes in a cluster.

```
# clnode status -Z all

=== Cluster Nodes ===

--- Node Status ---

Node Name                                       Status
---------                                       ------
global:phys-schost-1                            Online
global:phys-schost-2                            Online
global:phys-schost-4                            Online
global:phys-schost-3                            Online


=== Zone Cluster Nodes ===

--- Node Status ---

Node Name                                       Status
---------                                       ------
cz2:phys-schost-1                               Online
```

EXAMPLE 9 Displaying the Status of All Global-Cluster Nodes and Zone-Cluster Nodes in a Cluster *(Continued)*

```
cz2:phys-schost-3                                   Offline
```

EXAMPLE 10 Displaying Configuration Information About All Nodes in a Cluster

The following command displays configuration information about all nodes in a cluster.

```
# clnode show
=== Cluster Nodes ===

Node Name:                                          phys-schost-1
  Node ID:                                             1
  Enabled:                                             yes
  privatehostname:                                     clusternode1-priv
  reboot_on_path_failure:                              disabled
  globalzoneshares:                                    1
  defaultpsetmin:                                      1
  quorum_vote:                                         1
  quorum_defaultvote:                                  1
  quorum_resv_key:                                     0x4487349A00000001
  Transport Adapter List:                              bge2, bge3

Node Name:                                          phys-schost-2
  Node ID:                                             2
  Enabled:                                             yes
  privatehostname:                                     clusternode2-priv
  reboot_on_path_failure:                              disabled
  globalzoneshares:                                    1
  defaultpsetmin:                                      1
  quorum_vote:                                         1
  quorum_defaultvote:                                  1
  quorum_resv_key:                                     0x4487349A00000002
  Transport Adapter List:                              bge2, bge3
```

EXAMPLE 11 Displaying Configuration Information About a Particular Node in a Cluster

The following command displays configuration information about `phys-schost-1` in a cluster.

```
# clnode show phys-schost-1
=== Cluster Nodes ===

Node Name:                                          phys-schost-1
  Node ID:                                             1
  Enabled:                                             yes
  privatehostname:                                     clusternode1-priv
  reboot_on_path_failure:                              disabled
  globalzoneshares:                                    1
```

EXAMPLE 11 Displaying Configuration Information About a Particular Node in a Cluster *(Continued)*

```
defaultpsetmin:                                 1
quorum_vote:                                    1
quorum_defaultvote:                             1
quorum_resv_key:                                0x4487349A00000001
Transport Adapter List:                         bge2, bge3
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/system/core`
Interface Stability	Evolving

See Also

`prctl(1)`, `claccess(1CL)`, `clresourcegroup(1CL)`, `cluster(1CL)`, `Intro(1CL)`, `newfs(1M)`, `su(1M)`, `hosts(4)`, `scinstall(1M)`, `nsswitch.conf(4)`, `vfstab(4)`, `attributes(5)`, `rbac(5)`, `clconfiguration(5CL)`, `lofi(7D)`

See the example that describes how to change the private hostname in "Overview of Administering the Cluster" in *Oracle Solaris Cluster System Administration Guide*.

Notes

The superuser can run all forms of this command.

All users can run this command with the `-?` (help) or `-V` (version) option.

To run the `clnode` command with subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
`add`	`solaris.cluster.modify`
`clear`	`solaris.cluster.modify`
`create-loadlimit`	`solaris.cluster.modify`
`delete-loadlimit`	`solaris.cluster.modify`
`evacuate`	`solaris.cluster.admin`
`export`	`solaris.cluster.read`
`list`	`solaris.cluster.read`
`remove`	`solaris.cluster.modify`
`rename`	`solaris.cluster.modify`

Subcommand	RBAC Authorization
set	solaris.cluster.modify
set-loadlimit	solaris.cluster.modify
show	solaris.cluster.read
show-rev	solaris.cluster.read
status	solaris.cluster.read

Name clpstring, clps – manage Oracle Solaris Cluster private strings

Synopsis

```
/usr/cluster/bin/clpstring  -V

/usr/cluster/bin/clpstring subcommand -?

/usr/cluster/bin/clpstring subcommand
 [options] -v  [pstring-name[...]

/usr/cluster/bin/clpstring create -b object-instance [-f stringvalue-file]
     [-t object-type] [-Z {zoneclustername | global}] pstring-name

/usr/cluster/bin/clpstring delete [-F]
     [-Z {zoneclustername[,...] | global | all}] + | pstring-name ...

/usr/cluster/bin/clpstring list [-b object-instance[,...]] [-t type[,...]]
     [-Z {zoneclustername[,...] | global | all}] [+ | pstring-name[ ...]]

/usr/cluster/bin/clpstring set [-f stringvalue-file] [-Z {zoneclustername | global}] pstring-name

/usr/cluster/bin/clpstring show [-b object-instance[,...]] [-t type[,...]]
     [-Z {zoneclustername[,...] | global | all}] [+ | pstring-name[ ...]]
```

Description The `clpstring` command manages Oracle Solaris Cluster private strings. A private string is identified with a unique name, and has an encoded value that can only be obtained by using the `scha_cluster_get(1HA)` command.

Private strings are used by cluster objects such as resources to store and retrieve private values securely. A typical use might be for an internal password used by an agent.

The `clps` command is the short form of the `clpstring` command. The `clpstring` command and the `clps` command are identical. You can use either form of the command.

The general form of this command is as follows:

`clpstring  [subcommand] [options] [operands]`

You can omit *subcommand* only if *options* specifies the `-?` option or the `-V` option.

Each option of this command has a long form and a short form. Both forms of each option are provided with the description of the option in the OPTIONS section of this man page.

Use the `clpstring` command for the following administrative tasks:

- To create a private string that is intended to be used by a cluster object instance that may or may not yet exist
- To update the value of private string
- To delete private strings from the cluster configuration
- To display the specifications of private strings

The `clpstring` command can be run only on an active cluster node. The result of running the command is always the same regardless of the node on which you run it.

All the subcommands of the `clpstring` command can be run in both the global zone and a zone cluster. When you run it in a global zone, you can use the `-Z` option to specify the name of a particular zone cluster to which you want to restrict an operation.

You can access all zone cluster information from a global cluster node, but a particular zone cluster is not aware of other zone clusters. If you do not restrict an operation to a particular zone cluster, the subcommand you use operates in the current cluster only.

Subcommands The following subcommands are supported:

`create`
Create a private string that is intended to be used by an Oracle Solaris Cluster object instance.

Use the `-b` option to specify the cluster object instance that intends to use this private string. The object instance does not have to exist in the cluster configuration when you create the private string for the instance. Use the `-t` option to indicate the type of the cluster object instance. The default object type is `resource`.

Use the `-f` option to specify a file that contains the private string value. The command prompts for the private string value if `-f` is not specified. Details can be found in the OPTIONS section.

Users other than superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization to use the `create` subcommand. See the `rbac(5)` man page for more information.

See also the description of the `delete` subcommand.

`delete`
Delete the specified private strings for the Oracle Solaris Cluster configuration.

If you do not specify the force option `-F`, you must have already removed the cluster object instance for which the private string was created. If you specify the `-F` option, the command removes the private strings even if the associated object instance still exists in the cluster configuration and uses the private string. See `-F` in OPTIONS for more information.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use the `delete` subcommand.

See also the description of the `create` subcommand.

`list`
Displays the names of all private strings created in the cluster, but not their values.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`set`
Sets the value of the specified private string. You can use the `-f` option to specify the source of the private string value. The command prompts for the value if `-f` is not specified. See the description of `-f` option in the OPTIONS section for information about the private string value.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`show`
Displays the specifications of private strings, but not their values. The specifications include the private string names, their associated object instances, and the object type of the instances.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

Options The following options are supported:

`-?`
`--help`
Displays help information. When this option is used, no other processing is performed.

You can specify this option without a subcommand or with a subcommand.

If you specify this option without a subcommand, the list of subcommands for this command is displayed.

If you specify this option with a subcommand, the usage options for the subcommand are displayed.

`-b` *object-instance*
`--object-instance=`*object-instance*
`--object-instance` *object-instance*
Specifies the name of an object instance which uses or intends to use the private string. Only object instances whose object type is `resource` are supported currently.

`-F`
`--force`
Forces the removal of the specified private strings. You can specify this option only with the `delete` subcommand.

When you use this option with the `delete` subcommand, you delete the specified private strings even if the object instance that uses the private string still exists in the cluster. You would normally remove the object instance from the cluster before removing its private strings.

`-f` *stringvalue-file*
`--stringvalue-file=`*stringvalue-file*
`--stringvalue-file` *stringvalue-file*

Specifies the file that contains the value of a private string. The filename must be a full path that can be accessed from the node where you run the command.

For security reasons, the private string value cannot be specified in command-line options. To keep the value secure, place it in a plain text file and specify the full path to the file by using the `-f` option. Make root the owner of the string value file, and set permissions of the file to be readable by root and prohibit any access by group and world. For even greater security, you can delete the file after you run the command to set the value in the private string.

If you do not specify the `-f` option, the command prompts for the private string value twice to confirm that it is entered the same. It reads the value from the controlling terminal with echoing disabled.

You can specify `-f -` (a space and dash following the `-f`) to read the private string value directly from standard input just once. The private string value is echoed on screen as it is typed, or will appear in a script if the command is scripted; so you should be careful when setting the private string value this way.

The private string value input has the following requirements:

- The length of the string must be less than or equal to 257 characters.
- The string cannot include NUL characters.

`-t` *object-type*
`--object-type=`*object-type*
`--object-type` *object-type*
Specifies the type of the object instance. The default type is `resource` and is currently the only object type that can use private strings, so the `-t` option is not required.

`-V`
`--version`
Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The `-V` option displays only the version of the command. No other operations are performed.

`-v`
`--verbose`
Displays verbose messages to the standard output.

You can specify this option with any form of the command.

`-Z` {*zoneclustername* | `global` | `all` }
`--zoneclustername=`{*zoneclustername* | `global` | `all` }
Specifies the cluster where the private string is to be created or where it exists.

This option is supported by all subcommands.

If you specify this option, you must also specify one argument from the following list:

zoneclustername — Specifies that the command with which you use this option is to operate on all specified private strings in the zone cluster named *zoneclustername* only.

`global` — Specifies that the command with which you use this option is to operate on all specified private strings in the global cluster only.

`all` — If you use this argument in the global cluster, it specifies that the command with which you use it is to operate on all specified resources in all clusters, including the global cluster and all zone clusters.

Operands Only the following operand is supported:

pstring-name — Specifies the name of a private string. When you create a private string, the name you give must be unique across the cluster. If the subcommand accepts more than one private string, you can use the plus sign (+) in place of the *pstring-name* to specify all private strings.

Exit Status If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

The following exit codes can be returned:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

`6 CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su(1M)` and `rbac(5)` man pages for more information.

`18 CL_EINTERNAL`
Internal error was encountered

An internal error indicates a software defect or other defect.

36 `CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

37 `CL_EOP`
Operation not allowed

You tried to perform an operation on an unsupported configuration, or you performed an unsupported operation.

39 `CL_EEXIST`
Object exists

The device, device group, cluster interconnect component, node, cluster, resource, resource type, resource group, or private string that you specified already exists.

41 `CL_ETYPE`
Invalid type

The type that you specified with the `-t` or `-p` option does not exist.

These exit values are compatible with the return codes that are described in the `scha_calls`(3HA) man page.

Examples

EXAMPLE 1 Creating a Private String for a Resource in the Global Cluster or Zone Cluster

The following command creates a private string for a resource instance in the global cluster.

```
# clpstring create -b resource1 -t resource -v pstring1
Enter string value:
Enter string value again:
Private string "pstring1" is created for the global cluster.
```

The following command is run in the global zone and creates a private string to the zone cluster named `zc1`. The value of the private string is specified in file `/pvalue.file`.

```
# clpstring create -Z zc1 -b resource2 -f /pvalue.file pstring2
```

EXAMPLE 2 Deleting the Private Strings from the Global Cluster or Zone Cluster Configuration

The following command deletes all the private strings from the cluster configuration, whether the object instances still exist in the cluster or not.

```
# clpstring delete -F +
```

EXAMPLE 2 Deleting the Private Strings from the Global Cluster or Zone Cluster Configuration *(Continued)*

The following command deletes the specified private string from a zone cluster named zc1.

```
# clpstring delete -Z zc1 pstring1
```

EXAMPLE 3 Displaying the specifications of private strings created in the cluster

The following command displays the private strings in the cluster.

```
# clpstring show
=== Private Strings ===

Pstring Name:                                pstring1
  Object Instance:                              resource1
  Object Type:                                  resource

Pstring Name:                                pstring2
  Object Instance:                              object2
  Object Type:                                  resource
```

EXAMPLE 4 Listing the Private Strings in the Global Cluster and Zone Clusters

The following command displays the private string names in the global cluster and all the zone clusters.

```
# clpstring list -Z all
global:pstring1
global:pstring2
zc1:pstring1
zc1:pstring2
zc2:pstring
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

Intro(1CL), cluster(1CL), scha_calls(3HA), attributes(5), rbac(5)

Notes

The superuser can run all forms of this command.

Any user can run this command with the following options:

- -? option
- -V option

To run this command with subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
create	solaris.cluster.modify
delete	solaris.cluster.modify
list	solaris.cluster.read
set	solaris.cluster.modify
show	solaris.cluster.read

Name clquorum, clq – manage Oracle Solaris Cluster quorum devices and properties

Synopsis

```
/usr/cluster/bin/clquorum -V

/usr/cluster/bin/clquorum subcommand
 -?

/usr/cluster/bin/clquorum subcommand
 [options] -v devicename[ ...]

/usr/cluster/bin/clquorum add [-a] [-t type] [-p name=value[,...]]
 devicename[ ...]

/usr/cluster/bin/clquorum add -i {- | clconfigfile}
 [-t type] [-p name=value[,...]] {+ | devicename[ ...]}

/usr/cluster/bin/clquorum disable [-t type[,...]]
 {+ | devicename...}

/usr/cluster/bin/clquorum enable [-t type[,...]]
 {+ | devicename[ ...]}

/usr/cluster/bin/clquorum export [-o {- | clconfigfile}]
 [-t type[,...]] {+ | devicename[ ...]}

/usr/cluster/bin/clquorum list [-t type[,...]]
 [-n node[,...]] [+ | devicename[ ...]]

/usr/cluster/bin/clquorum remove -F [-t type[,...]]
 {+ | devicename[ ...]}

/usr/cluster/bin/clquorum reset

/usr/cluster/bin/clquorum show [-t type[,...]]
 [-n node[,...]] [+ | devicename[ ...]]

/usr/cluster/bin/clquorum status [-t type[,...]]
 [-n node[,...]] [+ | devicename[ ...]]
```

Description The `clquorum` command manages cluster quorum devices and cluster quorum properties. The `clq` command is the short form of the `clquorum` command. The `clquorum` command and the `clq` command are identical. You can use either form of the command.

For more information about valid uses of this command, see the descriptions of the individual subcommands. For ease of administration, use this command in the global zone.

The general form of this command is as follows:

`clquorum` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the `-?` option or the `-V` option.

Each option of this command has a long form and a short form. Both forms of each option are provided with the description of the option in the OPTIONS section of this man page.

Quorum devices are necessary to protect the cluster from split-brain and amnesia situations. (For information about split-brain and amnesia situations, see the section on quorum and quorum devices in the *Oracle Solaris Cluster Concepts Guide*.) Each quorum device must be connected, either by a SCSI cable or through an IP network, to at least two nodes.

A quorum device can be a shared SCSI storage device, a shared NAS storage device (Oracle's Sun ZFS Storage Appliance), or a quorum server. If the quorum device stores user data, you do not affect this data if you add or remove such a device as a quorum device. However, if you are using replicated storage devices, the quorum device must be on an unreplicated volume.

Both nodes and quorum devices participate in cluster quorum formation, unless the nodes and quorum devices are in the maintenance state. If a node or a quorum device is in the maintenance state, its vote count is always zero and it does not participate in quorum formation.

You can use the `clquorum` command to perform the following tasks:

- Add a quorum device to the Oracle Solaris Cluster configuration
- Remove a quorum device from the Oracle Solaris Cluster configuration
- Manage quorum properties

Subcommands The following subcommands are supported:

`add`

Adds the specified shared device as a quorum device.

You can use this subcommand only in the global zone.

Each quorum device must be connected to at least two nodes in the cluster. The quorum device is added with connection paths in the cluster configuration to every node to which the device is connected. Later, if the connection between the quorum device and the cluster nodes changes, you must update the paths. Update the paths by removing the quorum device and then adding it back to the configuration. This situation could arise if you add more nodes that are connected to the quorum device or if you disconnect the quorum device from one or more nodes. For more information about quorum administration, see Chapter 6, “Administering Quorum,” in *Oracle Solaris Cluster System Administration Guide*.

Quorum devices have several types. See the `-t` option in the OPTIONS section for a complete description. The `shared_disk` type is the default type.

Users other than superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization. See `rbac(5)`.

See also the description of the `remove` subcommand.

`disable`

Puts a quorum device or node in the quorum maintenance state.

You can use this subcommand only in the global zone.

In the maintenance state, a shared device or node has a vote count of zero. This shared device or node no longer participates in quorum formation. In addition, for a node that is in the maintenance state, any quorum devices that are connected to the node have their vote counts decremented by one.

This feature is useful when you need to shut down a node or a device for an extended period of time for maintenance. After a node boots back into the cluster, the node removes itself from maintenance mode unless the `installmode` is set.

You must shut down a node before you can put the node in the maintenance state.

Users other than superuser require `solaris.cluster.modify` RBAC authorization. See `rbac(5)`.

See also the description of the `enable` subcommand.

`enable`

Removes a quorum device or a node from the quorum maintenance state.

You can use this subcommand only in the global zone.

The `enable` subcommand removes a quorum device or node from maintenance mode. The subcommand resets the configured quorum vote count of a quorum device or node to the default. The shared device or node can then participate in quorum formation.

After resetting a quorum device, the vote count for the quorum device is changed to *N*-1. In this calculation, *N* is the number of nodes with nonzero vote counts that are connected to the device. After resetting a node, the vote count is reset to its default. Then the quorum devices that are connected to the node have their vote counts incremented by one.

Unless the install mode setting `installmode` is enabled, the quorum configuration for each node is automatically enabled at boot time.

Users other than superuser require `solaris.cluster.modify` RBAC authorization. See `rbac(5)`.

See also the description of the `disable` subcommand.

`export`

Exports the configuration information for the cluster quorum.

You can use this subcommand only in the global zone.

If you specify a file by using the `-o` option, the configuration information is written to that file. If you do not specify a file, the information is written to standard output (`stdout`).

The `export` subcommand does not modify any cluster configuration data.

Users other than superuser require `solaris.cluster.read` RBAC authorization. See `rbac(5)`.

`list`
Displays the names of quorum devices that are configured in the cluster.

You can use all forms of this subcommand in the global zone. In a zone cluster, you can use this subcommand only with the `-?` or `-V` option or without any option.

If you do not specify options, the `list` subcommand displays all the quorum devices that are configured in the cluster. If you specify the `-t` option, the subcommand displays only quorum devices of the specified type. If you specify the `-n` option, the subcommand displays the names of all quorum devices that are connected to any of the specified nodes.

Users other than superuser require `solaris.cluster.read` RBAC authorization. See `rbac(5)`.

`remove`
Removes the specified quorum device or devices from the Oracle Solaris Cluster quorum configuration.

You can use this subcommand only in the global zone.

Use the force option, `-F`, with this subcommand to remove the last quorum device of a two-node cluster. The `remove` subcommand will not remove the last quorum device of a two-node cluster if the `-F` option is not specified.

The `remove` subcommand does not disconnect and remove the physical device. The subcommand also does not affect the user data on the device, if any data exists. The last quorum device in a two-node cluster cannot be removed, unless the `installmode` is enabled.

You can remove only a quorum device. You cannot use this subcommand to remove cluster nodes.

Users other than superuser require `solaris.cluster.modify` RBAC authorization. See `rbac(5)`.

See also the description of the `add` subcommand.

`reset`
Resets the entire quorum configuration to the default vote count settings.

You can use this subcommand only in the global zone.

If `installmode` is enabled, the mode is cleared by resetting. `installmode` cannot be reset on a two-node cluster unless at least one quorum device has been successfully configured.

Users other than superuser require `solaris.cluster.modify` RBAC authorization. See `rbac(5)`.

See also the `-p` option in `cluster(1CL)` for the description of the `installmode` property.

`show`

Displays the properties of quorum devices.

You can use this subcommand only in the global zone.

If you do not specify options, the `show` subcommand displays the properties of all the quorum devices in the cluster.

If you specify the type by using the `-t` option, the subcommand displays properties of devices of that type only. See `-t` in OPTIONS.

If you specify nodes by using the `-n` option, this subcommand displays the properties of the quorum devices that are connected to any of the specified nodes.

Users other than superuser require `solaris.cluster.read` RBAC authorization. See `rbac(5)`.

`status`

Checks and displays the current status and vote counts of quorum devices.

You can use all forms of this subcommand in the global zone. In a zone cluster, you can use this subcommand only with the `-?` or `-V` option or without any option.

You can use this subcommand in the global zone to immediately check the status of quorum devices that are connected to the specified node. For quorum devices that are not connected to the node, this subcommand displays the status that was true during the previous cluster reconfiguration.

If you do not specify options, the `status` subcommand displays information about all the quorum devices in the cluster.

If you specify the type by using the `-t` option, the subcommand displays information about devices of that type only. See `-t` in OPTIONS.

If you specify nodes by using the `-n` option, this subcommand displays the properties of the quorum devices that are connected to any of the specified nodes.

Users other than superuser require `solaris.cluster.read` RBAC authorization. See `rbac(5)`.

Options The following options are supported:

`-?`
`--help`

Displays help information. When this option is used, no other processing is performed.

You can specify this option without a subcommand or with a subcommand.

If you specify this option without a subcommand, the list of subcommands of this command is displayed.

If you specify this option with a subcommand, the usage options for the subcommand are displayed.

`-a`
`--autoconfig`
For a two-node cluster that uses shared disks, automatically chooses and configures one quorum device if no quorum devices are configured.

All shared disks in the cluster must be qualified to be a quorum device. The `autoconfig` subcommand does not check whether an available device is qualified to be a quorum device. The `autoconfig` subcommand checks only for shared disks.

Users other than superuser require `solaris.cluster.modify` RBAC authorization. See the `rbac`(5) man page.

`-F`
Forces the removal of the specified quorum device.

The force option is available only with the `remove` subcommand. The force option makes it possible to remove the last quorum device of a two-node cluster, or to remove a failed quorum device. When you use this option with the `remove` subcommand, the quorum subsystem does not touch the quorum device during the removal process.

`-i` *clconfigfile*
`--input=`*clconfigfile*
`--input` *clconfigfile*
Specifies configuration information that is to be used for managing the quorum devices. This information must conform to the format that is defined in the `clconfiguration`(5CL) man page.

When `-i` is used with a subcommand along with other command-line options, the arguments of the command-line options overwrite the settings in the configuration file.

`-n` *node-name*
`--node=`*node-name*
`--node` *node-name*
Specifies the node name to which the quorum devices are connected. This option is used in the `list`, `status`, and `show` subcommands to limit the information that is displayed to those quorum devices that are connected to the specified nodes.

You can specify either a node name or a node ID for the *node-name*.

`-o` {- | *clconfigfile*}
`--output={- |` *clconfigfile*`-}`
`--output {- |` *clconfigfile*`-}`
Writes quorum-device-configuration information to a file or to the standard output (`stdout`). The format of this configuration information conforms to the format that is described in the `clconfiguration`(5CL) man page. To specify the standard output, specify `-` instead of a file name.

`-p` *name*=*value*[,…]
`--property` *name*`-`=*value*`-[,...]`
`--property` *name*`-` *value*`-[,...]`

Specifies properties of a quorum device that are specific to a device type. You use this option with the `add` subcommand. See the description of the `-t` option for a list and a description of these properties.

`-t` *device-type*
`--type=`*device-type*
`--type` *device-type*

Specifies the quorum device type. When this option is specified, the operands must be of the specified type.

For the `add`, `export`, and `remove` subcommands, the current supported quorum device types are as follows:

- Shared local disks, specified by `shared_disk`, which can be SCSI-2, SCSI-3, or software quorum (SCSI disks with fencing disabled)
- A quorum server process that runs on the Oracle Solaris Cluster Quorum Server machine, specified by `quorum_server`

The default type is `shared_disk`.

The `add` subcommand does not accept `-t` *node* as a quorum type.

For the `enable`, `disable`, `list`, `show`, and `status` subcommands, you can specify the types `node`, `shared_disk`, or `quorum_server`. These different types of quorum devices have the following properties:

`node`

No specific properties are set for nodes to participate in quorum formation.

This type is used only with the `enable`, `disable`, `list`, `status`, and `show` subcommands. It cannot be used to add a quorum device of type `node`.

`quorum_server`

The `quorum_server` type of quorum device has the following properties:

`qshost=`*quorum-server-host*: Specifies the name of the machine where the quorum server runs. This host can be the IP address of the machine or the hostname on the network. If you specify the hostname, the IP address of the machine must be specified in the `/etc/hosts` file, the `/etc/inet/ipnodes` file, or both.

`port=`*port*: Specifies the port number used by the quorum server to communicate with the cluster nodes.

Before you can add a quorum server, the quorum server software must be installed on the host machine and the quorum server must be started and running. Refer to the *Oracle Solaris Cluster Software Installation Guide* for details.

`shared_disk`
Use this type to configure SCSI-2, SCSI-3, or software quorum devices. No specific properties are set for `shared_disk` quorum devices. The `autoconfig` subcommand accepts only this quorum device type.

`-V`
`--version`
Displays the version of the command.

Do not specify this option with other subcommands, options, or operands. The subcommands, options, or operands are ignored. The `-V` option displays only the version of the command. No other operations are performed.

`-v`
`--verbose`
Displays verbose information to standard output (`stdout`).

Operands The following operands are supported:

devicename
For the `add`, `export`, and `remove` subcommands only, the operand is the name of a shared disk (SCSI, quorum server, or NAS quorum device). For the `add` subcommand, if you do not specify a `clconfigurationfile` by using `-i`, you must specify at least one quorum device as the operand.

For the `disable`, `enable`, `list`, `status`, and `show` subcommands only, the operand can be the name of a node or of a shared disk (SCSI, quorum server, or NAS quorum device).

In every case, the operand type must match the value of the `-t` option, if you specify that option.

Use the following values as the *devicename* operand:

- For nodes, the operand must be the node name or the node ID.
- For SCSI quorum devices, the operand must be the device identifier or the full DID path name, for example, `d1` or `/dev/did/rdsk/d1`.
- For quorum server quorum devices, the operand must specify an identifier for the quorum server or servers. This can be the quorum server instance name, and must be unique across all quorum devices.

+
For the `disable`, `enable`, `list`, `status`, and `show` subcommands only, specifies all quorum devices configured for the cluster. If you use the `-t` option, the plus sign (+) operand specifies all devices of that type.

Exit Status If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

The following exit values can be returned:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

`6 CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su(1M)` and `rbac(5)` man pages for more information.

`18 CL_EINTERNAL`
Internal error was encountered

An internal error indicates a software defect or other defect.

`35 CL_EIO`
I/O error

A physical input/output error has occurred.

`36 CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

`39 CL_EEXIST`
Object exists

The device, device group, cluster interconnect component, node, cluster, resource, resource type, resource group, or private string that you specified already exists.

41 `CL_ETYPE`
Invalid type

The type that you specified with the `-t` or `-p` option does not exist.

Examples

EXAMPLE 1 Adding a SCSI Quorum Device

The following `clquorum` command configures a SCSI quorum device that is connected to all the cluster nodes.

```
# clquorum add /dev/did/rdsk/d4s2
```

When you use the `add` subcommand, the `shared_disk` type is the default. To add a `shared_disk` quorum device, you do not need to specify `-t shared_disk`.

EXAMPLE 2 Adding a Quorum Server

The following `clquorum` command configures a quorum server, `qs1`:

```
# clquorum add -t quorum_server -p qshost=10.11.114.81 -p port=9000 qs1
```

EXAMPLE 3 Removing a Quorum Device

The following `clquorum` command removes the `d4` quorum device.

```
# clquorum remove d4
```

The command that you use to remove a quorum device is the same, whether your device has a type of `shared_disk` or `quorum_server`.

EXAMPLE 4 Putting a Quorum Device into a Maintenance State

The following `clquorum` command puts a quorum device, `qs1` into a maintenance state and verifies that the device is in a maintenance state.

```
# clquorum disable qs1
# clquorum status qs1

=== Cluster Quorum ===

--- Quorum Votes by Device ---

Device Name       Present      Possible      Status
-----------       -------      --------      ------
qs1                1            1             Offline
```

EXAMPLE 5 Resetting the Quorum Votes of a Quorum Device

The following `clquorum` command resets the configured quorum vote count of a quorum device, `d4`, to the default.

```
# clquorum enable d4
```

EXAMPLE 6 Displaying the Configured Quorum Devices in the Cluster

The following `clquorum` commands display the quorum devices in concise format and verbose format.

```
# clquorum list
d4
pcow1
pcow2
```

```
# clquorum list -v
Quorums              Type
-------              ----
d4                   shared_disk
pcow1                node
pcow2                node
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

`Intro(1CL)`, `cluster(1CL)`, `clconfiguration(5CL)`

Notes

The superuser can run all forms of this command.

Any user can run this command with the following options:

- `-?` option
- `-V` option

To run this command with other subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
`add`	`solaris.cluster.modify`
`disable`	`solaris.cluster.modify`
`enable`	`solaris.cluster.modify`

Subcommand	RBAC Authorization
export	solaris.cluster.read
list	solaris.cluster.read
remove	solaris.cluster.modify
reset	solaris.cluster.modify
show	solaris.cluster.read
status	solaris.cluster.read

Name clreslogicalhostname, clrslh – manage resources for Oracle Solaris Cluster logical hostnames

Synopsis

/usr/cluster/bin/clreslogicalhostname [*subcommand*] -?

/usr/cluster/bin/clreslogicalhostname -V

/usr/cluster/bin/clreslogicalhostname [*subcommand* [*options*]] -v [*lhresource*]...

/usr/cluster/bin/clreslogicalhostname create -g *resourcegroup* [-h *lhost*[,...]] [-N *netif@node*[,...]] [-p *name*=*value*] [-Z {*zoneclustername* | global}] [-d] *lhresource*

/usr/cluster/bin/clreslogicalhostname create -i {- | *clconfiguration*} [-a] [-g *resourcegroup*[,...]] [-p *name*=*value*] [-d] {+ | *lhresource*...}

/usr/cluster/bin/clreslogicalhostname delete [-g *resourcegroup*[,...]] [-Z {*zoneclustername* | global}] [-F] {+ | *lhresource*...}

/usr/cluster/bin/clreslogicalhostname disable [-g *resourcegroup*[,...]] [-R] [-n *node*[,...]] [-Z {*zoneclustername* | global}] {+ | *lhresource*...}

/usr/cluster/bin/clreslogicalhostname enable [-g *resourcegroup*[,...]] [-R] [-n *node*[,...]] [-Z {*zoneclustername* | global}] {+ | *lhresource*...}

/usr/cluster/bin/clreslogicalhostname export [-o {- | *configfile*}] [+ | *lhresource*...]

/usr/cluster/bin/clreslogicalhostname list [-s *state*[,...]] [-g *resourcegroup*[,...]] [-Z {*zoneclustername* [,...] | global | all}] [+ | *lhresource*...]

/usr/cluster/bin/clreslogicalhostname list-props [-l *listtype*] [-p *name*[,...]] [-Z {*zoneclustername* [,...] | global | all}] [+ | *lhresource*...]

/usr/cluster/bin/clreslogicalhostname monitor [-g *resourcegroup*[,...]] [-Z *zoneclustername* | all | global] {+ | *lhresource*...}

/usr/cluster/bin/clreslogicalhostname reset [-f *errorflag*] [-g *resourcegroup*[,...]] [-Z {*zoneclustername* | global}] {+ | *lhresource*...}

/usr/cluster/bin/clreslogicalhostname set [-i {- | *clconfiguration*}] [-g *resourcegroup*[,...]] [-p *name*[+|-]=*value*] [-Z {*zoneclustername*}] {+ | *lhresource*...}

/usr/cluster/bin/clreslogicalhostname show [-g *resourcegroup*[,...]] [-p *name*[,...]] [-Z {*zoneclustername* [,...] | global | all}] [+ | *lhresource*...]

/usr/cluster/bin/clreslogicalhostname status [-s *state*[,...]] [-n *node*[,...]] [-g *resourcegroup*[,...]] [-Z {*zoneclustername* [,...] | global | all}] [+ | *lhresource*...]

```
/usr/cluster/bin/clreslogicalhostname unmonitor
 [-g resourcegroup[,...] ] [-Z {zoneclustername | global}] {+ |  lhresource...}
```

Description

The `clreslogicalhostname` command manages resources for Oracle Solaris Cluster logical hostnames. The `clrslh` command is the short form of the `clreslogicalhostname` command. The `clreslogicalhostname` command and the `clrslh` command are identical. You can use either form of the command.

The `clreslogicalhostname` command includes built-in convenience options for creating logical-hostname resources. The `clreslogicalhostname` command also supports the automatic creation of Solaris IP multipathing (IPMP) groups.

Some subcommands of the `clreslogicalhostname` command modify the resource configuration:

- `disable`
- `enable`
- `monitor`
- `reset`
- `set`
- `unmonitor`

Some subcommands of the `clreslogicalhostname` command only obtain information about resources. You can use these subcommands from the global cluster or a zone cluster: The following commands only obtain information about resources:

- `export`
- `list`
- `list-props`
- `show`
- `status`

To avoid unpredictable results from this command, run all forms of the command from the global-cluster node.

The general form of this command is as follows:

`clreslogicalhostname` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the option `-?`, `-o`, `-V`, or `-v`.

Each option of this command has a long form and a short form. Both forms of each option are given with the description of the option in the OPTIONS section of this man page.

Operation with Zone Clusters

You can use the `clreslogicalhostname` command with all subcommands except `export` in a zone cluster.

You can also use the `-Z` option with all subcommands except `export` to specify the name of a particular zone cluster to which you want to restrict an operation. And, you can also attach the zone-cluster name to a logical-hostname resource (*zoneclustername* : *lhresource*) to restrict an operation to a particular zone cluster.

You can access all zone cluster information from a global-cluster node, but a particular zone cluster is not aware of other zone clusters. If you do not restrict an operation to a particular zone cluster, the subcommand you use operates in the current cluster only.

Subcommands The following subcommands are supported:

`create`

Creates the logical-hostname resources that are specified as operands to the command.

When you use `create` with the `-i` option to specify a configuration file, the subcommand accepts the plus sign (+) as an operand. When you use the + operand, all resources in the configuration file that do not exist are created.

Before you use the `create` subcommand, ensure that the `/etc/netmasks` file has IP-address subnet and netmask entries for all logical hostnames. If necessary, edit the `/etc/netmasks` file to add any missing entries.

By default, resources are created in the enabled state with monitoring enabled. However, a resource comes online and is monitored only after the resource's resource group is brought online. To create resources in the disabled state, specify the `-d` option.

You can use this subcommand in the global cluster or in a zone cluster.

To create a logical-hostname resource in a zone cluster from the global cluster, use the `-Z` option to specify the name of the zone cluster.

Users other than superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization to use this subcommand.

See also the description of the `delete` subcommand.

`delete`

Deletes the logical-hostname resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that all resources are deleted.

The `-g` option filters the list of operands to limit the resources that are deleted. The `-g` option deletes only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

- By default, a resource is deleted *only* if the following conditions are met:
- The resource is disabled.
- All dependencies on the resource are eliminated.

- To ensure that all specified resources are deleted, specify the `-F` option. The effects of the `-F` option are as follows:

- All specified resources are deleted, even resources that are not disabled.
- All specified resources are removed from resource-dependency settings of other resources.

Resources are deleted in the order that is required to satisfy dependencies between the resources, regardless of the order in which resources are specified on the command line.

You can use this subcommand in the global cluster or in a zone cluster.

To delete the logical-hostname resources in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

See also the description of the `create` subcommand.

`disable`

Disables the logical-hostname resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that all resources are disabled.

The `-g` option filters the list of operands to limit the resources that are disabled. The `-g` option disables only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

To ensure that all required resource dependencies are satisfied, specify the `-R` option. The `-R` option disables any resources that depend on the resources that are specified as operands to the command, even if the resources are not specified as operands to the command. The `-g` option and the `-t` option do not apply to resources that are to be disabled solely to satisfy resource dependencies.

Resources are disabled in the order that is required to satisfy dependencies between the resources, regardless of the order in which resources are specified on the command line.

You can use this subcommand in the global cluster or in a zone cluster.

To disable the logical-hostname resources registered in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `enable` subcommand.

`enable`

Enables the logical-hostname resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that all resources are enabled.

The `-g` option filters the list of operands to limit the resources that are enabled. The `-g` option enables only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

To ensure that all required resource dependencies are satisfied, specify the `-R` option. The `-R` option enables any resources that depend on the resources that are specified as operands to the command, even if the resources are not specified as operands to the command. The `-g` option does not apply to resources that are to be enabled solely to satisfy resource dependencies.

Resources are enabled in the order that is required to satisfy dependencies between the resources, regardless of the order in which resources are specified on the command line.

You can use this subcommand in the global cluster or in a zone cluster.

To enable the logical-hostname resources registered in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `disable` subcommand.

`export`

Exports the logical-hostname resource configuration in the format that is described by the `clconfiguration`(5CL) man page.

You can use this subcommand only in the global cluster.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`list`

Displays a list of the logical-hostname resources that are specified as operands to the command. By default, all resources are displayed.

The `-g` option filters the list of operands to limit the resources that are displayed. The `-g` option displays only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

This subcommand accepts the plus sign (+) as an operand to specify all resources in the specified resource groups or that are instances of the specified resource types. If no operands are supplied, all resources in the specified resource groups or that are instances of the specified resource types are displayed.

If you specify the `-v` option, the resource group and resource type of each resource in the list is also displayed.

You can use this subcommand in the global cluster or in a zone cluster.

To view the logical-hostname resources registered in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`list-props`

Displays a list of the properties of the logical-hostname resources that are specified as operands to the command. By default, the extension properties of all resources are displayed.

The following options filter the list of operands to limit the resources whose properties are displayed:

`-g` *resourcegrouplist*	Displays the properties only of the logical-hostname resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

The `-l` option specifies the type of resource properties that are to be displayed:

`-l all`	Specifies that standard properties and extension properties are displayed.
`-l extension`	Specifies that only extension properties are displayed. By default, only extension properties are displayed.
`-l standard`	Specifies that only standard properties are displayed.

If you do not specify the `-l`option, only extension properties are displayed, unless you specify a standard property explicitly by using the `-p` option or the `-y` option.

The `-p` option limits the set of resource properties that is to be displayed. The `-p` option displays only the properties that are specified in *namelist*. You can specify standard properties and extension properties in *namelist*.

If you specify the `-v` option, the description of each property is also displayed.

This subcommand accepts the plus sign (+) as an operand to specify all resources in the specified resource groups or that are instances of the specified resource types. If no operands are supplied, properties of all resources in the specified resource groups or that are instances of the specified resource types are displayed.

You can use this subcommand in the global cluster or in a zone cluster.

To view the list of properties of the logical-hostname resources of a zone cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`monitor`

Turns on monitoring for the logical-hostname resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that monitoring is turned on for all resources.

The `-g` option filters the list of operands to limit the resources that are monitored. The `-g` option monitors only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

- If monitoring is turned on for a resource, the resource is monitored only if the following conditions are met:
- The resource is enabled.
- The resource group that contains the resource is online on at minimum one cluster node.

Note – When you turn on monitoring for a resource, you do *not* enable the resource.

You can use this subcommand in the global cluster or in a zone cluster.

To monitor the resources in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `unmonitor` subcommand.

`reset`

Clears an error flag that is associated with the logical-hostname resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that the error flag is cleared for all resources.

The `-g` option filters the list of operands to limit the resources that are reset. The `-g` option resets only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

By default, the `reset` subcommand clears the `STOP_FAILED` error flag. To specify explicitly the error flag that is to be cleared, use the `-f` option. The only error flag that the `-f` option accepts is the `STOP_FAILED` error flag.

You can use this subcommand in the global cluster or in a zone cluster.

To reset the logical-hostname resources in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

`set`

Modifies specified properties of the logical-hostname resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that the specified properties of all resources are modified.

The `-g` option filters the list of operands to limit the resources that are modified. The `-g` option modifies only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

You can use this subcommand in the global cluster or in a zone cluster.

To set the properties of logical-hostname resources in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`show`

Displays the configuration of the logical-hostname resources that are specified as operands to the command. By default, the configuration of all resources is displayed.

The `-g` option filters the list of operands to limit the resources for which the configuration is displayed. The `-g` option displays the configuration of only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

The `-p` option limits the set of resource properties that is to be displayed. The `-p` option displays only the properties that are specified in *namelist*. You can specify standard properties and extension properties in *namelist*.

This subcommand accepts the plus sign (+) as an operand to specify all resources in the specified resource groups or that are instances of the specified resource types. If no operands are supplied, the configuration of all resources in the specified resource groups or that are instances of the specified resource types are displayed.

You can use this subcommand in the global cluster or in a zone cluster.

To view the configuration of the logical-hostname resources in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`status`

Displays the status of the logical-hostname resources that are specified as operands to the command. By default, the status of all resources is displayed.

The following options filter the list of operands to limit the list of resources for which the status is displayed:

`-g` *resourcegrouplist*	Displays the status of only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.
`-n` *nodelist*	Displays the status of only the resources in the list of operands that are hosted on the nodes in *nodelist*.
`-s` *statelist*	Displays the status of only the resources in the list of operands that are in the states in *statelist*.

This subcommand accepts the plus sign (+) as an operand to specify all resources in the specified resource groups or that are instances of the specified resource types. If no operands are supplied, the status of all resources in the specified resource groups or that are instances of the specified resource types are displayed.

You can use this subcommand in the global cluster or in a zone cluster.

To view the status of logical-hostname resources in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`unmonitor`

Turns off monitoring for the logical-hostname resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that monitoring is turned off for all resources.

If you turn off monitoring for a resource that is disabled, the resource is not affected. The resource and its monitor are already offline.

Note – When you turn off monitoring for a resource, you do *not* disable the resource. However, when you disable a resource, you do not need to turn off monitoring for the resource. The disabled resource and its monitor are kept offline.

The `-g` option filters the list of operands to limit the resources for which monitoring is turned off. The `-g` option turns off monitoring for the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

You can use this subcommand in the global cluster or in a zone cluster.

ITo turn off monitoring for a logical-hostname resource in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `disable` subcommand and the `monitor` subcommand.

Options The following options are supported:

`-?`
`--help`

Displays help information. When this option is used, no other processing is performed.

You can specify this option without a subcommand or with a subcommand.

If you specify this option without a subcommand, the list of subcommands for this command is displayed.

If you specify this option with a subcommand, the usage options for the subcommand are displayed.

The effect of this option with specific subcommands is as follows:

`create`	When specified with the `-g` option, this option displays help information for all resource properties of the specified resource group.
`set`	Displays help information for properties of the resources that are specified as operands to the command.

`-a`
`--automatic`

Automatically performs the following additional operations when resources are being created from cluster configuration information:

- Registering resource types
- Creating resource groups
- Creating resources on which the resources that are specified in the list of operands depend
- The cluster configuration information must contain sufficient information to do all of the following:
- Enable the resource types to be registered
- Enable the resource groups to be created
- Enable the resources to be created

You can specify this option only with the `create` subcommand. If you specify this option, you must also specify the `-i` option and provide a configuration file.

`-d`
`--disable`

Disables a resource when the resource is created. You can specify this option only with the `create` subcommand. By default, resources are created in the enabled state.

Enabling a resource does not guarantee that the resource is brought online. A resource comes online only after the resource's resource group is brought online on at minimum one node.

`-f` *errorflag*

`--flag` *errorflag*

Specifies explicitly the error flag that is to be cleared by the `reset` subcommand. You can specify this option only with the `reset` subcommand. By default, the `reset` subcommand clears the `STOP_FAILED` error flag.

The only error flag that the `-f` option accepts is the `STOP_FAILED` error flag.

`-F`

`--force`

Forces the deletion of resources that are not disabled. You can specify this option only with the `delete` subcommand.

`-g` *resourcegroup*[,…]

`--resourcegroup` *resourcegroup*`-[,…]`

Specifies a resource group or a list of resource groups.

For subcommands except `create`, the command acts on only the resources in the list of operands that are members of the resource groups that the `-g` option specifies.

The effect of this option with specific subcommands is as follows:

`create`	Specifies that the resource is created in the specified resource group. When you use `-g` with the `create` subcommand, you can specify only one resource group.

`-h` *lhost*[,…]

`--logicalhost` *lhost*`-[,…]`

Specifies the list of logical hostnames that this resource represents. You must use the `-h` option either when more than one logical hostname is to be associated with the new logical-hostname resource or when the logical hostname does not have the same name as the resource itself. All logical hostnames in the list must be on the same subnet. If you do not specify the `-h` option, the resource represents a single logical hostname whose name is the name of the resource itself.

You can use `-h` instead of setting the `HostnameList` property with `-p`. However, you cannot use `-h` and explicitly set `HostnameList` in the same command.

You can only use `-h` is with the `create` subcommand.

Note – For a zone cluster, all the logical hostnames or the corresponding IP addresses must be specified in the net properties in the global scope in the zone cluster configuration. Otherwise the resource group creation fails.

For more information about global scope net properties, refer to clzonecluster(1CL) man page.

`-i` {- | *clconfiguration*}
`--input {- | `*clconfiguration*`-}`

Specifies configuration information that is to be used for creating or modifying logical-hostname resources. This information must conform to the format that is defined in the clconfiguration(5CL) man page. This information can be contained in a file or supplied through the standard input. To specify the standard input, specify `-` instead of a file name.

Only the resources that are supplied as operands to the command are created or modified. Options that are specified in the command override any options that are set in the configuration information. If configuration parameters are missing in the configuration information, you must specify these parameters on the command line.

The effect of this option with specific subcommands is as follows:

`create`	When specified with the `-a` option, this option registers all required resource types and creates all required resource groups. You must supply all information that is required for the registration and configuration. All other configuration data is ignored.

`-l` *listtype*
`--listtype` *listtype*

Specifies the type of resource properties that are to be displayed by the `list-props` subcommand. You can specify this option only with the `list-props` subcommand.

You must specify one value from the following list for *listtype*:

`all`	Specifies that standard properties and extension properties are displayed.
`extension`	Specifies that only extension properties are displayed. By default, only extension properties are displayed.
`standard`	Specifies that only standard properties are displayed.

If you do not specify the `-l` option, only extension properties are displayed, unless you specify a standard property explicitly by using the `-p` option.

`-n` *node*[,…]
`--node` *node*[,...]

Specifies a node or a list of nodes in the target global cluster or zone cluster. You can specify each node as node name or a node ID. If the `-Z` option is specified, then you can specify only zone-cluster hostnames with the `-n` option and not the global-cluster hostnames. If `-Z` option is not specified, then you can specify only the global-cluster hostnames with the `-n` option.

The subcommands with which you can specify this option are as follows:

`disable`	Disables only the resources in the list of operands that are hosted on the specified nodes.
`enable`	Enables only the resources in the list of operands that are hosted on the specified nodes.
`status`	Reports the status only of resources in the list of operands that are hosted on the specified nodes.

`-N` *netif@node*[,…]
`--netiflist` *netif@node*[,…]

Specifies a resource property. The `-N` option enables you to set the `NetIfList` property without using the `-p` option for the property. If you do not specify `-N`, the `clreslogicalhostname` command attempts to set the `NetIfList` property for you based on available IPMP groups or public adapters, as well as the subnet associated with the `HostnameList` property.

You can specify the `NetIfList` property in the form of *ipmpgroup@node*[,…] or *publicNIC@node*[,…]. If you do not use `-N`, or if you use it with *publicNIC@node*, the `clreslogicalhostname` command attempts to create the necessary IPMP groups. The system creates single-adapter IPMP groups with basic defaults, which the user can later modify by using standard Solaris IPMP interfaces. IPMP groups are automatically created only in the global-cluster node.

You can use `-N` instead of directly setting the `NetIfList` property with `-p`. However, you cannot use `-N` and explicitly set `NetIfList` in the same command.

You can only use `-N` with the `create` subcommand.

`-o` {- | *clconfiguration*}
`--output {- |` *clconfiguration*`-}`

Specifies the location where resource configuration information is to be written. This location can be a file or the standard output. To specify the standard output, specify - instead of a file name. If you specify the standard output, all other standard output for the command is suppressed. You can specify this option only with the `export` subcommand.

Configuration information is written only for the resources that are supplied as operands to the command. The information is written in the format that is defined in the `clconfiguration(5CL)` man page.

`-p` *name=value*
`-p` *name*`-+=`*array-values*
`-p` *name-=array-values*
`--property` *name*`-=`*value*
`--property` *name+=value-values*
`--property` *name*`--=`*value-values*

Sets the standard properties and extension properties of a resource. You can specify this option only with the `create` subcommand and the `set` subcommand.

For a description of standard properties, see the `r_properties(5)` man page.

For a description of a resource type's extension properties, see the documentation for the resource type.

The operators to use with this option are as follows:

`=` Sets the property to the specified value. The `create` subcommand and the `set` subcommand accept this operator.

`+=` Adds a value or values to a string array value. Only the `set` subcommand accepts this operator. You can specify this operator only for string array values.

`-=` Removes a value or values from a string array value. Only the `set` subcommand accepts this operator. You can specify this operator only for string array values.

If a per-node property is to be set only on a subset of cluster nodes, specify the nodes the where the property is set by appending the list of nodes in braces to the property name as follows:

name{*nodelist*}

nodelist is a comma-separated list of node names or node IDs. For more information about per-node properties, see the `rt_properties(5)` man page.

`-p` *name*[,…]
`--property` *name*`-[,…]`

Specifies a list of properties for the `list-props` subcommand and `show` subcommand.

You can use this option for standard properties and extension properties of a resource.

For a description of standard properties, see the `r_properties(5)` man page.

For a description of a resource type's extension properties, see the documentation for the resource type.

Without this option, the `list-props` subcommand and `show` subcommand list all or most resource properties, depending on whether the `-v` option is also specified.

`-R`
`--recursive`

Recursively enables or disables resources to ensure that all required dependencies are satisfied. You can specify this option only with the `disable` subcommand and the `enable` subcommand.

The effect of this option with these subcommands is as follows:

`disable`	Disables any resources that depend on the resources that are specified as operands to the command, even if the resources are not specified as operands to the command.
`enable`	Enables any resources on which resources that are specified as operands to the command depend, even if the resources are not specified as operands to the command.

`-s` *state*[,…]
`--state` *state*`-[,…]`
Specifies a list of states for the `list` subcommand and `status` subcommand.

This option limits the output to include only those resources that are in one of the specified states on one or more nodes in the node list.

The possible states are as follows:

- `degraded`
- `detached`
- `faulted`
- `monitor_failed`
- `not_online` - specifies any state other than `online` or `online_not_monitored`
- `offline`
- `online`
- `online_not_monitored`
- `start_failed`
- `stop_failed`
- `unknown`
- `unmonitored`
- `wait`

`-V`
`--version`
Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The `-V` option only displays the version of the command. No other operations are performed.

`-v`
`--verbose`
Displays verbose messages to standard output.

You can specify this option with any form of the command.

Do not specify the `-v` option with the `-o -` option. The`-v` option is ignored. The `-o -` option suppresses all other standard output.

`-Z` {*zoneclustername* | `global` | `all`}
`--zoneclustername=`{*zoneclustername* | `global` | `all`}
`--zoneclustername` {*zoneclustername* | `global` | `all`}

Specifies the cluster or clusters in which the resource exists and on which you want to operate.

This option is supported by all subcommands except the `export` subcommand.

If you specify this option, you must also specify one argument from the following list:

zoneclustername — Specifies that the command with which you use this option is to operate on all specified resources in only the zone cluster named *zoneclustername*.

`global` — Specifies that the command with which you use this option is to operate on all specified resources in the global cluster only.

`all` — If you use this argument in the global cluster, it specifies that the command with which you use it is to operate on all specified resources in all clusters, including the global cluster and all zone clusters.

If you use this argument in a zone cluster, it specifies that the command with which you use it is to operate on all specified resources in that zone cluster only.

Operands

The following operand is supported:

resource — Specifies that the Oracle Solaris Cluster resource names should be accepted as operands. If the subcommand accepts more than one resource, you can use the plus sign (+) to specify all logical-hostname resources.

Exit Status

If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

6 `CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su(1M)` and `rbac(5)` man pages for more information.

9 `CL_ESTATE`
Object is in wrong state

You tried to modify a property, a resource group, or other object that you cannot modify at that particular time or at any time.

10 `CL_EMETHOD`
Resource method failed

A method of a resource failed. The method failed for one of the following reasons:

- The `validate` method failed when you tried to create a resource or modify the properties of a resource.
- A method other than `validate` failed when you tried to enable, disable, or delete a resource.

15 `CL_EPROP`
Invalid property

The property or value that you specified with the `-p`, `-y`, or `-x` option does not exist or is not allowed.

35 `CL_EIO`
I/O error

A physical input/output error has occurred.

36 `CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

39 `CL_EEXIST`
Object exists

The device, device group, cluster interconnect component, node, cluster, resource, resource type, resource group, or private string that you specified already exists.

These exit values are compatible with the return codes that are described in the scha_calls(3HA) man page.

Examples

EXAMPLE 1 Creating a Logical-Hostname Resource

This command creates a resource that is named `logicalhost1` in a resource group that is named `rg-failover`. The resource is created in the enabled state, with monitoring enabled.

```
# clreslogicalhostname create -g rg-failover logicalhost1
```

Either of the following two commands create a resource that is named `logicalhost1` in a zone cluster `ZC`. These commands can be executed from the global-cluster node or the zone cluster `ZC`. If the command is executed from a zone cluster, explicitly defining the scope of the resource with the zone-cluster name is optional.

```
# clreslogicalhostname create -g rg-failover -Z ZC logicalhost1
```

```
# clreslogicalhostname create -g rg-failover ZC:logicalhost1
```

EXAMPLE 2 Creating a Logical-Hostname Resource with a Different Logical Hostname

This command creates a resource named `rs-logicalhost1` in a resource group that is named `rg-failover`.

The logical hostname is not the same as the resource name, but the name and IP address of the logical host remain the same.

```
# clreslogicalhostname create -g rg-failover \\
-h logicalhost1 rs-logicalhost1
```

EXAMPLE 3 Specifying the IPMP Groups for a Logical-Hostname Resource

This command sets the IPMP groups for the `logicalhost1` resource.

```
# clreslogicalhostname create -g rg-failover \\
-N ipmp0@black,ipmp0@white logicalhost1
```

EXAMPLE 4 Deleting a Logical-Hostname Resource

This command deletes a resource that is named `logicalhost1`.

```
# clreslogicalhostname delete logicalhost1
```

EXAMPLE 5 Listing Logical-Hostname Resources

This command lists all logical-hostname resources.

```
# clreslogicalhostname list
logicalhost1
logicalhost2
```

EXAMPLE 6 Listing Logical-Hostname Resources With Resource Groups and Resource Types

This command lists all logical-hostname resources with their resource groups and resource types.

```
# clreslogicalhostname list -v
Resources    Resource Groups Resource Types
---------    --------------- --------------
logicalhost1 rg-failover-1   SUNW.LogicalHostname
logicalhost2 rg-failover-2   SUNW.LogicalHostname
```

EXAMPLE 7 Listing Extension Properties of Logical-Hostname Resources

This command lists the extension properties of all logical-hostname resources.

```
# clreslogicalhostname list-props -v
Properties       Descriptions
----------       ------------
NetIfList        List of IPMP groups on each node
HostnameList     List of hostnames this resource manages
CheckNameService Name service check flag
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

Intro(1CL), cluster(1CL), clresource(1CL), clressharedaddress(1CL), clresourcegroup(1CL), clresourcetype(1CL), scha_calls(3HA), clconfiguration(5CL), rbac(5), r_properties(5)

Notes

The superuser can run all forms of this command.

Any user can run this command with the following options:

- -? option
- -V option

To run this command with subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
create	solaris.cluster.modify
delete	solaris.cluster.modify
disable	solaris.cluster.admin

Subcommand	RBAC Authorization
enable	solaris.cluster.admin
export	solaris.cluster.read
list	solaris.cluster.read
list-props	solaris.cluster.read
monitor	solaris.cluster.admin
reset	solaris.cluster.admin
set	solaris.cluster.modify
show	solaris.cluster.read
status	solaris.cluster.read
unmonitor	solaris.cluster.admin

Name clresource, clrs – manage resources for Oracle Solaris Cluster data services

Synopsis `/usr/cluster/bin/clresource` *subcommand*
`[-?]`

`/usr/cluster/bin/clresource -V`

`/usr/cluster/bin/clresource` *subcommand*
`[`*options*`] -v [`*resource*`]...`

`/usr/cluster/bin/clresource clear [-f` *errorflag*`]`
`[-g [`*resourcegroup*`,]...] [-t [`*resourcetype*`,]...]`
`-n` *node*`[,...]] [-Z {`*zoneclustername* `| global}] {+ |` *resource*`...}`

`/usr/cluster/bin/clresource create -g` *resourcegroup*
`-t` *resourcetype* `[-d] [-p "`*property-name*`[{`*node-specifier*`,...}]"=`*value*`]`
`[-x "`*extension-property*`[{`*node-specifier*`,...}]"=`*value*`]`
`[-y` *standard-property*`=`*value*`] [-Z {`*zoneclustername* `| global}]` *resource*

`/usr/cluster/bin/clresource create -i {- |` *clconfiguration*`}`
`-t` *resourcetype* `[-a] [-d] [-g [`*resourcegroup*`,]...]`
`[-p "`*property-name*`[{`*node-specifier*`,...}]"=`*value*`]`
`[-x "`*extension-property*`[{`*node-specifier*`,...}]"=`*value*`]`
`[-y` *standard-property*`=`*value*`] {+ |` *resource*`...}`

`/usr/cluster/bin/clresource delete [-F] [-g [`*resourcegroup*`,]...]`
`[-t [`*resourcetype*`,...]] [-Z {`*zoneclustername* `| global}] {+ |` *resource*`...}`

`/usr/cluster/bin/clresource disable [-r] [-g [`*resourcegroup*`,]...]`
`[-t [`*resourcetype*`,]...] [-n` *node*`[,...]]`
`[-Z {`*zoneclustername* `| global}] {+ |` *resource*`...}`

`/usr/cluster/bin/clresource enable [-r] [-g [`*resourcegroup*`,]...]`
`[-t [`*resourcetype*`,]...] [ -n` *node*`[,...]]`
`[-Z {`*zoneclustername* `| global}] {+ |` *resource*`...}`

`/usr/cluster/bin/clresource export [-o {- |` *configfile*`}]`
`[+ |` *resource*`...]`

`/usr/cluster/bin/clresource list [-g [`*resourcegroup*`,]...]`
`[-t [`*resourcetype*`,]...] [ -n` *node*`[,...]]`
`[-Z {`*zoneclustername* `[,...] | global | all}] [+ |` *resource*`...]`

`/usr/cluster/bin/clresource list-props [-l` *listtype*`]`
`[-g [`*resourcegroup*`,]...] [-p "`*property-name*`[{`*node-specifier*`,...}]",...]`
`[-t [`*resourcetype*`,]...] [-x "`*extension-property*`[{`*node-specifier*`,...}]"...]`
`[-y "`*standard-property*`[{`*node-specifier*`,...}]",...]`
`[-Z {`*zoneclustername* `[,...] | global | all}] [+ |` *resource*`...]`

`/usr/cluster/bin/clresource monitor [-g [`*resourcegroup*`,]...]`
`[-t [`*resourcetype*`,]...] [ -n` *node*`[,...]]`
`[-Z {`*zoneclustername* `| global}] {+ |` *resource*`...}`

`/usr/cluster/bin/clresource set [-g [`*resourcegroup*`,]...]`
`[-p "`*property-name*`[{`*node-specifier*`,...}]"=`*value*`]`

```
[-t [resourcetype,]...] [-x "extension-property[{node-specifier,...}]"=value]
[-y standard-property [+= | -=]value]
[-Z {zoneclustername | global}] {+ | resource...}
```

```
/usr/cluster/bin/clresource show [-g [resourcegroup,]...]
 [-p property-name[{node-specifier,...}]",...]
 [-t [resourcetype,]...] [-x "extension-property[{node-specifier,...}]",...]
 [-y "standard-property[{node-specifier,...}]",...]
 [-Z {zoneclustername [,...] | global | all}] [+ | resource...]
```

```
/usr/cluster/bin/clresource status [-g [resourcegroup,]...]
 [-s [state,]...] [-t [resourcetype,]...]
 [ -n node[,...]] [-Z {zoneclustername [,...] | global | all}] [+ | resource...]
```

```
/usr/cluster/bin/clresource unmonitor [-g [resourcegroup,]...]
 [-t [resourcetype,]...] [ -n node[,...]]
 [-Z {zoneclustername | global}] {+ | resource...}
```

Description

The `clresource` command manages resources for Oracle Solaris Cluster data services. The `clrs` command is the short form of the `clresource` command. The `clresource` command and the `clrs` command are identical. You can use either form of the command.

The general form of this command is as follows:

`clresource [subcommand] [options] [operands]`

You can omit *subcommand* only if *options* specifies the `-?` option or the `-V` option.

Each option of this command has a long form and a short form. Both forms of each option are provided with the description of the option in the OPTIONS section of this man page.

Using This Command in a Zone Cluster

You can use the `clresource` command with all subcommands except `export` in a zone cluster.

You can also use the `-Z` option with all subcommands except `export` to specify the name of a particular zone cluster to which you want to restrict an operation. And, you can also attach the zone-cluster name to a resource name (*zoneclustername* : *resource*) to restrict an operation to a particular zone cluster.

You can access all zone cluster information from a global-cluster node, but a particular zone cluster is not aware of other zone clusters. If you do not restrict an operation to a particular zone cluster, the subcommand you use operates in the current cluster only.

A resource in a zone cluster can have a dependency on a resource in another zone cluster or on a resource on the global cluster. Also, a resource from the global cluster can have a dependency on a resource in any of the zone clusters on that global cluster. The inter-cluster dependencies can be set only from the global cluster.

You can use the following command to specify the inter-cluster dependencies:

```
# clresource set -p resource_dependencies=target-zc:target-rs source-zc:source-rs
```

For example, if you need to specify a dependency from resource R1 in zone cluster ZC1 to a resource R2 in zone cluster ZC2, use the following command:

```
# clresource set -p resource_dependencies=ZC2:R2 ZC1:R1
```

If you need to specify a dependency of zone cluster ZC1 resource R1 on global-cluster resource R2, use the following command:

```
# clresource set -p resource_dependencies=global:R2 ZC1:R1
```

The existing resource dependencies (`Strong`, `Weak`, `Restart`, and `Offline-Restart`) are supported.

Resource State and Status

The resource state and resource status are maintained on a per-node basis. A given resource has a distinct state on each cluster node and a distinct status on each cluster node.

Resource Group Manager (RGM) sets the resource state on each node, based on which methods have been invoked on the resource. For example, after the `STOP` method has run successfully on a resource on a given node, the resource's state will be `OFFLINE` on that node. If the `STOP` method exits nonzero or times out, then the state of the resource is `Stop_failed`.

Possible resource states include the following:

- `Online`
- `Offline`
- `Start_failed`
- `Stop_failed`
- `Monitor_failed`
- `Online_not_monitored`
- `Starting`
- `Stopping`
- `Not_online`

Note – State names, such as `Offline` and `Start_failed`, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify state names.

In addition to resource state, the RGM also maintains a resource status that can be set by the resource itself by using the API. The field `Status Message` actually consists of two components: status keyword and status message. Status message is optionally set by the resource and is an arbitrary text string that is printed after the status keyword.

Descriptions of possible values for a resource's status are as follows:

`DEGRADED` The resource is online, but its performance or availability might be compromised in some way.

`FAULTED` The resource has encountered an error that prevents it from functioning.

`OFFLINE` The resource is offline.

`ONLINE` The resource is online and providing service.

`UNKNOWN` The current status is unknown or is in transition.

Subcommands The following subcommands are supported:

`clear`

Clears an error flag that is associated with the resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that the error flag is cleared for all resources.

You can use this subcommand in the global cluster or in a zone cluster.

The following options filter the list of operands to limit the resources on which an error flag is cleared:

`-g` *resourcegroup*	Clears only the resources in the list of operands that are members of the resource groups in *resourcegroup*.
`-n` *node*	Clears the resources on the specified node or nodes. If you do not provide an `-n` option, the command clears resources on all nodes.
`-t` *resourcetype*	Clears only the resources in the list of operands that are instances of the resource types in *resourcetype*.
`-Z` {*zoneclustername* | `global`}	Clears only the resources in the particular cluster or clusters that you specify. To clear the resources in a zone cluster from the global cluster, specify the zone cluster by using the `-Z` option.

By default, the `clear` subcommand clears the `STOP_FAILED` error flag. To specify explicitly the error flag that is to be cleared, use the `-f` option. The only error flag that the `-f` option accepts is the `STOP_FAILED` error flag.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

`create`

Creates the resources that are specified as operands to the command.

You can use this subcommand in the global cluster or in a zone cluster.

To create a resource in the specific zone cluster from the global cluster, you can use the `-Z` option to specify the name of the zone cluster.

When you use `create` with the `-i` option to specify a configuration file, the subcommand accepts the plus sign (+) as an operand. When you use the + operand, all resources in the configuration file that do not exist are created.

By default, resources are created in the enabled state with monitoring enabled. However, a resource is brought online and is monitored only after the resource's resource group is brought online. To create resources in the disabled state, specify the `-d` option.

Use the following options to set property values when creating a resource:

`-p` *property-name=value*	Sets standard or extension properties, as long as their names are unique.
`-x` *extension-property=value*	Sets extension properties.
`-y` *standard-property=value*	Sets standard properties.

node-specifier is an *optional* qualifier to the `-p` and `-x` options. It indicates that the properties on *only* the specified node or nodes are to be set when the resource is created. The specified properties on other nodes in the cluster are not set. If you do not include *node-specifier*, the specified properties on all nodes in the cluster are set. Examples of the syntax of *node-specifier* include the following:

```
-x "myprop{phys-schost-1}"
```

The braces ({}) indicate that you want to set the specified property on only node `phys-schost-1`. For most shells, braces must be quoted.

You can use the following syntax to set a property on two nodes:

```
-x "myprop{phys-schost-1,phys-schost-2}"
```

Users other than superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization to use this subcommand.

See also the description of the `delete` subcommand.

`delete`

Deletes the resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that all resources are deleted.

You can use this subcommand in the global cluster or in a zone cluster.

This subcommand deletes multiple resources in the order that is required to satisfy dependencies between the resources. The subcommand disregards the order in which you specify resources on the command line.

When you delete multiple resources at the same time, the command is carried out in several steps. If the command is interrupted, for example, if a node fails, some resources might be left in an invalid configuration. To correct the problem and finish deleting the resources, reissue the same command on a healthy node.

The following options filter the list of operands to limit the resources that are deleted:

`-g` *resourcegroup*	Deletes only the resources in the list of operands that are members of the resource groups in *resourcegroup*.
`-t` *resourcetype*	Deletes only the resources in the list of operands that are instances of the resource types in *resourcetype*.
`-Z` {*zoneclustername* | `global`}	Deletes only the resources in the particular cluster or clusters that you specify. To delete the resources in a zone cluster from the global cluster, specify the zone cluster by using the `-Z` option.

By default, a resource is deleted *only* if the following conditions are met:

- The resource must be disabled.
- All dependencies on the resource must be eliminated.

To force deletion of the specified resources, specify the `-F` option. Use this option with caution, because it has the following effects:

- All specified resources are deleted, even resources that are not disabled.
- All specified resources are removed from resource-dependency settings of other resources.

These effects might cause a loss of service in the cluster. Dependent resources that are not deleted might also be left in an invalid state or in an error state.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

See also the description of the `create` subcommand.

`disable`

Disables the resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that all resources are disabled.

You can use this subcommand in the global cluster or in a zone cluster.

The following options filter the list of operands to limit the resources that are disabled:

`-g` *resourcegroup*	Disables only the resources in the list of operands that are members of the resource groups in *resourcegroup*.
`-n` *node*	You can use `-n` *node* to disable resources on one or more nodes.
`-t` *resourcetype*	Disables only the resources in the list of operands that are instances of the resource types in *resourcetype*.
`-Z` {*zoneclustername* | `global`}	Disables only the resources in the particular cluster or clusters that you specify. To delete the resources in a zone

cluster from the global cluster, specify the zone cluster by using the `-Z` option.

The `-r` option disables any resources that depend on the resources that are specified as operands to the command. These resources are disabled even if the resources are not specified as operands to the command. The `-g` option and the `-t` option do not apply to resources that are to be disabled solely to satisfy resource dependencies.

This subcommand does not affect the monitoring status of the resource. If the resource was monitored when enabled, it is still monitored after the disable. If the resource is subsequently re-enabled, the resource is also monitored.

This subcommand disables resources in the order that is required to satisfy dependencies between the resources. The subcommand disregards the order in which resources are specified at the command line.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `enable` subcommand.

`enable`

Enables the resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that all resources are enabled.

You can use this subcommand in the global cluster or in a zone cluster.

The following options filter the list of operands to limit the resources that are enabled:

`-g` *resourcegroup*	Enables only the resources in the list of operands that are members of the resource groups in *resourcegroup*.
`-n` *node*	You can use `-n` *node* to enable resources on one or more nodes.
`-t` *resourcetype*	Enables only the resources in the list of operands that are instances of the resource types in *resourcetype*.
`-Z` {*zoneclustername* | `global`}	Enables only the resources in the particular cluster or clusters that you specify. To enable the resources in a zone cluster from the global cluster, specify the zone cluster by using the `-Z` option.

To ensure that all required resource dependencies are satisfied, specify the `-r` option. The `-r` option enables any resources on which the resources that are specified as operands to the command depend. These resources are enabled, even if the resources are not specified as operands to the command. The `-g` option and the `-t` option do not apply to resources that are to be enabled solely to satisfy resource dependencies.

Resources are enabled in the order that is required to satisfy dependencies between the resources. The subcommand disregards the order in which resources are specified at the command line.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `disable` subcommand.

`export`

Exports the cluster resource configuration in the format that is described by the `clconfiguration`(5CL) man page.

You can use this subcommand only in the global cluster.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`list`

Displays a list of the resources that are specified as operands to the command. By default, all resources are displayed.

You can use this subcommand in the global cluster or in a zone cluster.

The following options filter the list of operands to limit the resources that are displayed:

`-g` *resourcegroup*	Displays only the resources in the list of operands that are members of the resource groups in *resourcegroup*.
`-n` *node*	You can use `-n` *node* to list only those resources that are online on one or more nodes.
`-t` *resourcetype*	Displays only the resources that are instances of the resource types in *resourcetype*.
`-Z` {*zoneclustername* | `global` | `all`}	Displays only the resources in the particular cluster or clusters that you specify. To display the resources in a zone cluster from the global cluster, specify the zone cluster by using the `-Z` option.

This subcommand accepts the plus sign (+) as an operand to specify that all the resource configuration is displayed. You can restrict the displayed information to specific resource groups or resource types by specifying a `-g` option or `-t` option. If no operands are supplied, all resources in the specified resource groups or that are instances of the specified resource types are displayed.

If you specify the `-v` option, the resource group and resource type of each resource in the list are also displayed.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`list-props`

Displays a list of the properties of the resources that are specified as operands to the command.

You can use this subcommand in the global cluster or in a zone cluster.

The following options filter the list of operands to limit the resources whose properties are displayed:

`-g` *resourcegroup*	Displays the properties only of the resources in the list of operands that are members of the resource groups in *resourcegroup*.
`-t` *resourcetype*	Displays the properties only of the resources in the list of operands that are instances of the resource types in *resourcetype*.

The `-l` option specifies the type of resource properties that are to be displayed:

`-l all`	Specifies that standard properties and extension properties are displayed.
`-l extension`	Specifies that only extension properties are displayed. By default, only extension properties are displayed.
`-l standard`	Specifies that only standard properties are displayed.

If you do not specify the `-l` option, only extension properties are displayed. To display standard properties, specify the properties explicitly by using the `-p` option or the `-y` option.

The following options limit the set of resource properties that is to be displayed:

`-p` *property-name*	Displays only the properties that are specified in *property-name*. You can specify standard properties and extension properties in *property-name*.
`-x` *extension-property*	Displays only the extension properties on one or more nodes that are specified in *extension-property*.
`-y` *standard-property*	Displays only the standard properties that are specified in *standard-property*.

node-specifier is an *optional* qualifier to the `-p`, `-x`, and `-y` options. It indicates that the properties on *only* the specified node or nodes, are to be displayed. The specified properties on other nodes in the cluster are not displayed. If you do not include *node-specifier*, the specified properties on all nodes in the cluster are displayed. Examples of the syntax of *node-specifier* include the following:

`-x "myprop{phys-schost-1}"`

The braces ({}) indicate that you want to display the specified property on only node `phys-schost-1`. For most shells, braces must be quoted.

You can use the following syntax to display a property on two nodes:

`-x "myprop{phys-schost-1,phys-schost-2}"`

If you specify the `-v` option, the description of each property is also displayed.

This subcommand accepts the plus sign (+) as an operand to specify that all resource properties are displayed. If no operands are supplied, properties of all resources in the specified resource groups or that are instances of the specified resource types are displayed.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`-Z` {*zoneclustername* | `global` | `all`}
Lists the properties of resources in the particular cluster or clusters that you specify. To list the resources in a zone cluster from the global cluster, specify the zone cluster by using the `-Z` option.

`monitor`
Turns on monitoring for the resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that monitoring is turned on for all resources.

You can use this subcommand in the global cluster or in a zone cluster.

The following options filter the list of operands to limit the resources for which monitoring is turned on:

`-g` *resourcegroup*	Turns on monitoring only for the resources in the list of operands that are members of the resource groups in *resourcegroup*.
`-n` *node*	Turns on monitoring for only those resources that are online on one or more nodes.
`-t` *resourcetype*	Turns on monitoring only for the resources in the list of operands that are instances of the resource types in *resourcetype*.
`-Z` {*zoneclustername* | `global`}	Turns on monitoring only for the resources in the particular cluster or clusters that you specify. To turn on

the resources in a zone cluster from the global cluster, specify the zone cluster by using the `-Z` option.

If monitoring is turned on for a resource, the resource is monitored only if the following conditions are met:

- The resource is enabled.
- The resource group that contains the resource is online on at least one cluster node.

Note – When you turn on monitoring for a resource, you do *not* enable the resource.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `unmonitor` subcommand.

`set`

Sets specified properties of the resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that the specified properties of all resources are modified.

You can use this subcommand in the global cluster or in a zone cluster.

The following options filter the list of operands to limit the resources for which properties are modified:

`-g` *resourcegroup*	Modifies properties of only the resources in the list of operands that are members of the resource groups in *resourcegroup*.
`-t` *resourcetype*	Modifies properties of only the resources in the list of operands that are instances of the resource types in *resourcetype*.

Use the following options to set property values:

`-p` *property-name=value*	Sets standard or extension properties, as long as their names are unique.
`-x` *extension-property=value*	Sets extension properties.
`-y` *standard-property=value*	Sets standard properties.

node-specifier is an *optional* qualifier to the `-p` and `-x` options for updating a per-node extension property. It indicates that the property is to be set on *only* the specified node or nodes. The specified property is not set on other nodes in the cluster. If you do not include *node-specifier*, the specified properties on all nodes in the cluster are set. Examples of the syntax of *node-specifier* include the following:

`-x "myprop{phys-schost-1}"`

The braces ({}) indicate that you want to set the specified property on only node `phys-schost-1`. For most shells, braces must be quoted.

You can use the following syntax to set a property on two nodes:

`-x "myprop{phys-schost-1,phys-schost-2}"`

`-Z` {*zoneclustername* | `global`}
Sets the properties only for resources in the particular cluster or clusters that you specify. To set the properties of resources in a zone cluster from the global cluster, specify the zone cluster by using the `-Z` option.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`show`
Displays the configuration of the resources that are specified as operands to the command. By default, the configuration of all resources is displayed.

You can use this subcommand in the global cluster or in a zone cluster.

The following options filter the list of operands to limit the list of resources for which the configuration is displayed:

`-g` *resourcegroup*	Displays the configuration of only the resources in the list of operands that are members of the resource groups in *resourcegroup*.
`-n` *node*	You can use `-n` *node* to display the configuration of only those resources that are online on one or more nodes.
`-t` *resourcetype*	Displays the configuration of only the resources in the list of operands that are instances of the resource types in *resourcetype*.

`-Z` {*zoneclustername* | `global` | `all`}
Displays only the resources in the particular cluster or clusters that you specify. To display the resources in a zone cluster from the global cluster, specify the zone cluster by using the `-Z` option.

The following options limit the set of resource properties that are displayed:

`-p` *property-name*	Displays only the properties that are specified in *property-name*. You can specify standard properties and extension properties in *property-name*.
`-x` *extension-property*	Displays only the extension properties on one or more nodes that are specified in *extension-property*.
`-y` *standard-property*	Displays only the standard properties that are specified in *standard-property*.

node-specifier is an *optional* qualifier to the `-p`, `-x`, and `-y` options. It indicates that the properties on *only* the specified node or nodes, are to be displayed. The specified properties on other nodes in the cluster are not displayed. If you do not include *node-specifier*, the specified properties on all nodes in the cluster are displayed. Examples of the syntax of *node-specifier* include the following:

```
-x "myprop{phys-schost-1}"
```

The braces ({}) indicate that you want to display the specified property on only node `phys-schost-1`. For most shells, braces must be quoted.

You can use the following syntax to display a property on two nodes:

```
-x "myprop{phys-schost-1,phys-schost-2}"
```

This subcommand accepts the plus sign (+) as an operand to specify all resource configuration is to be displayed. You can restrict the displayed information to specific resource groups or resource types by specifying a `-g` option or `-t` option. If you do not supply an operand, the subcommand displays the configuration of all specified resources.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`status`

Displays the status of the resources that are specified as operands to the command. By default, the status of all resources is displayed.

The following options filter the list of operands to limit the list of resources for which the status is displayed:

`-g` *resourcegroup*	Displays the status of only the resources in the list of operands that are members of the resource groups in *resourcegroup*.
`-n` *node*	You can use `-n` *node* to display the status of only those resources that are online on one or more nodes. You cannot specify the `-n` and `-s` options together.
`-s` *state*	Displays the status of only the resources in the list of operands that are in the states in *state*. You cannot specify the `-n` and `-s` options together.
`-t` *resourcetype*	Displays the status of only the resources in the list of operands that are instances of the resource types in *resourcetype*.
`-Z` {*zoneclustername* | `global` | `all`}	Displays the status of resources in the particular cluster or clusters that you specify. To display the status of resources in a zone cluster from the global cluster, specify the zone cluster by using the `-Z` option.

This subcommand accepts the plus sign (+) as an operand to specify that the status of all resources is to be displayed. You can restrict the displayed information to specific resource groups or resource types by specifying a `-g` option or `-t` option. If no operands are supplied, the status of all specified resources is displayed.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`unmonitor`

Turns off monitoring for the resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that monitoring is turned off for all resources.

You can use this subcommand in the global cluster or in a zone cluster.

If you turn off monitoring for a resource that is disabled, the resource is not affected. The resource and its monitor are already offline.

Note – When you turn off monitoring for a resource, you do *not* disable the resource. However, when you disable a resource, you do not need to turn off monitoring for the resource. The disabled resource and its monitor are kept offline.

The following options filter the list of operands to limit the resources for which monitoring is turned off:

`-g` *resourcegroup*	Turns off monitoring only for the resources in the list of operands that are members of the resource groups in *resourcegroup*.
`-n` *node*	Turns off monitoring for only those resources that are online on one or more nodes.
`-t` *resourcetype*	Turns off monitoring only for the resources in the list of operands that are instances of the resource types in *resourcetype*.
`-Z` {*zoneclustername* | `global`}	Turns off monitoring only for resources in the particular cluster or clusters that you specify. To turn off the monitoring of resources in a zone cluster from the global cluster, specify the zone cluster by using the `-Z` option.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `disable` subcommand and the `monitor` subcommand.

Options The following options are supported:

`-?`
`--help`
Displays help information. When this option is used, no other processing is performed.

You can specify this option without a subcommand or with a subcommand.

If you specify this option without a subcommand, the list of subcommands for this command is displayed.

If you specify this option with a subcommand, the usage options for the subcommand are displayed.

`-a`
`--automatic`
Automatically performs the following additional operations when resources are being created from a cluster configuration file (`clconfiguration`(5CL)):

- Registering resource types
- Creating resource groups
- Creating resources on which the resources that are specified in the list of operands depend

The cluster configuration information must contain sufficient information to do all of the following:

- Enable the resource types to be registered
- Enable the resource groups to be created
- Enable the resources to be created

You can specify this option only with the `create` subcommand. If you specify this option, you must also specify the `-i` option and provide a configuration file.

`-d`
`--disable`
Disables a resource when the resource is created. You can specify this option only with the `create` subcommand. By default, resources are created in the enabled state.

Enabling a resource does not guarantee that the resource is brought online. A resource is brought online only after the resource's resource group is brought online on at least one node.

`-f` *errorflag*
`--flag=`*errorflag*
`--flag` *errorflag*
Specifies explicitly the error flag that is to be cleared by the `clear` subcommand. You can specify this option only with the `clear` subcommand. By default, the `clear` subcommand clears the `STOP_FAILED` error flag.

The only error flag that the `-f` option accepts is the `STOP_FAILED` error flag.

`-F`
`--force`
Forces the deletion of resources that are not disabled. You can specify this option only with the `delete` subcommand.

Use this option with caution, because it has the following effects:

- All specified resources are deleted, even resources that are not disabled.
- All specified resources are removed from resource-dependency settings of other resources.

These effects might cause a loss of service in the cluster. Dependent resources that are not deleted might also be left in an invalid state or in an error state.

`-g` *resourcegroup*[,…]
`--resourcegroup=`*resourcegroup*`-[,…]`
`--resourcegroup` *resourcegroup*`-[,…]`
Specifies a resource group or a list of resource groups.

For subcommands except `create`, the command acts on only the resources in the list of operands that are members of the specified resource groups. Specify resource groups by using the `-g` option.

When you specify the `-g` option with the `create` subcommand, `clresource` creates the resource in the specified resource group. You can specify only one resource group when using this option.

`-i` {- | *clconfiguration*}
`--input={- |` *clconfiguration*`-}`
`--input {- |` *clconfiguration*`-}`
Specifies configuration information that is to be used for creating or modifying resources. This information must conform to the format that is defined in the `clconfiguration`(5CL) man page. This information can be contained in a file or supplied through the standard input. To specify the standard input, specify `-` instead of a file name.

Only the resources that are supplied as operands to the command are created or are modified. Options that are specified in the command override any options that are set in the configuration information. If configuration parameters are missing in the configuration information, you must specify these parameters at the command line.

When you use the `-i` option with the `create` subcommand, `clresource` registers all required resource types and creates all required resource groups. You must supply all information that is required for the registration and configuration. All other configuration data is ignored.

`-l` *listtype*
`--listtype=`*listtype*
`--listtype` *listtype*

Specifies the type of resource properties that are to be displayed by the `list-props` subcommand. You can specify this option only with the `list-props` subcommand.

You must specify one value from the following list for *listtype*:

`all`	Specifies that standard properties and extension properties are displayed.
`extension`	Specifies displayed only extension properties are displayed. By default, only extension properties are displayed.
`standard`	Specifies that only standard properties are displayed.

If you do not specify the `-l` option, only extension properties are displayed. To display standard properties, specify the properties explicitly by using the `-p` option or the `-y` option.

`-n` *node*`-[,…]`
`--node=`*node*`-[,…]`
`--node` *node*`-[,…]`

Specifies a node or a list of nodes in the target global cluster or zone cluster. You can specify each node as a node name or a node ID.

If the `-Z` option is specified, then you can specify only zone-cluster hostnames with the `-n` option and not the global-cluster hostnames. If `-Z` option is not specified, then you can specify only the global-cluster hostnames with the `-n` option.

The subcommands with which you can specify this option are as follows:

`disable`	Disables only the resources in the list of operands that are hosted on the specified nodes.
`enable`	Enables only the resources in the list of operands that are hosted on the specified nodes.
`list`	Displays a list of only those resources in the list of operands that are hosted on the specified nodes.
`monitor`	Monitors only those resources in the list of operands that are hosted on the specified nodes.
`show`	Displays the configuration information of only those resources in the list of operands that are hosted on the specified nodes.
`status`	Reports the status only of resources in the list of operands that are hosted on the specified nodes.

`unmonitor` Unmonitors only those resources in the list of operands that are hosted on the specified nodes.

`-o {- |` *clconfiguration*`-}`
`--output={- |` *clconfiguration*`-}`
`--output {- |` *clconfiguration*`-}`

Specifies the location where resource configuration information is to be written. This location can be a file or the standard output. To specify the standard output, specify a dash (`-`) instead of a file name. If you specify the standard output, all other standard output for the command is suppressed. You can specify this option only with the `export` subcommand.

Configuration information is written only for the resources that are supplied as operands to the command. The information is written in the format that is defined in the `clconfiguration`(5CL) man page.

`-p` *property-name*=*value*
`-p` *property-name*+=*array-values*
`-p` *property-name*`-`=*array-values*
`--property=`*property-name*=*value*
`--property` *property-name*=*value*
`--property=`*property-name*+=*array-values*
`--property` *property-name*+=*array-values*
`--property=`*property-name*`-`=*array-values*
`--property` *property-name*`-`=*array-values*

Sets the values of a property for resources that are supplied as operands to the command. You can specify the assignment form of this option only with the `create` subcommand and the `set` subcommand.

Use the `-p` option to specify any standard or extension property. If an extension property of a resource type has the same name as a standard property of that resource type, use of the `-p` option returns an error. In this situation, use the `-x` option to specify the extension property and the `-y` option to specify the standard property.

For a description of standard properties, see the `r_properties`(5) man page.

For a description of a resource type's extension properties, see the documentation for the resource type.

The operators to use with this option are as follows:

`=` Sets the property to the specified value. The `create` subcommand and the `set` subcommand accept this operator.

`+=` Adds a value or values to a string array value. Only the `set` subcommand accepts this operator. You can specify this operator only for properties that accept lists of string values, for example `Resource_dependencies`.

`-=` Deletes a value or values from a string array value. Only the `set` subcommand accepts this operator. You can specify this operator only for properties that accept lists of string values, for example `Resource_dependencies`.

To set a per-node extension property on a subset of cluster nodes, specify the nodes when the property is set. Append the list of nodes in braces to the property name as follows:

name{*node*}

node is a comma-separated list of node names, or node IDs. For more information about per-node extension properties, see the `rt_properties(5)` man page.

To set a per-node resource dependency on a subset of cluster nodes, specify each per-node dependency in the following form:

```
myres1@node1,myres2@node2,myres3@node3
```

For the gds-rs resource, the following command sets a dependency on resource trancos-3-rs on node ptrancos1 and resource trancos-4-rs on node ptrancos2:

```
# clresource set -p \\
resource_dependencies=trancos-3-rs@ptrancos1,trancos-4-rs@ptrancos2 gds-rs
phys-schost-1# clresource show -p resource_dependencies gds-rs
=== Resources ===
Resource: gds-rs
Resource_dependencies: trancos-3-rs@ptrancos1 trancos-4-rs@ptrancos2
```

To set a resource dependency with local-node scope, specify the `LOCAL_NODE` qualifier in the following form:

```
myres1{LOCAL_NODE},myres2{LOCAL_NODE}
```

For the gds-rs resource, the following command sets a local node dependency on resource trancos-3-rs:

```
# clresource set -p resource_dependencies=trancos-3-rs{LOCAL_NODE} gds-rs
phys-schost-1# clresource show -p resource_dependencies gds-rs
=== Resources ===
Resource: gds-rs
Resource_dependencies: trancos-3-rs{LOCAL_NODE}
```

For more information about per-node resource dependencies and dependency scope qualifiers, see the `r_properties(5)` man page.

`-p` *property-name*`[,…]`
`--property=`*property-name*`[,...]`
`--property` *property-name*`[,...]`

Specifies a list of properties for the `list-props` subcommand and `show` subcommand.

Use the `-p` option to specify any standard or extension property. If an extension property of a resource type has the same name as a standard property of that resource type, use of the

`-p` option returns an error. In this situation, use the `-x` option to specify the extension property and the `-y` option to specify the standard property.

For a description of standard properties, see the `r_properties(5)` man page.

For a description of a resource type's extension properties, see the documentation for the resource type.

Without this option, the `list-props` subcommand and `show` subcommand list all or most resource properties, depending on whether the `-v` option is also specified.

`-r`
`--recursive`
Recursively enables or disables resources to ensure that all required dependencies are satisfied. You can specify this option only with the `disable` subcommand and the `enable` subcommand.

The effect of this option with these subcommands is as follows:

`disable`	Disables any resources that depend on the resources that are specified as operands to the command. The resources are disabled even if the resources are not specified as operands to the command.
`enable`	Enables any resources on which resources that are specified as operands to the command depend. The resources are enabled even if the resources are not specified as operands to the command.

`-s` *state*`-[,…]`
`--state=`*state*`-[,...]`
`--state` *state*`-[,...]`
Specifies a list of states for the `list` subcommand and `status` subcommand.

This option limits the output to include only those resources that are in one of the specified states on one or more nodes in the node list.

The possible states are as follows:

- `Online`
- `Offline`
- `Start_failed`
- `Stop_failed`
- `Monitor_failed`
- `Online_not_monitored`
- `Starting`
- `Stopping`
- `Not_online`

Note – State names, such as `Offline` and `Start_failed`, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify state names.

`-t` *resourcetype*`-[,…]`
`--type=`*resourcetype*`-[,...]`
`--type` *resourcetype*`-[,...]`

Specifies a resource type or list of resource types.

For all subcommands that accept this option except `create`, the command acts only on resources that satisfy both of the following qualifications:

- The resources are in the list of operands.
- The resources are instances of the resource types that the `-t` option specifies.

When you specify the `-t` option with `clresource create`, you create a resource of the specified type. You can specify only one resource type.

For a description of the format of resource type names, see "Legal RGM Names" in *Oracle Solaris Cluster Data Services Planning and Administration Guide*.

`-u`

If you use the + operand, this option specifies that the command operates on resources whose resource group is suspended.

If you do not specify the `-u` option when you specify the + operand, the command ignores all resources whose resource group is suspended. The `-u` option is valid when the + operand is specified with `clear`, `disable`, `enable`, `monitor`, `set`, or `unmonitor` commands.

When you use the + operand with `clear`, `disable`, `enable`, `monitor`, `set`, or `unmonitor` subcommand, the command ignores all resources whose resource groups is suspended unless you also specify the `-u` option.

`-V`
`--version`

Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The `-V` option displays only the version of the command. No other operations are performed.

`-v`
`--verbose`

Displays verbose messages to the standard output.

You can specify this option with any form of the command.

Do not specify the `-v` option with the `-o` option. The`-v` option is ignored. The `-o` option suppresses all other standard output.

`-x` *extension-property*=*value*
`-x` *extension-property*+=*array-value*
`-x` *extension-property*-=*array-value*

`--extension-property=`*extension-property*`=`*value*
`--extension-property` *extension-property*`=`*value*
`--extension-property=`*extension-property*`+=`*array-value*
`--extension-property` *extension-property*`+=`*array-value*
`--extension-property=`*extension-property*`-=`*array-value*
`--extension-property` *extension-property*`-=`*array-value*

Sets or modifies the value of an extension property of resources that are supplied as operands to the command.

In general, use the `-p` option to specify any standard or extension property. If an extension property of a resource type has the same name as a standard property of that resource type, use of the `-p` option returns an error. In this situation, use the `-x` option to specify the extension property and the `-y` option to specify the standard property.

You can specify the assignment form of this option only with the `create` subcommand and the `set` subcommand.

For a description of a resource type's extension properties, see the documentation for the resource type.

The operators to use with this option are as follows:

`=` Sets the property to the specified value. The `create` subcommand and the `set` subcommand accept this operator.

`+=` Adds a value or values to a string array value. Only the `set` subcommand accepts this operator. You can specify this operator only for properties that accept lists of string values, for example `Resource_dependencies`.

`-=` Removes a value or values from a string array value. Only the `set` subcommand accepts this operator. You can specify this operator only for properties that accept lists of string values, for example `Resource_dependencies`.

To set a per-node extension property on a subset of cluster nodes, specify the nodes when the property is set. Append the list of nodes in braces to the property name as follows:

name{*node*}

node is a comma-separated list of node names, or node IDs. For more information about per-node properties, see the `rt_properties(5)` man page.

`-x` *extension-property*`-[,…]`
`--extension-property=`*extension-property*`-[,...]`
`--extension-property` *name*`-[,...]`

Specifies a list of extension properties for the `list-props` subcommand and the `show` subcommand.

For a description of a resource type's extension properties, see the documentation for the resource type.

Use the `-p` option to specify any standard or extension property. If an extension property of a resource type has the same name as a standard property of that resource type, use of the `-p` option returns an error. In this situation, use the `-x` option to specify the extension property and the `-y` option to specify the standard property.

Without this option, the `list-props` subcommand and the `show` subcommand list all or most resource properties, depending on whether the `-v` option is also specified.

`-y` *standard-property*=*value*
`-y` *standard-property*+=*array-value*
`-y` *standard-property*`-`=*array-value*
`--standard-property`=*standard-property*=*value*
`--standard-property` *standard-property*=*value*
`--standard-property`=*standard-property*+=*array-value*
`--standard-property` *standard-property*+=*array-value*
`--standard-property`=*standard-property*`-`=*array-value*
`--standard-property` *standard-property*`-`=*array-value*

Sets or modifies the value of a standard property of resources that are supplied as operands to the command.

Use the `-p` option to specify any standard or extension property. If an extension property of a resource type has the same name as a standard property of that resource type, use of the `-p` option returns an error. In this situation, use the `-x` option to specify the extension property and the `-y` option to specify the standard property.

You can specify the assignment form of this option only with the `create` subcommand and the `set` subcommand.

For a description of standard properties, see the `r_properties(5)` man page.

The operators to use with this option are as follows:

`=` Sets the property to the specified value. The `create` subcommand and the `set` subcommand accept this operator.

`+=` Adds a value or values to a string array value. Only the `set` subcommand accepts this operator. You can specify this operator only for properties that accept lists of string values, for example `Resource_dependencies`.

`-=` Removes a value or values from a string array value. Only the `set` subcommand accepts this operator. You can specify this operator only for properties that accept lists of string values, for example `Resource_dependencies`.

`-y` *standard-property*`[,…]`
`--standard-property`=*standard-property*`[,...]`
`--standard-property` *standard-property*`[,...]`

Specifies a list of standard properties for the `list-props` subcommand and `show` subcommand.

For a description of standard properties, see the `r_properties(5)` man page.

Use the `-p` option to specify any standard or extension property. If an extension property of a resource type has the same name as a standard property of that resource type, use of the `-p` option returns an error. In this situation, use the `-x` option to specify the extension property and the `-y` option to specify the standard property.

Without this option, the `list-props` subcommand and the `show` subcommand list all or most resource properties, depending on whether the `-v` option is also specified.

`-Z` {*zoneclustername* | `global` | `all`}
`--zoneclustername=`{*zoneclustername* | `global` | `all`}
`--zoneclustername` {*zoneclustername* | `global` | `all`}

Specifies the cluster or clusters in which the resource exists and on which you want to operate.

This option is supported by all subcommands except the `export` subcommand.

If you specify this option, you must also specify one argument from the following list:

zoneclustername — Specifies that the command with which you use this option is to operate on all specified resources in only the zone cluster named *zoneclustername*.

`global` — Specifies that the command with which you use this option is to operate on all specified resources in the global cluster only.

`all` — If you use this argument in the global cluster, it specifies that the command with which you use it is to operate on all specified resources in all clusters, including the global cluster and all zone clusters.

If you use this argument in a zone cluster, it specifies that the command with which you use it is to operate on all specified resources in that zone cluster only.

Operands

Only the following operand is supported:

resource — Specifies the resource that is to be managed or the resources that are to be managed. If the subcommand accepts more than one resource, you can use the plus sign (+) to specify all resources.

Exit Status

If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

The following exit codes can be returned:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

1 `CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

3 `CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

6 `CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su(1M)` and `rbac(5)` man pages for more information.

9 `CL_ESTATE`
Object is in wrong state

You tried to modify a property, a resource group, or other object that you cannot modify at that particular time or at any time.

10 `CL_EMETHOD`
Resource method failed

A method of a resource failed. The method failed for one of the following reasons:

- The `validate` method failed when you tried to create a resource or modify the properties of a resource.
- A method other than `validate` failed when you tried to enable, disable, or delete a resource.

15 `CL_EPROP`
Invalid property

The property or value that you specified with the `-p`, `-y`, or `-x` option does not exist or is not allowed.

36 `CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

39 CL_EEXIST
Object exists

The device, device group, cluster interconnect component, node, cluster, resource, resource type, resource group, or private string that you specified already exists.

41 CL_ETYPE
Invalid type

The type that you specified with the -t or -p option does not exist.

These exit values are compatible with the return codes that are described in the scha_calls(3HA) man page.

Examples

EXAMPLE 1 Creating a Resource

This example creates a resource that is named rs-nfs in a resource group that is named rg-failover. The resource is an instance of the SUNW.nfs resource type. The resource is created in the enabled state and with resource monitoring turned on.

```
# clresource create -g rg-failover -t SUNW.nfs rs-nfs
```

Either of the following two commands create a resource that is named rs-nfs in a zone cluster ZC in a resource group that is named rg-failover. These commands can be executed from the global-cluster node, or inside the zone cluster ZC. If you execute the command from a zone cluster, explicitly defining the scope of the resource with the zone-cluster name is optional.

```
# clresource create -g rg-failover -t SUNW.nfs -Z ZC rs-nfs
```

```
# clresource create -g rg-failover -t SUNW.nfs ZC:rs-nfs
```

EXAMPLE 2 Turning On Monitoring for a Resource

This example turns on monitoring for a resource that is named rs-nfs.

```
# clresource monitor rs-nfs
```

When monitoring is turned on for a resource, it remains on until explicitly turned off by using the clresource unmonitor command. Disabling and enabling a resource does not affect whether it is monitored.

EXAMPLE 3 Enabling Resources

This example enables all resources in resource groups rg-failover and rg-failover2.

```
# clresource enable -g rg-failover,rg-failover2 +
```

This command does not affect whether the resources are monitored.

EXAMPLE 4 Setting a Resource Property

This example sets the `r_description` property of all instances of the `SUNW.nfs` resource type to `HA-NFS res`.

```
# clresource set -t SUNW.nfs -p r_description="HA-NFS res" +
```

EXAMPLE 5 Setting a Per-Node Resource Property

This example sets the per-node property `oracle_sid` of the resource `rs-oracle` to different values on different nodes, as follows:

- On node `phys-schost-1` and node `phys-schost-2`, this property is set to `myora1`.
- On node `phys-schost-3`, this property is set to `myora2`.

This example assumes that the brace character has a special meaning to the shell that is used. Therefore, each property name to which the node list is appended is enclosed in double quotes.

```
# clresource set -p "oracle_sid{phys-schost-1,phys-schost-2}"=myora1 \\
-p "oracle_sid{phys-schost-3}"=myora2 rs-oracle
```

EXAMPLE 6 Setting a Per-Node Resource Dependency

This example sets a per-node resource dependency of gds-rs so that it is dependent on two different logical host resources.

```
# clresource set -p resource_dependencies=node-3-rs@pnode1,node-4-rs@pnode2 gds-rs
# clresource show -p resource_dependencies gds-rs
Resource: gds-rs
Standard Properties:
Resource_dependencies: node-3-rs@pnode1,node-4-rs@pnode2
```

EXAMPLE 7 Adding a Value to a String-Array Property

This example adds the value `rs-oracle` to the string-array property `resource_dependencies` of the resource `rs-myapp`. Existing values in this string-array property are unchanged.

```
# clresource set -p resource_dependencies+=rs-oracle rs-myapp

# clresource show -p resource_dependencies rs-myapp
Resource: rs-myapp
Standard Properties:
Resource_dependencies: rs-nfs rs-oracle
```

EXAMPLE 8 Deleting a Resource

This example deletes a resource that is named `rs-nfs`.

```
# clresource delete rs-nfs
```

EXAMPLE 9 Updating an Entire Cluster Configuration

This example updates an entire cluster configuration by performing the following sequence of operations:

1. Bringing offline all resource groups in the cluster, deleting all resources, and deleting all resource groups
2. Unregistering all resource types
3. Creating all resources that are specified in the configuration file `/net/server/export/mycluster.xml`, registering their resource types, and creating all required resource groups

```
# clresourcegroup delete --force +
# clresourcetype unregister +
# clresource -i /net/server/export/mycluster.xml -a +
```

EXAMPLE 10 Listing Resources

This example lists all resources.

```
# clresource list
logicalhost1
rs-nfs-1
rs-nfs-2
logicalhost2
rs-apache-1
```

EXAMPLE 11 Listing Resources With Groups and Types

This example lists all resources with their resource groups and resource types.

```
# clresource list -v

Resource Name      Resource Group    Resource Type
-------------      --------------    -------------
logicalhost1       rg-failover-1     SUNW.LogicalHostname
rs-nfs-1           rg-failover-1     SUNW.nfs
logicalhost2       rg-failover-2     SUNW.LogicalHostname
rs-nfs-2           rg-failover-2     SUNW.nfs
rs-apache-1        rg-failover-1     SUNW.apache
```

EXAMPLE 12 Listing Resources of a Specific Type

This example lists all instances of the `nfs` resource type.

```
# clresource list -t nfs
rs-nfs-1
rs-nfs-2
```

EXAMPLE 13 Listing Extension Properties and Descriptions for a Resource Type

This example lists the extension properties and a description of each extension property for the `nfs` resource type.

```
# clresource list-props -t nfs -v
Properties              Descriptions
----------              ------------
Monitor_retry_count     Number of PMF restarts allowed for the fault monitor
Monitor_retry_interval  Time window (minutes) for fault monitor restarts
Rpcbind_nullrpc_timeout Timeout(seconds) to use when probing rpcbind
Nfsd_nullrpc_timeout    Timeout(seconds) to use when probing nfsd
Mountd_nullrpc_timeout  Timeout(seconds) to use when probing mountd
Statd_nullrpc_timeout   Timeout(seconds) to use when probing statd
Lockd_nullrpc_timeout   Timeout(seconds) to use when probing lockd
Rpcbind_nullrpc_reboot  Boolean to indicate if we should reboot system when
                          null rpc call on rpcbind fails
Nfsd_nullrpc_restart    Boolean to indicate if we should restart nfsd when
                          null rpc call fails
Mountd_nullrpc_restart  Boolean to indicate if we should restart mountd when
                          null rpc call fails
```

Line breaks in the Descriptions column are added to enhance the readability of this example. Actual output from the command does not contain these line breaks.

EXAMPLE 14 Clearing a Start_failed Resource State by Disabling and Enabling a Resource

The `Start_failed` resource state indicates that a `Start` or `Prenet_start` method failed or timed out on a resource, but its resource group came online anyway. The resource group comes online even though the resource has been placed in a faulted state and might not be providing service. This state can occur if the resource's `Failover_mode` property is set to `None` or to another value that prevents the failover of the resource group.

Unlike the `Stop_failed` resource state, the `Start_failed` resource state does *not* prevent you or the Oracle Solaris Cluster software from performing actions on the resource group. You do not need to issue the *command* `clear` command to clear a `Start_failed` resource state. You only need to execute a command that restarts the resource.

The following command clears a `Start_failed` resource state that has occurred on the resource `resource-1` by disabling and then re-enabling the resource.

```
# clresource disable resource-1
# clresource enable resource-1
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Interface Stability	Evolving

See Also Intro(1CL), clreslogicalhostname(1CL), clresourcegroup(1CL), clresourcetype(1CL), clressharedaddress(1CL), cluster(1CL), scha_calls(3HA), clconfiguration(5CL), attributes(5), r_properties(5), rbac(5)

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Notes The superuser can run all forms of this command.

Any user can run this command with the following options:

- -? option
- -V option

To run this command with subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
create	solaris.cluster.modify
delete	solaris.cluster.modify
disable	solaris.cluster.admin
enable	solaris.cluster.admin
export	solaris.cluster.read
list	solaris.cluster.read
list-props	solaris.cluster.read
set	solaris.cluster.modify
monitor	solaris.cluster.admin
clear	solaris.cluster.admin
show	solaris.cluster.read
status	solaris.cluster.read
unmonitor	solaris.cluster.admin

Name clresourcegroup, clrg – manage resource groups for Oracle Solaris Cluster data services

Synopsis

```
/usr/cluster/bin/clresourcegroup  -V

/usr/cluster/bin/clresourcegroup [subcommand] -?

/usr/cluster/bin/clresourcegroup subcommand [options] -v [resourcegroup ...]

/usr/cluster/bin/clresourcegroup add-node  -n node[,...] [-S]
     [-Z {zoneclustername | global}] {+ |  resourcegroup...}

/usr/cluster/bin/clresourcegroup create  [-S] [ -n node[,...]]
     [-p name=value] [...] [-Z {zoneclustername | global}]
     {+ | resourcegroup...}

/usr/cluster/bin/clresourcegroup create  -i {- | clconfigfile} [-S] [ -n node
     [,...]] [-p name=value] [...] {+ | resourcegroup...}

/usr/cluster/bin/clresourcegroup delete [-F] [-Z {zoneclustername | global}] {+
     |  resourcegroup...}

/usr/cluster/bin/clresourcegroup evacuate -n  node [-T seconds]
     [-Z {zoneclustername | global}] {+}

/usr/cluster/bin/clresourcegroup export [-o {- | configfile}]
     [+ | resourcegroup...]

/usr/cluster/bin/clresourcegroup list  [-n node[,...]]
     [-r resource[,...]] [-s state[,...]] [-t resourcetype[,...]]
     [  [-Z {zoneclustername[,...] | global | all}] [+ | resourcegroup...]

/usr/cluster/bin/clresourcegroup manage [-Z {zoneclustername | global}]
     {+ |  resourcegroup...}

/usr/cluster/bin/clresourcegroup offline  [-n node[,...]] ]
     [-Z {zoneclustername | global}] {+ |  resourcegroup...}

/usr/cluster/bin/clresourcegroup online  [-e] [-m] [-M] [-n node[,...]]
     [-Z {zoneclustername | global}] {+ |  resourcegroup...}

/usr/cluster/bin/clresourcegroup quiesce  [-k] [-Z {zoneclustername | global}] {+
     | resourcegroup...}

/usr/cluster/bin/clresourcegroup remaster  [-Z {zoneclustername | global}] {+
     | resourcegroup...}

/usr/cluster/bin/clresourcegroup remove-node  -n node[,...]
     [-Z {zoneclustername | global}]{+ |  resourcegroup...}

/usr/cluster/bin/clresourcegroup restart  [-n node[,...]]
     [-Z zoneclustername |global}] {+ | resourcegroup...}

/usr/cluster/bin/clresourcegroup resume  [-Z {zoneclustername | global}]
     {+ |  resourcegroup...}

/usr/cluster/bin/clresourcegroup set  [-i  {- |  clconfigfile}]
     [-n node[,...]] [-p name[+|-]=value] [...]
```

```
    [-Z {zoneclustername | global}] {+ | resourcegroup...}
```

```
/usr/cluster/bin/clresourcegroup show  [-n node[,...]]
     [-p name[,...]] [-r resource[,...]] [-t resourcetype[,...]]
     [-Z {zoneclustername[,...] | global | all}] [+ |  resourcegroup...]
```

```
/usr/cluster/bin/clresourcegroup status  [-n node[,...]]
     [-r resource [,]...] [-s state [,]...] [-t resourcetype
     [,]...] [-Z {zoneclustername[,...] | global | all}]
     [+ | resourcegroup...]
```

```
/usr/cluster/bin/clresourcegroup suspend  [-k] [-Z {zoneclustername | global}] {+
     | resourcegroup...}
```

```
/usr/cluster/bin/clresourcegroup switch  -n node[,...]
     [-e] [-m] [-M] [-Z {zoneclustername | global}] {+ | resourcegroup...}
```

```
/usr/cluster/bin/clresourcegroup unmanage  [-Z {zoneclustername | global}] {+
     | resourcegroup...}
```

Description

This command manages Oracle Solaris Cluster data service resource groups.

You can omit *subcommand* only if *options* is the `-?` option or the `-V` option.

Each option has a long and a short form. Both forms of each option are given with the description of the option in OPTIONS.

The `clrg` command is the short form of the `clresourcegroup` command.

With the exception of `list`, `show`, and `status`, subcommands require at least one operand. But, many subcommands accept the plus sign operand (+). This operand applies the subcommand to *all* applicable objects.

You can use some forms of this command in a zone cluster. For more information about valid uses of this command, see the descriptions of the individual subcommands. For ease of administration, use this command from the global-cluster node.

Resources and Resource Groups

The resource state, resource group state, and resource status are all maintained on a per-node basis. For example, a given resource has a distinct state on each cluster node and a distinct status on each cluster node.

Note – State names, such as `Offline` and `Start_failed`, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify state names.

The resource state is set by the Resource Group Manager (RGM) on each node, based only on which methods have been invoked on the resource. For example, after the `STOP` method has run successfully on a resource on a given node, the resource's state is `Offline` on that node. If the `STOP` method exits nonzero or times out, the state of the resource is `Stop_failed`.

Possible resource states include: `Online`, `Offline`, `Start_failed`, `Stop_failed`, `Monitor_failed`, `Online_not_monitored`, `Starting`, and `Stopping`.

Possible resource group states are: `Unmanaged`, `Online`, `Offline`, `Pending_online`, `Pending_offline`, `Error_stop_failed`, `Online_faulted`, and `Pending_online_blocked`.

In addition to resource state, the RGM also maintains a resource status that can be set by the resource itself by using the API. The field `Status Message` actually consists of two components: status keyword and status message. Status message is optionally set by the resource and is an arbitrary text string that is printed after the status keyword.

Descriptions of possible values for a resource's status are as follows:

`Degraded` The resource is online, but its performance or availability might be compromised in some way.

`Faulted` The resource has encountered an error that prevents it from functioning.

`Offline` The resource is offline.

`Online` The resource is online and providing service.

`Unknown` The current status is unknown or is in transition.

Using This Command in a Zone Cluster

You can use the `clresourcegroup` command with all subcommands except `export` in a zone cluster.

You can also use the `-Z` option with all subcommands except `export` to specify the name of a particular zone cluster to which you want to restrict an operation. And, you can also attach the zone-cluster name to a resource group (*zoneclustername*:*resourcegroup*) to restrict an operation to a particular zone cluster.

You can access all zone cluster information from a global-cluster node, but a particular zone cluster is not aware of other zone clusters. If you do not restrict an operation to a particular zone cluster, the subcommand you use operates in the current cluster only.

You can specify affinities between a resource group in a zone cluster and a resource group in another zone cluster or a resource group on the global cluster. You can use the following command to specify the affinities between resource groups in different zone clusters:

```
# clresourcegroup set -p RG_affinities={+|++|-|--}target-zc:target-rg  source-zc:source-rg
```

The affinity type can be one of the following:

- + (weak positive)
- ++ (strong positive)
- +++ (strong positive with failover delegation)
- - (weak negative)
- -- (strong negative)

For example, if you need to specify a strong positive affinity (++) between resource group RG1 in zone cluster ZC1 and resource group RG2 in zone cluster ZC2, use the following command:

```
# clresourcegroup set -p RG_affinities=++ZC2:RG2 ZC1:RG1
```

To specify a strong positive affinity with failover delegation (+++) between resource group RG1 in zone cluster ZC1 and resource group RG2 in zone cluster ZC2, use the following command:

```
# clresourcegroup set -p RG_affinities=+++ZC2:RG2 ZC1:RG1
```

To specify a strong negative affinity (--) between resource group RG1 in zone cluster ZC1 and resource group RG2 in the global cluster, use the following command:

```
# clresourcegroup set -p RG_affinities=--global:RG2 ZC1:RG1
```

Resource groups can be automatically distributed across cluster nodes or zones. For more information, see the entries for Load_factors, Priority, and Preemption_mode in the rg_properties(5) man pages.

Subcommands The following subcommands are supported:

add-node
Adds a node to the end of the Nodelist property for a resource group.

You can use this subcommand in the global cluster or in a zone cluster.

The order of the nodes and zones in the list specifies the preferred order in which the resource group is brought online on those nodes or zones. To add a node to a different position in the Nodelist property, use the set subcommand.

To add a node for the resource group in a specific zone cluster from the global-cluster node, you can use the -Z option to specify the name of the zone cluster.

Users other than superuser require solaris.cluster.modify role-based access control (RBAC) authorization to use this subcommand. See the rbac(5) man page.

create
Creates a new resource group.

You can use this subcommand in the global cluster or in a zone cluster.

To create a resource group in a specific zone cluster from the global-cluster node, you can use the -Z option to specify the name of the zone cluster.

If you specify a configuration file with the -i option, you can specify the plus sign operand (+). This operand specifies that you want to create all resources in that file that do not exist.

To set the Nodelist property for the new resource group, specify one of the following options:

- -n *node*

- `-p Nodelist=-`*node*`-][,…]`
- `-i` *clconfigfile*

The order of the nodes in the list specifies the preferred order in which the resource group is brought online on those nodes. If you do not specify a node list at creation, the `Nodelist` property is set to all nodes that are configured in the cluster. The order is arbitrary.

By default, resource groups are created with the `RG_mode` property set to `Failover`. However, by using the `-S` option or the `-p RG_mode=Scalable` option, or by setting `Maximum_primaries` to a value that is greater than 1, you can create a scalable resource group. You can set the `RG_mode` property of a resource group only when that group is created.

Resource groups are always placed in an unmanaged state when they are created. However, when you issue the `manage` subcommand, or when you issue the `online` or `switch` subcommand with the `-M` option, the RGM changes their state to a managed state.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`delete`

Deletes a resource group.

You can use this subcommand in the global cluster or in a zone cluster.

To delete a resource group in a specific zone cluster from the global-cluster node, you can use the `-Z` option to specify the name of the zone cluster.

You can specify the plus sign operand (+) with this subcommand to delete all resource groups.

You cannot delete resource groups if they contain resources, unless you specify the `-F` option. If you specify the `-F` option, all resources within each group, as well as the group, are deleted. All dependencies and affinities are deleted as well.

This subcommand deletes multiple resource groups in an order that reflects resource and resource group dependencies. The order in which you specify resource groups on the command line does not matter.

The following forms of the `clresourcegroup delete` command are carried out in several steps:

- When you delete multiple resource groups at the same time
- When you delete a resource group with the `-F` option

If either of these forms of the command is interrupted, for example, if a node fails, some resource groups might be left in an invalid configuration.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`evacuate`

Brings offline all resource groups on the node that you specify with the `-n` option.

You can use this subcommand in the global cluster or in a zone cluster.

When you run the `evacuate` command from the global-cluster node, this subcommand evacuates all resource groups in the global cluster or zone cluster. In a zone cluster, this subcommand only evacuates the resource groups in the specified zone cluster. To evacuate the resource groups in a specific zone cluster from the global-cluster node, you can use the `-Z` option to specify the name of the zone cluster.

Resource groups are brought offline in an order that reflects resource and resource group dependencies.

You can use the `-T` option with this subcommand to specify the number of seconds to keep resource groups from switching back. If you do not specify a value, 60 seconds is used by default.

Resource groups are prevented from failing over, or automatically being brought online, on the evacuating node for 60 seconds or the specified number of seconds after the evacuation completes.

If, however, you use the `switch` or `online` subcommand to switch a resource group online, or the evacuated node reboots, the evacuation timer immediately expires and automatic failovers are again allowed.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`export`

Writes the configuration information for a resource group to a file or to the standard output (`stdout`).

You can use this subcommand only in the global cluster.

You cannot apply the `export` command to resource groups in zone clusters.

The format of this configuration information is described in the `clconfiguration(5CL)` man page.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`list`

Displays a list, filtered by qualifier options, of resource groups that you specify.

You can use this subcommand in the global cluster or in a zone cluster.

When used in a zone cluster, this subcommand applies only to the resource groups in the zone cluster. In the global-cluster node, if the `-Z` option is not specified, this command lists only the resource groups created in the global cluster.

You can use `-r` *resource* to include only those resource groups that contain resources. You can use `-t` *resourcetype* to include only those resource groups that contain a resource type in *resourcetype*. You can use `-n` *node* to include only those resource groups that are online in one or more nodes.

If you specify `-s` *state*, only those groups with the states that you specify are listed.

If you do not specify an operand or if you specify the plus sign operand (+), all resource groups, filtered by any qualifier options that you specify, are listed.

If you specify the verbose option `-v`, the status (whether the resource group is online or offline) is displayed. A resource group is listed as online even if it is online on only one node in the cluster.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`manage`

Brings a resource group that you specify to a managed state.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this subcommand from the global-cluster node, this subcommand can operate on any resource group. If you use this subcommand in a zone cluster, it successfully operates only on resource groups in the zone cluster. To manage resource groups in a specific zone cluster from the global-cluster node, you can use the `-Z` option to specify the name of the zone cluster.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`offline`

Brings a resource group that you specify to an offline state.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this subcommand from the global-cluster node, this subcommand can operate on any resource group. If you use this subcommand in a zone cluster, it successfully operates only on resource groups in the zone cluster. To bring offline the resource groups in a specific zone cluster from the global-cluster node, you can use the `-Z` option to specify the name of the zone cluster.

If you specify the `-n` option, resource groups are taken offline only on the nodesthat you specify.

If you do not specify the -n option, resource groups are taken offline on all nodes.

If you take a resource group offline with the offline subcommand, the Offline state of the resource group does not survive node reboots. In other words, if a node dies or joins the cluster, the resource group might come online on some node, even if you previously switched the resource group offline. Even if all of the resources are disabled, the resource group comes online.

Similarly, a resource group that declares any RG_dependencies or strong RG_affinities might be brought online automatically when another resource group is switched over.

To prevent the resource group from coming online automatically, use the suspend subcommand to suspend the automatic recovery actions of the resource group. To resume automatic recovery actions, use the resume subcommand.

Resource groups are brought offline in an order that reflects resource and resource group dependencies.

Users other than superuser require solaris.cluster.admin RBAC authorization to use this subcommand. See the rbac(5) man page.

online
Brings a resource group that you specify to an online state.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this subcommand from the global-cluster node, this subcommand can operate on any resource group. If you use this subcommand in a zone cluster, it successfully operates only on resource groups in the zone cluster. To bring the resource groups in a specific zone cluster online from the global-cluster node, you can use the -Z option to specify the name of the zone cluster.

Use the -n option to specify the list of nodes on which to bring resource groups online. If you do not specify the -n option, this subcommand brings resource groups online on their most-preferred nodes, without taking the groups offline from any of their current primaries. The total number of online nodes for each resource group is bounded by the Desired_primaries and Maximum_primaries properties. The preference ordering of nodes is determined by the Nodelist, RG_affinities, and Load_factors properties. See the rg_properties(5) man page for more information about these properties.

When multiple resource group operands are provided on the command line and if the -n option is not specified, the resource group operands are assigned primary nodes in an order determined by the Priority property, with the highest-priority resource group receiving its node assignment first. After primary nodes have been assigned, all of the resource group operands are brought online in parallel, except as constrained by resource dependencies or resource group dependencies. The order in which you specify resource groups on the command line does not matter. For more information regarding the Priority property, see the rg_properties(5) man page.

Lower-priority resource groups might not be able to be assigned to their most-preferred node, or might be forced offline by higher-priority resource groups, if load limits are exceeded. For more information, see the `loadlimit` subcommands in the `clnode`(1CL) man page.

Unlike the `switch` subcommand, this subcommand does not attempt to take any nodes that are listed in the `Nodelist` property to the `Offline` state.

If you specify the `-e` option with this subcommand, all resources in the set of resource groups that are brought online are enabled.

You can specify the `-m` option to enable monitoring for all resources in the set of resource groups that are brought online. However, resources are not actually monitored unless they are first enabled and are associated with a `MONITOR_START` method.

You can also specify the `-M` option to indicate that all resource groups that are brought online are to be placed in a managed state. If the `-M` option is not specified, this subcommand has no effect on unmanaged resource groups.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac`(5) man page.

`quiesce`

Brings the specified resource group to a quiescent state.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this subcommand from the global-cluster node, this subcommand can operate on any resource group. If you use this subcommand in a zone cluster, it successfully operates only on resource groups in the zone cluster. To operate on resource groups in a specific zone cluster from the global-cluster node, you can use the `-Z` option to specify the name of the zone cluster.

This command stops a resource group from continuously switching from one node to another node if a `START` or `STOP` method fails. It also prevents the node reboot that would normally take place if a stop method fails and the `Failover_mode` property of the resource is set to `HARD`. In that case, the resource moves to a `STOP_FAILED` state instead.

Use the `-k` option to kill methods that are running on behalf of resources in the affected resource groups. If you do not specify the `-k` option, methods are allowed to continue running until they exit or exceed their configured timeout.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac`(5) man page.

`remaster`

Switches the resource groups that you specify from their current primary nodes to their most preferred nodes. The total number of online nodes for each resource group is bounded by the `Desired_primaries` and `Maximum_primaries` properties. The preference ordering of nodes is determined by the `Nodelist`, `RG_affinities`, and `Load_factors` properties. For more information, see the `clnode`(1CL) and the `rg_properties`(5) man pages.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this subcommand from the global-cluster node, this subcommand can operate on any resource group. If you use this subcommand in a zone cluster, it successfully operates only on resource groups in the zone cluster. To operate on the resource groups in a specific zone cluster from the global-cluster node, you can use the `-Z` option to specify the name of the zone cluster.

Unlike the `online` subcommand, this subcommand can switch resource groups offline from their current masters to bring them online on more preferred masters.

When multiple resource group operands are provided on the command line, the resource group operands are assigned primary nodes in an order determined by their `Priority` property, with the highest-priority resource group receiving its node assignment first. The order in which you specify resource groups on the command line does not matter. For more information, see the `rg_properties`(5) man page.

Lower-priority resource groups might not be able to be assigned to their most-preferred node, or might be forced offline by higher-priority resource groups if load limits are exceeded. For more information, see the `loadlimit` subcommands of the `clnode`(1CL)man page.

This subcommand has no effect on unmanaged resource groups.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac`(5) man page.

`remove-node`

Removes a node from the `Nodelist` property of a resource group.

You can use this subcommand in the global cluster or in a zone cluster.

You can use this subcommand from the global-cluster node or a zone cluster. To remove a node for a resource group in a zone cluster from the global-cluster node, you can use the `-Z` option to specify the name of the zone cluster.

After removing the node, `remove-node` might reset the value of the `Maximum_primaries` or `Desired_primaries` property to the new number of nodes in the `Nodelist` property. `remove-node` resets the value of the `Maximum_primaries` or `Desired_primaries` property only if either value exceeds the new number of nodes in the `Nodelist` property.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac`(5) man page.

`restart`
Takes a resource group offline and then back online on the same set of primary nodes that currently host the resource group.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this subcommand from the global-cluster node, this subcommand can operate on any resource group. If you use this subcommand in a zone cluster, it successfully operates only on resource groups in the zone cluster. To operate on the resource groups in a specific zone cluster from the global-cluster node, you can use the `-Z` option to specify the name of the zone cluster.

If you specify the `-n` option, the resource group is restarted only on current masters that are in the list of nodes that you specify.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`resume`
Resumes the automatic recovery actions on the specified resource group, which were previously suspended by the `suspend` subcommand.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this subcommand from the global-cluster node, this subcommand can operate on any resource group. If you use this subcommand in a zone cluster, it successfully operates only on resource groups in the zone cluster. To operate on the resource groups in a specific zone cluster from the global-cluster node, you can use the `-Z` option to specify the name of the zone cluster.

A suspended resource group is *not* automatically restarted or failed over until you explicitly issue the command that resumes automatic recovery. Whether online or offline, suspended data services remain in their current state. You can still manually switch the resource group to a different state on specified nodes. You can also still enable or disable individual resources in the resource group.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`set`
Modifies the properties that are associated with the resource groups that you specify.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this subcommand from the global-cluster node, this subcommand can operate on any resource group. If you use this subcommand in a zone cluster, it successfully operates only on resource groups in the zone cluster. To operate on the resource groups in a specific zone cluster from the global-cluster node, you can use the `-Z` option to specify the name of the zone cluster.

You can modify the `Nodelist` property either with `-p Nodelist=-`*node*`--` or, as a convenience, with `-n` *node*.

You can also use the information in the *clconfigfile* file by specifying the `-i` option with the `set` subcommand. See the `clconfiguration(5CL)` man page.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`show`

Generates a configuration report, filtered by qualifier options, for resource groups that you specify.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this command in a zone cluster, this subcommand applies only to the resource groups in the zone cluster.

You can use `-r` *resource* to include only those resource groups that contain resources. You can use `-t` *resourcetype* to include only those resource groups that contain a resource type in *resourcetype*. You can use `-n` *node* to include only those resource groups that are online in one or more nodes. You can use the `-Z` option from a global cluster to include only those resource groups that are online in the specified zone cluster.

You can use the `-p` option to display a selected set of resource group properties rather than all resource group properties.

If you do not specify an operand or if you specify the plus sign operand (+), all resource groups, filtered by any qualifier options that you specify, are listed.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`status`

Generates a status report, filtered by qualifier options, for resource groups that you specify.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this command in a zone cluster, this subcommand applies only to the resource groups in the zone cluster.

You can use `-r` *resource* to include only those resource groups that contain resources. You can use `-t` *resourcetype* to include only those resource groups that contain a resource type in *resourcetype*. You can use `-n` *node* to include only those resource groups that are online in one or more nodes. You can use the `-Z` option to specify a zone cluster from the global-cluster node to include only those resource groups that are online in the specified zone cluster.

If you specify `-s` *state*, only those groups with the states that you specify are listed.

Note – You can specify either the -n option or the -s option with the status subcommand. But, you cannot specify both options at the same time with the status subcommand.

If you do not specify an operand or if you specify the plus sign operand (+), all resource groups, filtered by any qualifier options that you specify, are listed.

Users other than superuser require solaris.cluster.read RBAC authorization to use this subcommand. See the rbac(5) man page.

suspend
Suspends the automatic recovery actions on and quiesces the specified resource group.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this subcommand in the global-cluster node, this subcommand can operate on any resource group. If you use this subcommand in a zone cluster, it successfully operates only on resource groups in the zone cluster. To operate on the resource groups in a specific zone cluster from the global-cluster node, you can use the -Z option to specify the name of the zone cluster.

A suspended resource group is *not* automatically restarted or failed over until you explicitly issue the command that resumes automatic recovery. Whether online or offline, suspended data services remain in their current state. While the resource group is suspended, you can manually switch the resource group or its resources to a different state on specific nodes by using the clresourcegroup(1CL) or clresource(1CL) commands with sub commands such as switch, online, offline, disable, or enable. Rather than directly operating on the resource such as killing the application processes or running application specific commands, use clresourcegroup(1CL) or clresource(1CL) commands. This allows the cluster framework to maintain an accurate picture of the current status of the resources and resource groups, so that availability can be properly restored when the resume subcommand is executed.

You might need to suspend the automatic recovery of a resource group to investigate and fix a problem in the cluster or perform maintenance on resource group services.

You can also specify the -k option to immediately kill methods that are running on behalf of resources in the affected resource groups. By using the -k option, you can speed the quiescing of the resource groups. If you do not specify the -k option, methods are allowed to continue running until they exit or they exceed their configured timeout.

Users other than superuser require solaris.cluster.admin RBAC authorization to use this subcommand. See the rbac(5) man page.

switch
Changes the node, or set of nodes, that is mastering a resource group that you specify.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this subcommand in the global-cluster node, this subcommand can operate on any resource group. If you use this subcommand in a zone cluster, it successfully operates only on resource groups in the zone cluster.

Use the `-n` option to specify the list of nodes on which to bring the resource groups online. You can use the `-Z` option to specify a zone cluster from the global-cluster node to include only the list of resource groups in the specified zone cluster.

If a resource group is not already online, it is brought online on the set of nodes that is specified by the `-n` option. However, groups that are online are brought offline on nodes that are not specified by the `-n` option before the groups are brought online on new nodes.

If you specify `-e` with this subcommand, all resources in the set of resource groups that are brought online are enabled.

You can specify `-m` to enable monitoring for all resources in the set of resource groups that are brought online. However, resources are not actually monitored unless they are first enabled and are associated with a `MONITOR_START` method.

You can specify the `-M` option to indicate that all resource groups that are brought online are to be placed in a managed state. If the `-M` option is not specified, this subcommand has no effect on unmanaged resource groups.

Resource groups are brought online in an order that reflects resource and resource group dependencies. The order in which you specify groups on the command line does not matter.

Lower-priority resource groups might not be able to be switched to the specified nodes, or might even be forced offline by higher-priority resource groups if load limits are exceeded. For more information, see the `loadlimit` subcommands in the `clnode(1CL)` man page.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`unmanage`

Brings a resource group that you specify to an unmanaged state.

You can use this subcommand in the global cluster or in a zone cluster.

If you use this subcommand from the global-cluster node, this subcommand can operate on any resource group. If you use this subcommand in a zone cluster, it successfully operates only on resource groups in the same zone cluster. To operate on the resource groups in a specific zone cluster from the global-cluster node, you can use the `-Z` option to specify the name of the zone cluster.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

Options The following options are supported:

Note – Both the short and long form of each option is shown in this section.

`-?`
`--help`
Displays help information.

You can specify this option with or without a *subcommand*.

If you specify this option without a *subcommand*, the list of all available subcommands is displayed.

If you specify this option with a *subcommand*, the usage for that *subcommand* is displayed.

If you specify this option with the `create` or `set` subcommands, help information is displayed for all resource group properties.

If you specify this option with other options, with subcommands, or with operands, they are all ignored. No other processing occurs.

`-e`
`--enable`
Enables all resources within a resource group when the group is brought online.

You can use this option only with the `switch` and `online` subcommands.

`-F`
`--force`
Deletes a resource group and all of its resources forcefully, even if those resources are enabled or online. This option also removes both resources and resource groups from any dependency property settings or affinity property settings in other resources and in other resource groups.

Use the `-F` option with the `delete` subcommand with care. A forced deletion might cause changes to other resource groups that reference the deleted resource group, such as when a dependency or affinity is set. Dependent resources might be left with an invalid or error state after the forced deletion. If this occurs, you might need to reconfigure or restart the affected dependent resources.

`-i` {`-` | *clconfigfile*}
`--input={- |` *clconfigfile*`-}`
`--input {- |` *clconfigfile*`-}`
Specifies that you want to use the configuration information that is located in the *clconfigfile* file. See the `clconfiguration`(5CL) man page.

Specify a dash (`-`) with this option to provide configuration information through the standard input (`stdin`).

If you specify other options, they take precedence over the options and information in *clconfigfile*.

Only those resource groups that you specify are affected by this option.

`-k`
`--kill`
Kills RGM resource methods that are running on behalf of resources in the resource group that you specify.

You can use this option with the `quiesce` and `suspend` subcommands. If you do not specify the `-k` option, methods are allowed to continue running until they exit or they exceed their configured timeout.

`-m`
`--monitor`
Enables monitoring for all resources within a resource group when the resource group is brought online.

Resources, however, are not actually monitored unless they are first enabled and are associated with a `MONITOR_START` method.

You can use this option only with the `switch` and `online` subcommands.

`-M`
`--manage`
Specifies that all resource groups that are brought online by the `switch` or `online` subcommand are to be in a managed state.

`-n` *node* `-[,…]]`
`--node=`*node* `-[,…]]`
`--node` *node* `-[,…]]`
Specifies a node or a list of nodes in the target global cluster or zone cluster. If the `-Z` option is specified, then you can specify only zone-cluster hostnames with the `-n` option and not the global-cluster hostnames. If `-Z` option is not specified, then you can specify only the global-cluster hostnames with the `-n` option.

You can specify the name or identifier of a node for *node*.

When used with the `list`, `show`, and `status` subcommands, this option limits the output. Only those resource groups that are currently online on one or more nodes in the node list are included.

Specifying this option with the `create`, `add-node`, `remove-node`, and `set` subcommands is equivalent to setting the `Nodelist` property. The order of the nodes in the `Nodelist` property specifies the order in which the group is to be brought online on those nodes. If you do not specify a node list with the `create` subcommand, the `Nodelist` property is set to all nodes in the cluster. The order is arbitrary.

When used with the `switch` and `online` subcommands, this option specifies the nodes on which to bring the resource group online.

When used with the `evacuate` and `offline` subcommands, this option specifies the nodes on which to bring the resource group offline.

When used with the `restart` subcommand, this option specifies nodes on which to restart the resource group. The resource group is restarted on current masters which are in the specified list.

`-o` {`-` | *clconfigfile*}
`--output={- |` *clconfigfile*`-}`
`--output {- |` *clconfigfile*`-}`
Writes resource group configuration information to a file or to the standard output (`stdout`). The format of the configuration information is described in the `clconfiguration`(5CL) man page.

If you specify a file name with this option, this option creates a new file. Configuration information is then placed in that file. If you specify `-` with this option, the configuration information is sent to the standard output (`stdout`). All other standard output for the command is suppressed.

You can use this option only with the `export` subcommand.

`-p` *name*
`--property=`*name*
`--property` *name*
Specifies a list of resource group properties.

You use this option with the `show` subcommand.

For information about the properties that you can set or modify with the `create` or `set` subcommand, see the description of the `-p` *name=value* option.

If you do not specify this option, the `show` subcommand lists most resource group properties. If you do not specify this option and you specify the `-verbose` option with the `show` subcommand, the subcommand lists all resource group properties.

Resource group properties that you can specify are described in "Resource Group Properties" in *Oracle Solaris Cluster Data Services Planning and Administration Guide*.

`-p` *name=value*
`-p` *name+=array-values*
`-p` *name=array-values*
`--property=`*name=value*
`--property=`*name+=array-values*
`--property=`*name-=array-values*
`--property` *name=value*
`--property` *name+=array-values*
`--property` *name-=array-values*
Sets or modifies the value of a resource group property.

You can use this option only with the `create` and `set` subcommands.

For information about the properties about which you can display information with the `show` subcommand, see the description of the `-p` *name* option.

Multiple instances of `-p` are allowed.

The operators to use with this option are as follows:

=	Sets the property to the specified value. The `create` and `set` subcommands accept this operator.
+=	Adds one or more values to a list of property values. Only the `set` subcommand accepts this operator. You can specify this operator only for properties that accept lists of string values, for example, `Nodelist`.
–=	Removes one or more values to a list of property values. Only the `set` subcommand accepts this operator. You can specify this operator only for properties that accept lists of string values, for example, `Nodelist`.

`-r` *resource*[,…]
`--resource=`*resource*`-[,…]`
`--resource` *resource*`-[,…]`

Specifies a resource or a list of resources.

You can use this option only with the `list`, `show`, and `status` subcommands. This option limits the output from these commands. Only those resource groups that contain one or more of the resources in the resource list are output.

`-s` *state*[,…]
`--state=`*state*`-[,…]`
`--state` *state*`-[,…]`

Specifies a resource group state or a list of resource group states.

You can use this option only with the `status` subcommand. This option limits the output so that only those resource groups that are in the specified state on any specified nodes are displayed. You can specify one or more of the following arguments (states) with this option:

`Error_stop_failed`
Any specified resource group that is in the `Error_stop_failed` state on any node that you specify is displayed.

`Not_online`
Any specified resource group that is in any state other than `online` on any node that you specify is displayed.

`Offline`
A specified resource group is displayed only if it is in the `Offline` state on *all* nodes that you specify.

`Online`
Any specified resource group that is in the `Online` state on any node that you specify is displayed.

`Online_faulted`
Any specified resource group that is in the `Online_faulted` state on any node that you specify is displayed.

`Pending_offline`
Any specified resource group that is in the `Pending_offline` state on any node that you specify is displayed.

`Pending_online`
Any specified resource group that is in the `Pending_online` state on any node that you specify is displayed.

`Pending_online_blocked`
Any specified resource group that is in the `Pending_online_blocked` state on any node that you specify is displayed.

`Unmanaged`
Any specified resource group that is in the `Unmanaged` state on any node that you specify is displayed.

`-S`
`--scalable`
Creates a scalable resource group or updates the `Maximum_primaries` and `Desired_primaries` properties.

You can use this option only with the `create` and `add-node` subcommands.

When used with the `create` subcommand, this option creates a scalable resource group rather than a failover resource group. This option also sets both the `Maximum_primaries` and `Desired_primaries` properties to the number of nodes in the resulting `Nodelist` property.

You can use this option with the `add-node` subcommand only if the resource group is already scalable. When used with the `add-node` subcommand, this option updates both the `Maximum_primaries` and `Desired_primaries` properties to the number of nodes in the resulting `Nodelist` property.

You can also set the `RG_mode`, `Maximum_primaries`, and `Desired_primaries` properties with the `-p` option.

`-t` *resourcetype*[,…]
`--type=`*resourcetype*`-[,…]`
`--type` *resourcetype*`-[,…]`
Specifies a resource type or a list of resource types.

You can use this option only with the `list`, `show`, and `status` subcommands. This option limits the output from these commands. Only those resource groups that contain one or more of the resources of a type that is included in the resource type list are output.

You specify resource types as [*prefix*.]*type*[:*RT-version*]. For example, an `nfs` resource type might be represented as `SUNW.nfs:3.2`, `SUNW.nfs`, or `nfs`. You need to include an *RT-version* only if there is more than one version of a resource type that is registered in the cluster. If you do not include a *prefix*, `SUNW` is assumed.

`-T` *seconds*
`--time=`*seconds*
`--time` *seconds*

Specifies the number of seconds to keep resource groups from switching back onto a node after you have evacuated resource groups from the node.

You can use this option only with the `evacuate` subcommand. You must specify an integer value between 0 and 65535 for *seconds*. If you do not specify a value, 60 seconds is used by default.

Resource groups are prevented from failing over, or automatically being brought online, on the evacuating node for 60 seconds or the specified number of seconds after the evacuation completes.

If, however, you use the `switch` or `online` subcommand to switch a resource group online, or the evacuated node reboots, the evacuation timer immediately expires and automatic failovers are again allowed.

The `-T` option specifies that resource groups are not to be brought online by the RGM on the evacuated node for a period of *T* seconds after the evacuation has completed. You can override the `-T` timer by switching a resource group onto the evacuated node by using the `switch` or `online` subcommand with the `-n` option. When such a switch completes, the `-T` timer immediately expires for that node. However, switchover commands such as `online` or `remaster` without the `-n` flag continues to respect the `-T` timer and avoid switching any resource groups onto the evacuated node.

`-u`

If you use the + operand, this option specifies that the command operates on resources whose resource group is suspended.

If you do not specify the `-u` option when you specify the + operand, the command ignores all suspended resource groups. The `-u` option is valid when the + operand is specified with the `add-node`, `manage`, `offline`, `online`, `quiesce`, `remaster`, `remove-node`, `restart`, `set`, `switch`, or `unamanage` subcommand.

When you use the + operand with the `add-node`, `manage`, `offline`, `online`, `quiesce`, `remaster`, `remove-node`, `restart`, `set`, `switch`, or `unamanage` subcommand, the command ignores all suspended resource groups unless you also specify the `-u` option.

`-v`
`--verbose`
Displays verbose information on the standard output (`stdout`).

`-V`
`--version`
Displays the version of the command.

If you specify this option with other options, with subcommands, or with operands, they are all ignored. Only the version of the command is displayed. No other processing occurs.

`-Z` {*zoneclustername* | `global` | `all`}
`--zoneclustername=`{*zoneclustername* | `global` | `all`}
`--zoneclustername` {*zoneclustername* | `global` | `all`}
Specifies the cluster or clusters in which the resource group exists and on which you want to operate.

This option is supported by all subcommands except the `export` subcommand.

If you specify this option, you must also specify one argument from the following list:

zoneclustername — Specifies that the command with which you use this option is to operate on all specified resource groups in only the zone cluster named *zoneclustername*.

`global` — Specifies that the command with which you use this option is to operate on all specified resource groups in the global cluster only.

`all` — If you use this argument in the global cluster, it specifies that the command with which you use it is to operate on all specified resource groups in all clusters, including the global cluster and all zone clusters.

If you use this argument in a zone cluster, it specifies that the command with which you use it is to operate on all specified resource groups in that zone cluster only.

Operands The following operands are supported:

resourcegroup — The name of the resource group that you want to manage.

`+` — All resource groups.

Exit Status The complete set of exit status codes for all commands in this command set are listed in the `Intro(1CL)` man page. Returned exit codes are also compatible with the return codes that are described in the `scha_calls(3HA)` man page.

If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

`6 CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the su(1M) and rbac(5) man pages for more information.

`35 CL_EIO`
I/O error

A physical input/output error has occurred.

`36 CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

`38 CL_EBUSY`
Object busy

You attempted to remove a cable from the last cluster interconnect path to an active cluster node. Or, you attempted to remove a node from a cluster configuration from which you have not removed references.

`39 CL_EEXIST`
Object exists

The device, device group, cluster interconnect component, node, cluster, resource, resource type, resource group, or private string that you specified already exists.

Examples

EXAMPLE 1 Creating a New Failover Resource Group

The first command in the following example creates the failover resource groups `rg1` and `rg2`. The second command adds the resources that are included in the configuration file `cluster-1.xml` to these resource groups.

```
# clresourcegroup create rg1 rg2
# clresource create -g rg1,rg2 -i /net/server/export/cluster-1.xml +
```

Either of the following two examples create failover resource groups `rg1` and `rg2` in a zone cluster `ZC` from the global-cluster node.

```
# clresourcegroup create -Z ZC rg1 rg2
# clresourcegroup create ZC:rg1 ZC:rg2
```

EXAMPLE 2 Bringing All Resource Groups Online

The following command brings all resource groups online, with all resources enabled and monitored.

```
# clresourcegroup online -eM +
```

EXAMPLE 3 Adding a Node to the Nodelist Property

The following command adds the node `phys-schost-4` to the `Nodelist` property for all resource groups.

```
# clresourcegroup set -p Nodelist+=phys-schost-4 +
```

EXAMPLE 4 Evacuating All Resource Groups From a Node

The following command evacuates all resource groups from the node `phys-schost-3`.

```
# clresourcegroup evacuate -n phys-schost-3 +
```

EXAMPLE 5 Bringing a Resource Group Offline on All Nodes

The following command brings the resource group `rg1` offline on all nodes.

```
# clresourcegroup offline rg1
```

EXAMPLE 6 Refreshing an Entire Resource Group Manager Configuration

The first command in the following example deletes all resources and resource groups, even if they are enabled and online. The second command unregisters all resource types. The third command creates the resources that are included in the configuration file `cluster-1.xml`. The third command also registers the resources' resource types and creates all resource groups upon which the resource types depend.

```
# clresourcegroup delete --force +
# clresourcetype unregister +
# clresource -i /net/server/export/cluster-1.xml -d +
```

EXAMPLE 7 Listing All Resource Groups

The following command lists all resource groups.

```
# clresourcegroup list
rg1
rg2
```

EXAMPLE 8 Listing All Resource Groups With Their Resources

The following command lists all resource groups with their resources. Note that `rg3` has no resources.

```
# clresourcegroup list -v
Resource Group Resource
-------------- --------
rg1            rs-2
rg1            rs-3
rg1            rs-4
rg1            rs-5
rg2            rs-1
rg3            -
```

EXAMPLE 9 Listing All Resource Groups That Include Particular Resources

The following command lists all groups that include Oracle Solaris Cluster HA for NFS resources.

```
# clresource list -t nfs
rg1
```

EXAMPLE 10 Clearing a Start_failed Resource State by Switching Over a Resource Group

The `Start_failed` resource state indicates that a `Start` or `Prenet_start` method failed or timed out on a resource, but its resource group came online anyway. The resource group comes online even though the resource has been placed in a faulted state and might not be providing service. This state can occur if the resource's `Failover_mode` property is set to `None` or to another value that prevents the failover of the resource group.

Unlike the `Stop_failed` resource state, the `Start_failed` resource state does *not* prevent you or the Oracle Solaris Cluster software from performing actions on the resource group. You do not need to issue the `reset` subcommand to clear a `Start_failed` resource state. You only need to execute a command that restarts the resource.

The following command clears a `Start_failed` resource state that has occurred on a resource in the `resource-grp-2` resource group. The command clears this condition by switching the resource group to the `schost-2` node.

```
# clresourcegroup switch -n schost-2 resource-grp-2
```

EXAMPLE 11 Clearing a Start_failed Resource State by Restarting a Resource Group

The following command clears a `Start_failed` resource state that has occurred on a resource in the `resource-grp-2` resource group. The command clears this condition by restarting the resource group on the `schost-1` node, which originally hosted the resource group.

```
# clresourcegroup restart resource-grp-2
```

EXAMPLE 12 Setting the `load_factors` Property

The following command sets load factors for two resource groups.

```
# clresourcegroup set -p load_factors=factor1@50,factor2@1 rg1 rg2
```

From a global cluster, the following command sets load factors for two resource groups within a zone cluster.

```
# clresourcegroup set -Z ZC load_factors=factor1@50,factor2@1 rg1 rg2
```

EXAMPLE 13 Setting the `priority` Property for a Resource Group

The following command sets a resource group's priority.

```
# clresourcegroup set -p priority=600 rg1
```

The rg1 resource group will get preference over lower-priority resource groups for node assignment. The rg1 can preempt other resource groups of lower priority on a node where a hard limit is exceeded. If rg1's priority exceeds another resource group's priority by at least 100, it can preempt that resource group on a node where a soft limit is exceeded. The default value of `priority` is *500*.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/system/core`
Interface Stability	Evolving

See Also

`clresource(1CL)`, `clresourcetype(1CL)`, `cluster(1CL)`, `Intro(1CL)`, `su(1M)`, `scha_calls(3HA)`, `attributes(5)`, `rbac(5)`, `rg_properties(5)`, `clconfiguration(5CL)`

Notes

The superuser can run all forms of this command.

All users can run this command with the `-?` (help) or `-V` (version) option.

To run the `clresourcegroup` command with other subcommands, users other than super user require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
add-node	solaris.cluster.modify
create	solaris.cluster.modify
delete	solaris.cluster.modify
evacuate	solaris.cluster.admin
export	solaris.cluster.read
list	solaris.cluster.read
manage	solaris.cluster.admin
offline	solaris.cluster.admin
online	solaris.cluster.admin
quiesce	solaris.cluster.admin
remaster	solaris.cluster.admin
remove-node	solaris.cluster.modify
restart	solaris.cluster.admin
resume	solaris.cluster.admin
set	solaris.cluster.modify
show	solaris.cluster.read
status	solaris.cluster.read
suspend	solaris.cluster.admin
switch	solaris.cluster.admin
unmanage	solaris.cluster.admin

Name clresourcetype, clrt – manage resource types for Oracle Solaris Cluster data services

Synopsis

```
/usr/cluster/bin/clresourcetype  [subcommand -?]

/usr/cluster/bin/clresourcetype subcommand -v [options] [resourcetype]...

/usr/cluster/bin/clresourcetype add-node
 -n node[,...] [-Z {zoneclustername | global}] {+ | resourcetype}

/usr/cluster/bin/clresourcetype export [-o {- | configfile}] [+ | resourcetype]

/usr/cluster/bin/clresourcetype list [ -n node[,...]] [-Z {zoneclustername[,...]
 | global | all}] [+ | resourcetype...]

/usr/cluster/bin/clresourcetype list-props [-p [name,...]]
 [-Z {zoneclustername[,...] | global | all}] [+ | resourcetype...]

/usr/cluster/bin/clresourcetype register [-i {- | clconfiguration}]
 [ { [-n node[,...]] | -N}]
 [-f rtrfile] [-p [name [+ | -]=value,]...]
 [-Z {zoneclustername | global}] {+ | resourcetype...}

/usr/cluster/bin/clresourcetype remove-node -n node[,...]
 [-Z {zoneclustername | global}] {+ | resourcetype...}

/usr/cluster/bin/clresourcetype set [-n node[,...] | -N]
 [-p [name [+| -]=value,...]
 [-Z {zoneclustername | global}]{+ | resourcetype...}

/usr/cluster/bin/clresourcetype show [ -n node[,...]]
 [-Z {zoneclustername[,...] | global | all}] [+ | resourcetype...]

/usr/cluster/bin/clresourcetype unregister [-Z {zoneclustername | global}] {+
 | resourcetype...}
```

Description The `clresourcetype` command manages resource types for Oracle Solaris Cluster data services. The `clrt` command is the short form of the `clresourcetype` command. The `clresourcetype` command and the `clrt` command are identical. You can use either form of the command.

For ease of administration, run this command from the global-cluster node.

You can use the `clresourcetype` command with all subcommands except `export` in a zone cluster.

You can also use the `-Z` option with all subcommands except `export` to specify the name of a particular zone cluster to which you want to restrict an operation. And, you can also attach the zone-cluster name to a resource-type name (*zoneclustername* : *resourcetype*) to restrict an operation to a particular zone cluster.

You can access all zone cluster information from a global-cluster node, but a particular zone cluster is not aware of other zone clusters. If you do not restrict an operation to a particular zone cluster, the subcommand you use operates in the current cluster only.

The general form of this command is as follows:

`clresourcetype [subcommand] [options] [operands]`

You can omit *subcommand* only if *options* specifies the `-?` option or the `-V` option.

Each option of this command has a long form and a short form. Both forms of each option are provided with the description of the option in the OPTIONS section of this man page.

Subcommands The following subcommands are supported:

`add-node`

Adds the specified nodes to the node list for the resource types specified as operands to the command.

You can use this subcommand in the global cluster or in a zone cluster.

While using the `add-node` command from the global-cluster node, you can use the `-Z` option to specify the name of the zone cluster.

This subcommand accepts the plus sign (+) as an operand to specify all resource types.

Users other than superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization to use this subcommand.

See also the description of the `remove-node` subcommand.

`export`

Exports the cluster resource-type configuration in the format that is described by the `clconfiguration`(5CL) man page.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

You can use this subcommand only in the global cluster.

`list`

Displays a list of the resource types that are specified as operands to the command. By default, all resource types that are registered in the cluster are displayed. This subcommand accepts the plus sign (+) as an operand to specify all resource types that are registered in the cluster.

You can use this subcommand in the global cluster or in a zone cluster.

In the global-cluster node, this subcommand displays only the resource types registered in the global-cluster node. To view the resource types registered in a zone cluster from the global cluster, you can use the `-Z` option to specify the zone cluster.

If you specify the `-n` *nodelist* option, only resource types that are registered for use on the nodes in *nodelist* are displayed.

If you specify the `-v` option, the node list of each resource type in the list is also displayed.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`list-props`
Displays the properties of the specified resource types. This subcommand accepts the plus sign (+) as an operand to specify all resource types that are registered in the cluster.

You can use this subcommand in the global cluster or in a zone cluster.

To view the resource-type properties registered in a zone cluster from the global cluster, you can use the `-Z` option to specify the zone cluster.

The `-p` option limits the set of properties that are to be displayed.

If you specify the `-v` option, the description of each property is also displayed.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`register`
Registers the resource types that are specified as operands to the command. A resource type must be registered before a resource of that type can be created.

You can use this subcommand in the global cluster or in a zone cluster.

To register resource types with a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

The data service that defines each resource type must be installed on each node where the resource type is to be available. If the data service is installed on only a subset of cluster nodes, use the `-n` *nodelist* option to specify the subset of nodes. If the resource type is to be available on all nodes in the cluster, specify the `-N` option. When you use the `-N` option, the resource type is also available to any nodes that might be added to the cluster in the future. Omitting both the `-N` option and the `-n` *nodelist* option is equivalent to specifying the `-N` option. To specify the property name explicitly, use the `-p Installed_nodes=`*nodelist* option.

Information about a resource type that is registered with the cluster is obtained from the resource type registration (RTR) file that defines the resource type. The location and name of the RTR file typically follow these conventions:

- The RTR file is typically located in the `/opt/cluster/lib/rgm/rtreg` directory.
- The name of the RTR file typically matches the name of the resource type.

The location and file name of all RTR files that are supplied by Oracle follow these conventions. For example, the RTR file that defines the `SUNW.nfs` resource type is contained in the file `/opt/cluster/lib/rgm/rtreg/SUNW.nfs`.

If an RTR file does not follow these conventions, you must specify the `-f` *rtrfile* option.

These conventions are also applicable for the resource types registered from a zone cluster. When a user registers a resource type for a zone cluster, the RTR file must reside inside the zone cluster *zonepath*. You cannot register a RTR file outside the zone cluster *zonepath* boundary. While registering a resource type with *Global_zone* property set to `TRUE` for a zone cluster, the RTR file must reside inside the global-cluster node in`/opt/cluster/lib/rgm/rtreg` or `/usr/cluster/lib/rgm/rtreg` directory. If you specify any location outside of these locations, the resource type fails to register.

Caution – Do not register a resource type for which the `Global_zone` property is set to `TRUE` unless the resource type comes from a known and trusted source. Resource types for which this property is set to `TRUE` circumvent zone isolation and present a risk.

This subcommand accepts the plus sign (+) as an operand to specify all resource types that are not already registered. The complete list of available resource types is determined as follows:

- If you specify the `-i` *clconfiguration* option, *clconfiguration* defines the complete list of available resource types.
- If you do not specify the `-i` option, the complete list of available resource types contains only resource types that are supplied by Sun Microsystems, Inc. These resource types must also be installed on all nodes in the node list.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

See also the description of the `unregister` subcommand.

`remove-node`

Removes a node from the list of nodes for which the resource types in the operand list are registered. This subcommand accepts the plus sign (+) as an operand to specify all resource types that are registered in the cluster.

You can use this subcommand in the global cluster or in a zone cluster.

To remove resource types with a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option

You can use this subcommand only on resource types that have already been registered for some nodes, but not all nodes, in a cluster. Consequently, an error occurs if you use this subcommand in the following situations:

- A resource type in the list of operands has already been registered for all nodes in a cluster. For information about the registration of resource types for all nodes in a cluster, see the description of the `-N` option.
- The `Installed_nodes` property of a resource type in the list of operands does not already specify a subset of the nodes in the cluster.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

See also the description of the `add-node` subcommand.

`set`

Sets properties of the resource types that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify all resource types that are registered in the cluster.

You can use this subcommand in the global cluster or in a zone cluster.

To set the properties of resource types in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

You can set only resource type properties that are designated as `Tunable Any Time` in the `rt_properties(5)` man page.

- You can modify the `Installed_Nodes` property by specifying the `-n` *nodelist* option without specifying the `-p` option. Or, you can specify the property name explicitly by using the `-p Installed_Nodes=`*nodelist* option.
- For all other properties that are designated as `Tunable Any Time`, you must specify the property name explicitly by using the `-p` *property* = *value* option.

To limit the list of nodes on which the resource type is to be available, specify the `-n` *nodelist* option. Conversely, to specify that the resource type is to be available on all nodes in the cluster, specify the `-N` option. When you use the `-N` option, the resource type is also available to any nodes that might be added to the cluster in the future. You must specify the `-n` option or the `-N` option. If you omit both options, the subcommand does not change any configuration information.

`show`

Displays information about resource types that are registered in the cluster. By default, the following information for all resource types that are registered is displayed:

- The list of properties that is associated with each resource type
- Parameters that define these properties

If you specify the `-n` *nodelist* option, only resource types that are registered for use on nodes in *nodelist* are displayed.

If you specify the `-v` option, the following information is also displayed for each resource type:

- The methods that are defined for the resource type
- The timeout parameters of each method

You can use this subcommand in the global cluster or in a zone cluster.

To view the resource types registered in a zone cluster from the global cluster, you can specify the zone-cluster name using the `-Z` option.

This subcommand accepts the plus sign (+) as an operand to specify all resource types that are registered in the cluster. If operands are not supplied, information about all resource types that are registered in the cluster is displayed.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`unregister`

Unregisters the resource types that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify all registered resource types for which no instances of the type exist.

You can use this subcommand in the global cluster or in a zone cluster.

To unregister resource types with a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Unregister a resource type before uninstalling the data service that defines the resource type.

If a resource of a certain resource type exists, you cannot unregister the resource type.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `register` subcommand.

Options The following options are supported:

`-?`
`--help`

Displays help information. When this option is used, no other processing is performed.

You can specify this option without a subcommand or with a subcommand.

If you specify this option without a subcommand, the list of subcommands for this command is displayed.

If you specify this option with a subcommand, the usage options for the subcommand are displayed.

`-f` *rtrfile*`-|`*rtrfiledir*
`--rtrfile=`*rtrfile*`-|`*rtrfiledir*
`--rtrfile` *rtrfile*`-|`*rtrfiledir*

Specifies the full path to an RTR file or a directory that contains RTR files for use in registering resource types. You can specify this option only with the `register` subcommand.

If you specify a file, you can register only one resource type.

You need to specify this option only if an RTR file that you are using does not follow these conventions:

- The RTR file is typically located in the `/opt/cluster/lib/rgm/rtreg` directory.
- The name of the RTR file typically matches the name of the resource type.

The location and file name of all RTR files that are supplied by Oracle follow these conventions. For example, the RTR file that defines the `SUNW.nfs` resource type is contained in the file `/opt/cluster/lib/rgm/rtreg/SUNW.nfs`.

If you use the `-i` option, you can specify a `resourcetypeRTRFile` element in the configuration information for any resource type that is specified in the configuration information. The `resourcetypeRTRFile` element specifies the RTR file that is to be used for registering the resource type. However, the `export` subcommand does not include the `resourcetypeRTRFile` element in generated configuration information. For more information about the `resourcetypeRTRFile` element, see the `clconfiguration`(5CL) man page.

`-i {- |` *clconfiguration*`-}`
`--input={- |` *clconfiguration*`-}`
`--input {- |` *clconfiguration*`-}`

Specifies configuration information that is to be used for registering resource types or for modifying the node lists of registered resource types. This information must conform to the format that is defined in the `clconfiguration`(5CL) man page. This information can be contained in a file or supplied through the standard input (`stdin`). To specify the standard input, specify - instead of a file name.

Only the resource types that are supplied as operands to the command are affected by this option. Options that are specified in the command override any options that are set in the `clconfiguration` file. If configuration parameters are missing in the `clconfiguration` file, you must specify these parameters at the command line.

`-N`
`--allnodes`

Specifies that the resource types in the list of operands are to be available on all nodes in the cluster. The `-N` option also makes these resource types available to any nodes that might be added to the cluster in the future. The option achieves this result by clearing the `Installed_nodes` property.

If you specify the `-N` option, you cannot specify the `-n` option in the same command.

You can specify the `-N` option only with the `register` subcommand or the `set` subcommand.

`-n` *node*`-[,…]`
`--node=`*node*`-[,...]`
`--node` *node*`-[,...]`

Specifies a node or a list of nodes in the target global cluster or zone cluster. You can specify each node as a node name or a node ID.

If the `-Z` option is specified, then you can specify only zone-cluster hostnames with the `-n` option and not the global-cluster hostnames. If `-Z` option is not specified, then you can specify only the global-cluster hostnames with the `-n` option.

If you specify the `-n` option, you cannot specify the `-N` option in the same command.

The subcommands with which you can specify this option are as follows:

`add-node`
Adds the specified nodes to the list of nodes for which resource types are registered.

`list`
Displays only resource types that are registered for use on the specified nodes.

`register`
Registers resource types only for use on the specified nodes. If you omit the `-n` option, the `register` subcommand registers resource types for use on all nodes. The subcommand also registers the resource types for any nodes that are added to the cluster in the future.

`remove-node`
Removes the specified nodes from the list of nodes for which resource types are registered.

`set`
Makes resource types available only on the specified nodes.

`show`
Displays information only about resource types that are registered for use on the specified nodes.

`-o {- |` *clconfiguration*`-}`
`--output={- |` *clconfiguration*`-}`
`--output {- |` *clconfiguration*`-}`
Specifies the location where configuration information about resource types is to be written. This location can be a file or the standard output (`stdout`). To specify the standard output, specify `-` instead of a file name. If you specify the standard output, all other standard output for the command is suppressed. You can specify this option only with the `export` subcommand.

Configuration information is written only for the resource types that are supplied as operands to the command. The information is written in the format that is defined in the `clconfiguration`(5CL) man page.

`-p` *name-=value*
`-p` *name+=array-values*
`-p` *name-=array-values*

`--property=`*name*`-=`*value*
`--property` *name*`-=`*value*
`--property=`*name*`+=`*array-values*
`--property` *name*`+=`*array-values*
`--property=`*name*`-=`*array-values*
`--property` *name*`-=`*array-values*

Sets the value of a property for resource types that are supplied as operands to the command.

The operators to use with this option are as follows:

`=` Sets the property to the specified value.

`+=` Adds a value or values to a string array value. You can specify this operator only for properties that accept lists of string values, for example `Installed_nodes`.

`-=` Removes a value or values from a string array value. You can specify this operator only for properties that accept lists of string values, for example `Installed_nodes`

Using the option `-p Installed_nodes+=nodeC,nodeD` with the `set` subcommand is identical to using the option `-n nodeC,nodeD` with the `add-node` subcommand.

`-p` *name*`-[,…]`
`--property=`*name*`-[,...]`
`--property` *name*`-[,...]`

Specifies a list of properties for the `list-props` subcommand.

`-V`
`--version`

Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The `-V` option displays only the version of the command. No other operations are performed.

`-v`
`--verbose`

Displays verbose messages to the standard output (`stdout`).

You can specify this option with any form of the command.

Do not specify the `-v` option with the `-o -` option. The `-v` option is ignored. The `-o -` option suppresses all other standard output.

`-Z` {*zoneclustername* | `global` | `all`}
`--zoneclustername=`{*zoneclustername* | `global` | `all`}
`--zoneclustername` {*zoneclustername* | `global` | `all`}

Specifies the cluster or clusters in which the resource type is registered and you want to operate.

This option is supported by all subcommands except the `export` subcommand.

If you specify this option, you must also specify one argument from the following list:

zoneclustername — Specifies that the command with which you use this option is to operate on all specified resource types in only the zone cluster named *zoneclustername*.

`global` — Specifies that the command with which you use this option is to operate on all specified resource types in the global cluster only.

`all` — If you use this argument in the global cluster, it specifies that the command with which you use it is to operate on all specified resource types in all clusters, including the global cluster and all zone clusters.

If you use this argument in a zone cluster, it specifies that the command with which you use it is to operate on all specified resource types in that zone cluster only.

Operands Only the following operand is supported:

resourcetype — Specifies the resource type that is to be managed or the resource types that are to be managed. If the subcommand accepts more than one resource type, you can use the plus sign (+) to specify all resource types.

For a description of the format of resource-type names, see "Legal RGM Names" in *Oracle Solaris Cluster Data Services Planning and Administration Guide*.

Exit Status If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

The following exit codes can be returned:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

6 `CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su(1M)` and `rbac(5)` man pages for more information.

18 `CL_EINTERNAL`
Internal error was encountered

An internal error indicates a software defect or other defect.

35 `CL_EIO`
I/O error

A physical input/output error has occurred.

36 `CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

37 `CL_EOP`
Operation not allowed

You tried to perform an operation on an unsupported configuration, or you performed an unsupported operation.

41 `CL_ETYPE`
Invalid type

The type that you specified with the `-t` or `-p` option does not exist.

These exit values are compatible with the return codes that are described in the `scha_calls(3HA)` man page.

Examples

EXAMPLE 1 Registering Resource Types

This example registers all resource types whose data services are installed on all nodes and that are not yet registered. The command runs in concise mode.

```
# clresourcetype register +
```

EXAMPLE 2 Registering Resource Types on Selected Nodes

This example registers all resource types whose data services are installed on node phys-schost-1 and node phys-schost-2 and that are not yet registered . The resources are to be made available only on these nodes. In this example, the command returns no error. The command runs in verbose mode.

```
# clresourcetype register -v -n phys-schost-1,phys-schost-2 +
```

The following command registers all resource types whose data services are installed on zone cluster nodes zc-host-1 and zc-host-2 of zone cluster ZC and that are not registered. The resources are available only on these zone cluster nodes.

```
#.clresourcetype register -n zc-host-1,zc-host-2 -Z ZC +
```

EXAMPLE 3 Registering a Single Resource Type

This example registers the SUNW.nfs:3.2 resource type. The data service for this resource type is installed on all cluster nodes.

```
# clresourcetype register nfs:3.2
```

EXAMPLE 4 Listing Resource Types

This example lists only the names of all registered resource types.

```
# clresourcetype list
SUNW.LogicalHostname
SUNW.SharedAddress
SUNW.nfs
SUNW.apache
```

EXAMPLE 5 Listing Resource Types With Their Node Lists

This example lists all registered resource types with their node lists.

```
# clresourcetype list -v

Resource Type         Node List
-------------         ---------
SUNW.LogicalHostname  <all>
SUNW.SharedAddress    <all>
SUNW.nfs                 phys-schost-1,phys-schost-2,phys-schost-3
SUNW.apache           phys-schost-1,phys-schost-2,phys-schost-3
```

When you execute the following command from the global-cluster node, the command lists all registered resource types in zone cluster ZC.

```
#.clresourcetype list -Z ZC
SUNW.nfs
SUNW.apache
```

EXAMPLE 6 Listing Resource Types on Specified Nodes

This example lists all resource types that are registered on `phys-schost-4`.

```
# clrt list -n phys-schost-4
SUNW.LogicalHostname
SUNW.SharedAddress
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

Intro(1CL), clreslogicalhostname(1CL), clresource(1CL), clresourcegroup(1CL), clressharedaddress(1CL), cluster(1CL), scha_calls(3HA), clconfiguration(5CL), r_properties(5), attributes(5), rbac(5)

"Resource Group Properties" in *Oracle Solaris Cluster Data Services Planning and Administration Guide*

Notes

The superuser user can run all forms of this command.

Any user can run this command with the following options:

- `-?` option
- `-V` option

To run this command with subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
add-node	solaris.cluster.modify
export	solaris.cluster.read
list	solaris.cluster.read
list-props	solaris.cluster.read
set	solaris.cluster.modify
register	solaris.cluster.modify
remove-node	solaris.cluster.modify
show	solaris.cluster.read
unregister	solaris.cluster.admin

Name clressharedaddress, clrssa – manage Oracle Solaris Cluster resources for shared addresses

Synopsis `/usr/cluster/bin/clressharedaddress` [*subcommand*] `-?`

`/usr/cluster/bin/clressharedaddress -V`

`/usr/cluster/bin/clressharedaddress` [*subcommand* [*options*]] `-v` [*saresource*]...

`/usr/cluster/bin/clressharedaddress create -g` *resourcegroup* [`-h` *lhost*[,...]] [`-N` *netif@node*[,...]] [`-X` *node*[,...]] [`-p` *name*=*value*] [`-Z` {*zoneclustername* | `global`}] [`-d`] *saresource*

`/usr/cluster/bin/clressharedaddress create -i` {- | *clconfiguration*} [`-a`] [`-g` *resourcegroup*[,...]] [`-X` *node*[,...]] [`-p` *name*=*value*] [`-d`] {+ | *saresource*...}

`/usr/cluster/bin/clressharedaddress delete` [`-g` *resourcegroup*[,...]] [`-Z` {*zoneclustername* | `global`}] [`-F`] {+ | *saresource*...}

`/usr/cluster/bin/clressharedaddress disable` [`-g` *resourcegroup*[,...]] [`-R`] [`-n` *node*[,...]] [`-Z` {*zoneclustername* | `global`}] {+ | *saresource*...}

`/usr/cluster/bin/clressharedaddress enable` [`-g` *resourcegroup*[,...]] [`-R`] [`-n` *node*[,...]] [`-Z` {*zoneclustername* | `global`}]{+ | *saresource*...}

`/usr/cluster/bin/clressharedaddress export` [`-o` {- | *configfile*}] [+ | *saresource*...]

`/usr/cluster/bin/clressharedaddress list` [`-s` *state*[,...]] [`-g` *resourcegroup*[,...]] [`-Z` {*zoneclustername* [,...] | `global` | `all`}] [+ | *saresource*...]

`/usr/cluster/bin/clressharedaddress list-props` [`-l` *listtype*] [`-p` *name*[,...]] [`-Z` {*zoneclustername* [,...] | `global` | `all`}] [+ | *lhresource*...]

`/usr/cluster/bin/clressharedaddress monitor` [`-g` *resourcegroup*[,...]] [`-Z` {*zoneclustername* | `global`}] {+ | *saresource*...}

`/usr/cluster/bin/clressharedaddress reset` [`-f` *errorflag*] [`-g` *resourcegroup*[,...]] [`-Z` {*zoneclustername* | `global`}] {+ | *saresource*...}

`/usr/cluster/bin/clressharedaddress set` [`-i` {- | *clconfiguration*}] [`-g` *resourcegroup*[,...]] [`-X` *node*[,...]] [`-p` *name*[+|-]=*value*] [`-Z` {*zoneclustername* | `global`}] {+ | *saresource*...}

`/usr/cluster/bin/clressharedaddress show` [`-g` *resourcegroup*[,...]] [`-p` *name*[,...]] [`-Z` {*zoneclustername* [,...] | `global` | `all`}] [+ | *saresource*...]

`/usr/cluster/bin/clressharedaddress status` [`-s` *state*[,...]] [`-n` *node*[,...]] [`-g` *resourcegroup*[,...]] [`-Z` {*zoneclustername* [,...] | `global` | `all`}] [+ | *saresource*...]

```
/usr/cluster/bin/clressharedaddress unmonitor  [-g resourcegroup[,...]]
 [-Z {zoneclustername | global}] {+ | saresource...}
```

Description The `clressharedaddress` command manages resources for Oracle Solaris Cluster shared addresses. The `clrssa` command is the short form of the `clressharedaddress` command. The `clressharedaddress` command and the `clrssa` command are identical. You can use either form of the command.

You can also use the `clresource(1CL)` command to manage resources for a shared address.

Some subcommands of the `clressharedaddress` command modify the resource configuration. You can use these subcommands from the global cluster or a zone cluster. The following subcommands modify resource configuration:

- `disable`
- `enable`
- `monitor`
- `reset`
- `set`
- `unmonitor`

Some subcommands of the `clressharedaddress` command only obtain information about resources.

- `export`
- `list`
- `list-props`
- `show`
- `status`

To avoid unpredictable results from this command, run all forms of the command from the global-cluster node.

The general form of this command is:

`clressharedaddress` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the option `-?` or `-V`.

Each option of this command has a long form and a short form. Both forms of each option are given with the description of the option in the OPTIONS section of this man page.

Operation with Zone Clusters

In a zone cluster, you can use the `clressharedaddress` command with all subcommands except `export`.

You can also use the `-Z` option with all subcommands except `export` to specify the name of a particular zone cluster to which you want to restrict an operation. And, you can also attach the zone-cluster name to a shared-address resource (*zoneclustername* : *saresource*) to restrict an operation to a particular zone cluster.

You can access all zone cluster information from a global-cluster node, but a particular zone cluster is not aware of other zone clusters. If you do not restrict an operation to a particular zone cluster, the subcommand you use operates in the current cluster only.

Subcommands The following subcommands are supported:

`create`

Creates the shared-address resources that are specified as operands to the command.

When you use `create` with the `-i` option to specify a configuration file, the subcommand accepts the plus sign (+) as an operand. When you use the + operand, all resources in the configuration file that do not exist are created.

Before you use the `create` subcommand, ensure that the `/etc/netmasks` file has IP-address subnet and netmask entries for all logical hostnames. If necessary, edit the `/etc/netmasks` file to add any missing entries.

By default, resources are created in the enabled state with monitoring enabled. However, a resource comes online and is monitored only after the resource's resource group is brought online. To create resources in the disabled state, specify the `-d` option.

You can use this subcommand in the global cluster or in a zone cluster.

To create a shared-address resource in a zone cluster from the global cluster, use the `- Z` option to specify the name of the zone cluster.

Users other than superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization to use this subcommand.

See also the description of the `delete` subcommand.

`delete`

Deletes the shared-address resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that all resources are deleted.

You can use this subcommand in the global cluster or in a zone cluster.

To delete a shared-address resource in a zone cluster from the global cluster, use the `-Z` option to specify the name of the zone cluster.

The `-g` option filters the list of operands to limit the resources that are deleted. The `-g` option deletes only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

- By default, a resource is deleted *only* if the following conditions are met:
- The resource must be disabled.
- All dependencies on the resource must be eliminated.
- To ensure that all specified resources are deleted, specify the `-F` option. The effects of the `-F` option are as follows:

- All specified resources are deleted, even resources that are not disabled.
- All specified resources are removed from resource-dependency settings of other resources.

Resources are deleted in the order that is required to satisfy dependencies between the resources, regardless of the order in which resources are specified on the command line.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

See also the description of the `create` subcommand.

`disable`

Disables the shared-address resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that all resources are disabled.

The `-g` option filters the list of operands to limit the resources that are disabled. The `-g` option disables only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

To ensure that all required resource dependencies are satisfied, specify the `-R` option. The `-R` option disables any resources that depend on the resources that are specified as operands to the command, even if the resources are not specified as operands to the command. The `-g` option and the `-t` option do not apply to resources that are to be disabled solely to satisfy resource dependencies.

Resources are disabled in the order that is required to satisfy dependencies between the resources, regardless of the order in which resources are specified on the command line.

You can use this subcommand in the global cluster or in a zone cluster.

To disable the shared-address resources that are registered in a zone cluster from the global cluster, specify the zone-cluster name using the `- Z` option.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `enable` subcommand.

`enable`

Enables the shared-address resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that all resources are enabled.

The `-g` option filters the list of operands to limit the resources that are enabled. The `-g` option enables only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

To ensure that all required resource dependencies are satisfied, specify the `-R` option. The `-R` option enables any resources that depend on the resources that are specified as operands to the command, even if the resources are not specified as operands to the command. The `-g` option does not apply to resources that are to be enabled solely to satisfy resource dependencies.

Resources are enabled in the order that is required to satisfy dependencies between the resources, regardless of the order in which resources are specified on the command line.

You can use this subcommand in the global cluster or in a zone cluster.

To enable the shared-address resources that are registered in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `disable` subcommand.

`export`

Exports the shared-address resource configuration in the format that is described by the `clconfiguration`(5CL) man page.

You can use this subcommand only in the global cluster.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`list`

Displays a list of the shared-address resources that are specified as operands to the command. By default, all resources are displayed.

The `-g` option filters the list of operands to limit the resources that are displayed. The `-g` option displays only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

This subcommand accepts the plus sign (+) as an operand to specify all resources in the specified resource groups or that are instances of the specified resource types. If no operands are supplied, all resources in the specified resource groups or that are instances of the specified resource types are displayed.

If you specify the `-v` option, the resource group and resource type of each resource in the list is also displayed.

You can use this subcommand in the global cluster or in a zone cluster.

To view the shared-address resources that are registered in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`list-props`

Displays a list of the properties of the shared-address resources that are specified as operands to the command. By default, the extension properties of all resources are displayed.

The following options filter the list of operands to limit the resources whose properties are displayed:

`-g` *resourcegrouplist*	Displays the properties only of the shared-address resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

The `-l` option specifies the type of resource properties that are to be displayed:

`-l all`	Specifies that standard properties and extension properties are displayed.
`-l extension`	Specifies that only extension properties are displayed. By default, only extension properties are displayed.
`-l standard`	Specifies that only standard properties are displayed.

If you do not specify the `-l`option, only extension properties are displayed, unless you specify a standard property explicitly by using the `-p` option or the `-y` option.

The `-p` option limits the set of resource properties that is to be displayed. The `-p` option displays only the properties that are specified in *namelist*. You can specify standard properties and extension properties in *namelist*.

If you specify the `-v` option, the description of each property is also displayed.

This subcommand accepts the plus sign (+) as an operand to specify all resources in the specified resource groups or that are instances of the specified resource types. If no operands are supplied, properties of all resources in the specified resource groups or that are instances of the specified resource types are displayed.

You can use this subcommand in the global cluster or in a zone cluster.

To view the list of properties of the shared-address resources of a zone cluster from the global cluster, specify the zone-cluster name using the `- Z` option.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`monitor`

Turns on monitoring for the shared-address resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that monitoring is turned on for all resources.

The `-g` option filters the list of operands to limit the resources that are monitored. The `-g` option monitors only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

If monitoring is turned on for a resource, the resource is monitored only if the following conditions are met:

- The resource is enabled.
- The resource group that contains the resource is online on at minimum one cluster node.

Note – When you turn on monitoring for a resource, you do *not* enable the resource.

You can use this subcommand in the global cluster or in a zone cluster.

To monitor the resources in a zone cluster from the global cluster, specify the zone-cluster name using the `- Z` option.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `unmonitor` subcommand.

`reset`

Clears an error flag that is associated with the shared-address resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that the error flag is cleared for all resources.

The `-g` option filters the list of operands to limit the resources that are reset. The `-g` option resets only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

By default, the `reset` subcommand clears the `STOP_FAILED` error flag. To specify explicitly the error flag that is to be cleared, use the `-f` option. The only error flag that the `-f` option accepts is the `STOP_FAILED` error flag.

You can use this subcommand in the global cluster or in a zone cluster.

To reset the shared-address resources in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

`set`

Modifies specified properties of the shared-address resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that the specified properties of all resources are modified.

The `-g` option filters the list of operands to limit the resources that are modified. The `-g` option modifies only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

You can use this subcommand in the global cluster or in a zone cluster.

To set the properties of shared-address resources in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand.

`show`

Displays the configuration of the shared-address resources that are specified as operands to the command. By default, the configuration of all resources is displayed.

The `-g` option filters the list of operands to limit the resources for which the configuration is displayed. The `-g` option displays the configuration of only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

The `-p` option limits the set of resource properties that is to be displayed. The `-p` option displays only the properties that are specified in *namelist*. You can specify standard properties and extension properties in *namelist*.

This subcommand accepts the plus sign (+) as an operand to specify all resources in the specified resource groups or that are instances of the specified resource types. If no operands are supplied, the configuration of all resources in the specified resource groups or that are instances of the specified resource types are displayed.

You can use this subcommand in the global cluster or in a zone cluster.

To view the configuration of the shared-address resources in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`status`

Displays the status of the shared-address resources that are specified as operands to the command. By default, the status of all resources is displayed.

The following options filter the list of operands to limit the list of resources for which the status is displayed:

`-g` *resourcegrouplist*	Displays the status of only the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.
`-n` *nodelist*	Displays the status of only the resources in the list of operands that are hosted on the nodes in *nodelist*.
`-s` *statelist*	Displays the status of only the resources in the list of operands that are in the states in *statelist*.

This subcommand accepts the plus sign (+) as an operand to specify all resources in the specified resource groups or that are instances of the specified resource types. If no operands are supplied, the status of all resources in the specified resource groups or that are instances of the specified resource types are displayed.

You can use this subcommand in the global cluster or in a zone cluster.

To view the status of the shared-address resources in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand.

`unmonitor`

Turns off monitoring for the shared-address resources that are specified as operands to the command. This subcommand accepts the plus sign (+) as an operand to specify that monitoring is turned off for all resources.

If you turn off monitoring for a resource that is disabled, the resource is not affected. The resource and its monitor are already offline.

Note – When you turn off monitoring for a resource, you do *not* disable the resource. However, when you disable a resource, you do not need to turn off monitoring for the resource. The disabled resource and its monitor are kept offline.

The `-g` option filters the list of operands to limit the resources for which monitoring is turned off. The `-g` option turns off monitoring for the resources in the list of operands that are members of the resource groups in *resourcegrouplist*.

You can use this subcommand in the global cluster or in a zone cluster.

To turn off monitoring for a shared-address resource in a zone cluster from the global cluster, specify the zone-cluster name using the `-Z` option.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand.

See also the description of the `disable` subcommand and the `monitor` subcommand.

Options The following options are supported:

`-?`
`--help`

Displays help information. When this option is used, no other processing is performed.

You can specify this option without a subcommand or with a subcommand.

If you specify this option without a subcommand, the list of subcommands for this command is displayed.

If you specify this option with a subcommand, the usage options for the subcommand are displayed.

The effect of this option with specific subcommands is as follows:

`create`	When specified with the `-g` option, this option displays help information for all resource properties of the specified resource group.
`set`	Displays help information for properties of the resources that are specified as operands to the command.

`-a`
`--automatic`

Automatically performs the following additional operations when resources are being created from cluster configuration information:

- Registering resource types
- Creating resource groups
- Creating resources on which the resources that are specified in the list of operands depend

The cluster configuration information must contain sufficient information to do all of the following:

- Enable the resource types to be registered
- Enable the resource groups to be created
- Enable the resources to be create

You can specify this option only with the `create` subcommand. If you specify this option, you must also specify the `-i` option and provide a configuration file.

`-d`
`--disable`

Disables a resource when the resource is created. You can specify this option only with the `create` subcommand. By default, resources are created in the enabled state.

Enabling a resource does not guarantee that the resource is brought online. A resource comes online only after the resource's resource group is brought online on at minimum one node.

`-f` *errorflag*

`--flag` *errorflag*

Specifies explicitly the error flag that is to be cleared by the `reset` subcommand. You can specify this option only with the `reset` subcommand. By default, the `reset` subcommand clears the `STOP_FAILED` error flag.

The only error flag that the `-f` option accepts is the `STOP_FAILED` error flag.

`-F`

`--force`

Forces the deletion of resources that are not disabled. You can specify this option only with the `delete` subcommand.

`-g` *resourcegroup*[,…]

`--resourcegroup` *resourcegroup*`-[,…]`

Specifies a resource group or a list of resource groups.

For subcommands except `create`, the command acts on only the resources in the list of operands that are members of the resource groups that the `-g` option specifies.

The effect of this option with specific subcommands is as follows:

`create`	Specifies that the resource is created in the specified resource group. When you use `-g` with the `create` subcommand, you can specify only one resource group.

`-h` *lhost*[,…]

`--logicalhost` *lhost*`-[,…]`

Specifies the host name list. You must use the `-h` option either when more than one logical host needs to be associated with the new `SharedAddress` resource or when the logical host does not have the same name as the resource itself. All logical hosts in a `HostnameList` for a `SharedAddress` resource must be on the same subnet. If you do not specify the `HostnameList` property, the `HostnameList` will be the same as the `SharedAddress` resource.

The logical host names for a `SharedAddress` resource must be on the same subnet.

You can use `-h` option instead of setting the `HostnameList` property with `-p`; however, you cannot use `-h` and explicitly set `HostnameList` in the same command.

You can only use `-h` option with the `create` subcommand.

`-i` {- | *clconfiguration*}

`--input {- |` *clconfiguration*`-}`

Specifies configuration information that is to be used for creating or modifying shared-address resources. This information must conform to the format that is defined in the clconfiguration(5CL) man page. This information can be contained in a file or supplied through standard input. To specify standard input, specify `-` instead of a file name.

Only the resources that are supplied as operands to the command are created or modified. Options that are specified in the command override any options that are set in the configuration information. If configuration parameters are missing in the configuration information, you must specify these parameters on the command line.

The effect of this option with specific subcommands is as follows:

`create` When specified with the `-a` option, this option registers all required resource types and creates all required resource groups. You must supply all information that is required for the registration and configuration. All other configuration data is ignored.

`-l` *listtype*
`--listtype` *listtype*

Specifies the type of resource properties that are to be displayed by the `list-props` subcommand. You can specify this option only with the `list-props` subcommand.

You must specify one value from the following list for *listtype*:

`all` Specifies that standard properties and extension properties are displayed.

`extension` Specifies that only extension properties are displayed. By default, only extension properties are displayed.

`standard` Specifies that only standard properties are displayed.

If you do not specify the `-l` option, only extension properties are displayed, unless you specify a standard property explicitly by using the `-p` option.

`-n` *node*[,…]
`--node` *node*[,…]

Specifies a node or a list of nodes in the target global cluster or zone cluster. You can specify each node as node name or a node ID.

If the `-Z` option is specified, then you can specify only zone-cluster hostnames with the `-n` option and not the global-cluster hostnames. If the `-Z` option is not specified, then you can specify only the global-cluster hostnames with the `-n` option.

The subcommands with which you can specify this option are as follows:

`disable` Disables only the resources in the list of operands that are hosted on the specified nodes.

`enable`	Enables only the resources in the list of operands that are hosted on the specified nodes.
`status`	Reports the status only of resources in the list of operands that are hosted on the specified nodes.

`-N` *netif@node*[,…]
`--netiflist` *netif-@node*`-[,…]`
Specifies a resource property. The `-N`option enables you to set the `NetIfList` property without using the `-p` option for the property. If you do not specify `-N`, the `clressharedaddress` command attempts to set the `NetIfList` property for you based on available IPMP groups or public adapters, and the subnet associated with the `HostnameList` property.

You can specify the `NetIfList` property in the form of *ipmpgroup@node*[,…]. However, `-N` accepts both *ipmpgroup@node*[,…] and *publicNIC@node*[,…]. If you do not use `-N`, or if you use it with *publicNIC@node*, the `clressharedaddress` command attempts to create the necessary IPMP groups. The system creates a set of one or more single-adapter IPMP groups with a set of default later modified to include multiple adapters using standard Oracle Solaris interfaces.

You can use `-N` instead of directly setting the `NetIfList` property with `-p`; however, you cannot use `-N` and explicitly set `NetIfList` in the same command.

You can only use `-N` with the `create` subcommand.

`-o` {- | *clconfiguration*}
`--output {- |` *clconfiguration*`-}`
Specifies the location where resource configuration information is to be written. This location can be a file or standard output. To specify standard output, specify `-` instead of a file name. If you specify standard output, all other standard output for the command is suppressed. You can specify this option only with the `export` subcommand.

Configuration information is written only for the resources that are supplied as operands to the command. The information is written in the format that is defined in the `clconfiguration(5CL)` man page.

`-p` *name=value*
`-p` *name-+=array-values*
`-p` *name-=array-values*
`--property` *name-=value*
`--property` *name+=array-values*
`--property` *name--=array-values*
Sets the standard properties and extension properties of a resource. You can specify this option only with the `create` subcommand and the `set` subcommand.

For a description of standard properties, see the `r_properties(5)` man page.

For a description of a resource type's extension properties, see the documentation for the resource type.

The operators to use with this option are as follows:

`=`	Sets the property to the specified value. The `create` subcommand and the `set` subcommand accept this operator.
`+=`	Adds a value or values to a string array value. Only the `set` subcommand accepts this operator. You can specify this operator only for string array values.
`-=`	Removes a value or values from a string array value. Only the `set` subcommand accepts this operator. You can specify this operator only for string array values.

If a per-node property is to be set only on a subset of cluster nodes, specify the nodes where the property is set by appending the list of nodes in braces to the property name as follows:

name{*nodelist*}

nodelist is a comma-separated list of node names or node IDs. For more information about per-node properties, see the `rt_properties(5)` man page.

`-p` *name*[,…]
`--property` *name*`-[,…]`
Specifies a list of properties for the `list-props` subcommand and `show` subcommand.

You can use this option for standard properties and extension properties of a resource.

For a description of standard properties, see the `r_properties(5)` man page.

For a description of a resource type's extension properties, see the documentation for the resource type.

Without this option, the `list-props` subcommand and `show` subcommand list all or most resource properties, depending on whether the `-v` option is also specified.

`-R`
`--recursive`
Recursively enables or disables resources to ensure that all required dependencies are satisfied. You can specify this option only with the `disable` subcommand and the `enable` subcommand.

The effect of this option with these subcommands is as follows:

`disable`	Disables any resources that depend on the resources that are specified as operands to the command, even if the resources are not specified as operands to the command.
`enable`	Enables any resources on which resources that are specified as operands to the command depend, even if the resources are not specified as operands to the command.

`-s` *state*[,…]

`--state` *state*`-[,…]`

Specifies a list of states for the `list` subcommand and `status` subcommand.

This option limits the output to include only those resources that are in one of the specified states on one or more nodes in the node list.

The possible states are as follows:

- `degraded`
- `detached`
- `faulted`
- `monitor_failed`
- `not_online` - specifies any state other than `online` or `online_not_monitored`
- `offline`
- `online`
- `online_not_monitored`
- `start_failed`
- `stop_failed`
- `unknown`
- `unmonitored`
- `wait`

`-V`

`--version`

Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The `-V` option only displays the version of the command. No other operations are performed.

`-v`

`--verbose`

Displays verbose messages to standard output.

You can specify this option with any form of the command.

Do not specify the `-v` option with the `-o -` option. The`-v` option is ignored. The `-o -` option suppresses all other standard output.

`-X` *node*[,…]

`--auxnode` *node*[,...]

Sets the `AuxNodeList` `SharedAddress` resource property.

The nodes in the `AuxNodeList` list can host the set of logical hosts that is associated with the shared-address resource. However, these nodes cannot serve as the primary node during a failover.

`-Z` {*zoneclustername* | `global` | `all`}
`--zoneclustername=`{*zoneclustername* | `global` | `all`}
`--zoneclustername` {*zoneclustername* | `global` | `all`}

Specifies the cluster or clusters in which the resource exists and on which you want to operate.

This option is supported by all subcommands except the `export` subcommand.

If you specify this option, you must also specify one argument from the following list:

zoneclustername
Specifies that the command with which you use this option is to operate on all specified resources in only the zone cluster named *zoneclustername*.

`global`
Specifies that the command with which you use this option is to operate on all specified resources in the global cluster only.

`all`
If you use this argument in the global cluster, it specifies that the command with which you use it is to operate on all specified resources in all clusters, including the global cluster and all zone clusters.

If you use this argument in a zone cluster, it specifies that the command with which you use it is to operate on all specified resources in that zone cluster only.

Operands

The following operands are supported:

resource
Specifies that the Oracle Solaris Cluster resource names should be accepted as operands. If the subcommand accepts more than one resource, you can use the plus sign (+) to specify all shared-address resources.

Exit Status

If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

6 `CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su(1M)` and `rbac(5)` man pages for more information.

9 `CL_ESTATE`
Object is in wrong state

You tried to modify a property, a resource group, or other object that you cannot modify at that particular time or at any time.

10 `CL_EMETHOD`
Resource method failed

A method of a resource failed. The method failed for one of the following reasons:

- The `validate` method failed when you tried to create a resource or modify the properties of a resource.
- A method other than `validate` failed when you tried to enable, disable, or delete a resource.

15 `CL_EPROP`
Invalid property

The property or value that you specified with the `-p`, `-y`, or `-x` option does not exist or is not allowed.

35 `CL_EIO`
I/O error

A physical input/output error has occurred.

36 `CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

39 `CL_EEXIST`
Object exists

The device, device group, cluster interconnect component, node, cluster, resource, resource type, resource group, or private string that you specified already exists.

These exit values are compatible with the return codes that are described in the scha_calls(3HA) man page.

Examples

EXAMPLE 1 Creating a Shared-Address Resource

This command creates a resource that is named `sharedhost1` in a resource group that is named `rg-failover`. The resource is created in the enabled state, with monitoring enabled.

```
# clressharedaddress create -g rg-failover sharedhost1
```

Both of the following two commands create a resource that is named `sharedhost1` in the zone cluster `ZC`. These commands can be executed in the global-cluster node or inside the zone cluster `ZC`.

```
# clressharedaddress create -g rg-failover -Z ZC sharedhost1
```

```
# clressharedaddress create -g rg-failover ZC:sharedhost1
```

EXAMPLE 2 Creating a Shared-Address Resource With a Different Logical Host Name

This command creates a resource named `rs-sharedhost1` in a resource group that is named `rg-failover`.

The logical host name is not the same as the resource name, but the name and IP address of the logical host remain the same.

```
# clressharedaddress create -g rg-failover \\
-h sharedhost1 rs-sharedhost1
```

EXAMPLE 3 Specifying the IPMP Groups for a Shared-Address Resource

This command sets the IPMP groups for the `sharedhost1` resource.

```
# clressharedaddress create -g rg-failover \\
-N ipmp0@black,ipmp0@white sharedhost1
```

EXAMPLE 4 Deleting a Shared-Address Resource

This command deletes a resource that is named `sharedhost1`.

```
# clressharedaddress delete sharedhost1
```

EXAMPLE 5 Listing Shared-Address Resources

This command lists all shared-address resources.

```
# clressharedaddress list
sharedhost1
sharedhost2
```

EXAMPLE 6 Listing Shared-Address Resources With Resource Groups and Resource Types

This command lists all shared-address resources with their resource groups and resource types.

EXAMPLE 6 Listing Shared-Address Resources With Resource Groups and Resource Types *(Continued)*

```
# clressharedaddress list -v
Resources   Resource Groups Resource Types
---------   --------------- --------------
sharedhost1 rg-failover-1   SUNW.SharedAddress
sharedhost2 rg-failover-2   SUNW.SharedAddress
```

EXAMPLE 7 Listing Extension Properties of Shared-Address Resources

This command lists the extension properties of all shared-address resources.

```
# clressharedaddress list-props -v
Properties       Descriptions
----------       ------------
NetIfList        List of IPMP groups on each node
AuxNodeList      List of nodes on which this resource is available
HostnameList     List of hostnames this resource manages
CheckNameService Name service check flag
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

Intro(1CL), cluster(1CL), clresource(1CL), clreslogicalhostname(1CL), clresourcegroup(1CL), clresourcetype(1CL), scha_calls(3HA), clconfiguration(5CL), rbac(5), r_properties(5)

Notes

The superuser user can run all forms of this command.

Any user can run this command with the following options:

- -? option
- -V option

To run this command with subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
create	solaris.cluster.modify
delete	solaris.cluster.modify
disable	solaris.cluster.admin

Subcommand	RBAC Authorization
enable	solaris.cluster.admin
export	solaris.cluster.read
list	solaris.cluster.read
list-props	solaris.cluster.read
monitor	solaris.cluster.admin
reset	solaris.cluster.admin
set	solaris.cluster.modify
show	solaris.cluster.read
status	solaris.cluster.read
unmonitor	solaris.cluster.admin

Name clsetup – configure Oracle Solaris Cluster interactively

Synopsis

```
/usr/cluster/bin/clsetup  -V
/usr/cluster/bin/clsetup  -?
/usr/cluster/bin/clsetup  [-f logfile]
```

Description The `clsetup` command provides the following configuration capabilities, depending on what state the cluster is in when you issue the command. The user must be superuser to run this command.

This command has no short form.

- When you run the `clsetup` command at post-installation time, the command performs initial setup tasks, such as configuring quorum devices and resetting the `installmode` property. If you deselected automatic Quorum Configuration when you created the cluster using either `scinstall` or the `cluster create` command, then you must run the `clsetup` command immediately after the cluster has been installed. Ensure that all nodes have joined the cluster before you run the `clsetup` command and reset the `installmode` property.

  If you used automatic quorum configuration when you created the cluster, you do not need to run the `clsetup` command after cluster installation. The automatic quorum configuration feature also resets the `installmode` property of the cluster.

  You can issue this form of the `clsetup` command from any node in the cluster.
- When you run the `clsetup` command during normal cluster operation, the `clsetup` command provides an interactive, menu-driven utility to perform cluster configuration tasks. The following are some of the cluster components which this utility administers:
  - Quorum
  - Resource groups
  - Data services
  - Cluster interconnect
  - Device groups and volumes
  - Private hostnames
  - New nodes
  - Zone clusters
  - Other cluster properties

  You can issue this form of the `clsetup` command from any node in the cluster.
- When you run the `clsetup` command from a node that is in noncluster mode, the `clsetup` command provides a menu-driven utility for changing and displaying the private IP address range.

  You must reboot all nodes into noncluster mode before you start this form of the `clsetup` utility.

Options The following options are supported:

`-?`
`--help`
Prints help information for the command.

`-f` *logfile*
`--file` *logfile*
Specifies the name of a log file to which commands can be logged. If this option is specified, most command sets generated by `clsetup` can be run and logged, or just logged, depending on user responses.

`-V`
`--version`
Prints the version of the command set. No command line processing will be performed and the command will not enter into its interactive menu.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also `Intro(1CL)`, `cldevicegroup(1CL)`, `clnode(1CL)`, `clquorum(1CL)`, `clreslogicalhostname(1CL)`, `clresourcegroup(1CL)`, `clresourcetype(1CL)`, `clressharedaddress(1CL)`, `cluster(1CL)`, `cltelemetryattribute(1CL)`, `clzonecluster(1CL)`

Oracle Solaris Cluster Software Installation Guide, *Oracle Solaris Cluster System Administration Guide*

Name clsnmphost – administer list of Oracle Solaris Cluster SNMP hosts

Synopsis

`/usr/cluster/bin/clsnmphost -V`

`/usr/cluster/bin/clsnmphost` [*subcommand*] `-?`

`/usr/cluster/bin/clsnmphost` [*subcommand* [*options*]] `-v` [*host*]

`/usr/cluster/bin/clsnmphost add` [`-c` *community*[,...]] [`-n` *node*,...] *host* [...]

`/usr/cluster/bin/clsnmphost add -i` {- | *clconfigfile*} [`-c` *community*[,...]] [`-n` *node*[,...]] *host* [...]

`/usr/cluster/bin/clsnmphost export` [`-o` {- | *clconfigfile*}] [`-c` *community*[,...]] [`-n` *node*[,...]] [+ | *host*...]

`/usr/cluster/bin/clsnmphost list` [`-c` *community*[,...]] [`-n` *node*[,...]] [+ | *host*...]

`/usr/cluster/bin/clsnmphost remove` [`-c` *community*[,...]] [`-n` *node*[,...]] {+ | *host*...}

`/usr/cluster/bin/clsnmphost show` [`-c` *community*[,...]] [`-n` *node*[,...]] [+ | *host*...]

Description The `clsnmphost` command administers Simple Network Management Protocol (SNMP) hosts and community names that will receive notifications of SNMP events. The SNMP hosts use the cluster Management Information Bases (MIBs) to provide access control mechanisms. When a MIB sends SNMP trap notifications, the SNMP hosts that were configured with this command can identify the hosts to which to send trap notifications. For more information about the cluster MIBs, see the `clsnmpmib`(1CL) man page.

This command has no short form.

The general form of this command is as follows:

`clsnmphost` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the option `-?` or `-V`.

Each option of this command has a long form and a short form. Both forms of each option are provided with the description of the option in the OPTIONS section of this man page.

See the `Intro`(1CL) man page for more information.

You can use this command only in the global zone.

Subcommands The following subcommands are supported:

`add`

Adds an SNMP host to the list of hosts that will receive trap notifications for the cluster MIBs and will be able to access the MIB tables.

You can use this subcommand only in the global zone.

If you use the `add` subcommand without the `-n` option, only the current node is affected. If you use `add` without the `-c` option, the subcommand uses `public` as the default community name. Specify the host by using either an IP address or host name.

If the specified community name does not exist, the command creates the community. Use the `-i` option to import one or more host configurations from the *clconfigfile*.

Users other than superuser require `solaris.cluster.modify` role–based access control (RBAC) authorization to use this subcommand. See the `rbac(5)` man page.

`export`

Exports the SNMP host information for the specified node.

You can use this subcommand only in the global zone.

Use the `-n` option to specify one or more nodes for which to export the SNMP host information. If you use `export` without the `-n` option, the subcommand exports only SNMP host information for the current node.

For more information about the output format from the `export` subcommand, see the `clconfiguration(5CL)` man page. By default, all output is sent to standard output. Use the `-o` option followed by a file name to redirect the output to the file.

By using the `-c` option, you can limit the output from the `export` subcommand to information only for hosts in a particular community. Specify one or more hosts as operands to restrict the output information to only these hosts.

Users other than superuser require`solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`list`

Lists the SNMP hosts that are configured on the specified node.

You can use this subcommand only in the global zone.

If you use the `list` subcommand without the `-n` option, only SNMP hosts on the current node are listed. By default this subcommand lists all hosts on the node. To restrict the output to information about specific hosts, specify one or more hosts as operands. You can also use the `-c` option to list only those hosts in the specified community.

Users other than `superuser` require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`remove`
Removes an SNMP host from the node configuration.

You can use this subcommand only in the global zone.

To remove a host from the configuration, you must specify the host name as an operand. If you use the `remove` subcommand without the `-n` option, only SNMP hosts on the current node are removed. To remove all hosts, use the plus sign (+) sign. To remove one or more hosts from a specific community, use the `-c` option.

Users other than `superuser` require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`show`
Shows the SNMP host information on the specified node.

You can use this subcommand only in the global zone.

If you use the `show` subcommand without the `-n` option, only information for SNMP hosts on the current node is displayed. By default, the `show` subcommand displays information for all the hosts and their communities. To restrict the output to information about only specific hosts in a community, use the `-c` option, or specify the name of one or more hosts as operands.

Users other than `superuser` require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

Options The following options are supported:

`-?`
`--help`
Prints help information.

You can specify this option with or without a subcommand.

- If you use this option without a subcommand, the list of available subcommands is displayed.
- If you use this option with a subcommand, the usage options for that subcommand are displayed.

When this option is used, no other processing is performed.

`-c` *community*
`--community` *community*
Specifies the SNMP community name that will be used in conjunction with a host name. This option might also be used with other subcommands to narrow the scope of the subcommand operation. For example, when used with the `remove` subcommand, the `-c` option can be used to remove one or many hosts from a specific *community*. If you use the `add` subcommand without the `-c` option, the subcommand uses `public` as the default community name.

`-i` {`-` | *clconfigfile*}
`--input {- |` *clconfigfile*`-}`
Specifies configuration information that can be used for validating or modifying the SNMP hosts configuration. This information must conform to the format that is defined in the `clconfiguration(5CL)` man page. This information can be contained in a file or supplied through standard input. To specify standard input, specify the minus sign (`-`) instead of a file name.

`-n` *node*[,…]
`--node[s]` *node*`-[,…]`
Specifies a node or a list of nodes. You can specify each node as node name or as a node ID. All forms of the `clsnmphost` command accept this option.

`-o` {`-` | *clconfigfile*}
`--output {- |` *clconfigfile*`-}`
Writes cluster SNMP host configuration information in the format that is defined by the `clconfiguration(5CL)` man page. This information can be written to a file or to standard output.

To write to standard output, specify the minus sign (`-`) instead of a file name. If you specify standard output, all other standard output for the command is suppressed.

If you supply a file name, the configuration is copied to a new file of that name.

The `-o` option is valid only with the `export` subcommand. If you do not specify the `-o` option , the output will print to standard output.

`-V`
`--version`
Prints the version of the command.

Do not specify this option with subcommands, operands, or other options because they are ignored. The `-V` option displays only the version of the command. No other operations are performed.

`-v`
`--verbose`
Prints verbose information to standard output.

You can specify this option with any form of the command, although some subcommands might not produce expanded output. For example, the `export` subcommand does not produce expanded output when you specify the verbose option.

Operands The following operands are supported:

+	Specifies all SNMP host entries.
host	Specifies the IP address, IPv6 address, or name of a host that is provided access to the SNMP MIBs on the cluster.

Exit Status If the command is successful for all specified operands, it returns zero (CL_NOERR). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

0 CL_NOERR
No error

The command that you issued completed successfully.

1 CL_ENOMEM
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

3 CL_EINVAL
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the -i option was incorrect.

6 CL_EACCESS
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the su(1M) and rbac(5) man pages for more information.

18 CL_EINTERNAL
Internal error was encountered

An internal error indicates a software defect or other defect.

35 CL_EIO
I/O error

A physical input/output error has occurred.

36 CL_ENOENT
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the -o option does not exist.
- The configuration file that you attempted to access with the -i option contains errors.

Examples

EXAMPLE 1 Adding a Host by Specifying the Host Name

The following command adds the host `myhost` to the SNMP host list of the community on the current node `private`.

```
# clsnmphost add -c private phys-schost-1
```

You must specify the community name when you add a host to a community other than `public`.

EXAMPLE 2 Adding a Host by Specifying the Host IP and IPv6 Addresses

The following command adds a host to the SNMP host list on the current node for the community `public`. The first version of the command adds the host by specifying the IP address for the host. The second version of the command adds the host by specifying the IPv6 address for the host.

```
# clsnmphost add -c public 192.168.12.12
    or
# clsnmphost add -c public fe:1::5
```

EXAMPLE 3 Removing Hosts

The following command removes all hosts from the community `private`.

```
# clsnmphost remove -c private +
```

EXAMPLE 4 Listing Hosts on the Current Node

The following command lists all the hosts on the current node.

```
# clsnmphost list
phys-schost-1
192.168.12.12
```

EXAMPLE 5 Listing Hosts and Their Community Names

The following command uses the verbose option `-v` to list all hosts on the current node and their community names.

```
# clsnmphost list -v

--- SNMP hosts on node phys-schost-1 ---

Host Name           Community
---------           ---------
phys-schost-1       private
192.168.12.12       public
```

EXAMPLE 6 Displaying the SNMP Host Configuration

The following command displays all the configuration information for the SNMP hosts on the node `phys-cluster-2`.

EXAMPLE 6 Displaying the SNMP Host Configuration *(Continued)*

```
# clsnmphost show -n phys-schost-2

--- SNMP Host Configuration on phys-schost-2 ---

SNMP Host Name:                                 phys-schost-2
  Community:                                       private
```

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also clsnmpmib(1CL), cluster(1CL), Intro(1CL), sceventmib(1M), su(1M), scha_calls(3HA), attributes(5), rbac(5), clconfiguration(5CL)

Notes The superuser can run all forms of this command.

All users can run this command with the `-?` (help) or `-V` (version) option.

To run the `clsnmphost` command with other subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
`add`	`solaris.cluster.modify`
`export`	`solaris.cluster.read`
`list`	`solaris.cluster.read`
`remove`	`solaris.cluster.modify`
`show`	`solaris.cluster.read`

Name clsnmpmib, clmib – administer Oracle Solaris Cluster SNMP MIBs

Synopsis

```
/usr/cluster/bin/clsnmpmib  -V

/usr/cluster/bin/clsnmpmib  [subcommand] -?

/usr/cluster/bin/clsnmpmib  [subcommand] [options]
 -v [mib]

/usr/cluster/bin/clsnmpmib disable  [-n node[,...] ]
 {+ |  mib ...}

/usr/cluster/bin/clsnmpmib enable  [-n node[,...] ]
 {+ |  mib ...}

/usr/cluster/bin/clsnmpmib export  [-n node[,...] ]
 [-o  {- |  clconfigfile}] [+ |  mib ...]

/usr/cluster/bin/clsnmpmib list  [-n node[,...] ]
 [+ |  mib ...]

/usr/cluster/bin/clsnmpmib set  [-p name=value] [...]
 [-n node[,... ] {+ |  mib ...}

/usr/cluster/bin/clsnmpmib show  [-n node[,...] ]
 [+ |  mib ...]
```

Description The `clsnmpmib` command administers existing Oracle Solaris Cluster Simple Network Management Protocol (SNMP) Management Information Bases (MIBs) on the current node. To create SNMP hosts that can administer the MIBs, see the `clsnmphost(1CL)` man page. To define SNMP Version 3 (SNMPv3) users who can access the MIBs when using the SNMPv3 protocol, see the `clsnmpuser(1CL)` man page.

The general form of this command is as follows:

`clsnmpmib` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the option `-?` or `-V`.

Each option of this command has a long form and a short form. Both forms of each option are provided with the description of the option in the OPTIONS section.

See the `Intro(1CL)` man page for more information.

Oracle Solaris Cluster MIBs

Oracle Solaris Cluster currently supports one MIB, the Event MIB. The Oracle Solaris Cluster SNMP Event MIB notifies an SNMP manager of cluster events in real time. When enabled, the Oracle Solaris Cluster Event MIB automatically sends trap notifications to all hosts that are defined by the `clsnmphost` command. The Oracle Solaris Cluster Event MIB sends trap notifications on port 11162. The SNMP tree is viewed on port 11161.

Because clusters generate numerous event notifications, only events with a severity of `warning` or greater are sent as trap notifications. The MIB maintains a read-only table of the most current 50 events for which a trap has been sent. This information does not persist across reboots.

You can use this command only in the global zone.

Subcommands The following subcommands are supported:

`disable`

Disables one or more of the cluster MIBs on the specified nodes.

You can use this subcommand only in the global zone.

If you do not specify the `-n` option, only MIBs on the current node are disabled. When a MIB is disabled, you cannot access the MIB tables, and the MIB does not send any trap notifications.

Users other than superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization to use this subcommand. See the `rbac(5)` man page.

`enable`

Enables one or more cluster MIBs on the specified node.

You can use this subcommand only in the global zone.

If you do not specify the `-n` option, only MIBs on the current node are enabled. To limit the MIBs that are enabled, use the *mib* operand.

When you enable a MIB, you enable all of its functionality. However, some further configuration might be necessary for all of the MIB features to be fully functional. For example, the MIB cannot send trap notifications if no hosts have been configured. For information about configuring the SNMP host, see the `clsnmphost(1CL)` man page man page.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`export`

Exports the cluster MIB configuration information.

You can use this subcommand only in the global zone.

Use the `-n` option to specify one or more nodes from which to export the MIB configuration information. If you use `export` without the `-n` option, the subcommand exports only MIB configuration information from the current node. By default, this subcommand exports configuration information from all MIBs on the current node. To refine the output further, specify the name of one or more MIBs for which you need configuration information.

For more information about the output format from the `export` subcommand, see the `clconfiguration(5CL)` man page. By default all output is sent to the standard output. Use the `-o` option followed by a file name to redirect the output to the file.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`list`
Displays a list of cluster MIBs on the specified nodes.

You can use this subcommand only in the global zone.

Use the `-n` option to specify the nodes for the cluster MIBs that you want to list. If you use the `list` subcommand without the `-n` option, the subcommand lists only the MIBs on the current node. To limit the MIBs that are listed, specify the name of one or more MIBs that you want to list.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`set`
Changes the SNMP protocol setting that is used on one or more of the MIBs on the specified nodes.

You can use this subcommand only in the global zone.

By default, this subcommand changes all MIBs on the nodes. If you do not specify the node, only the SNMP protocol for the MIBs on the current node is modified. You must specify the SNMP protocol by using the `-p` option. All MIBs use SNMPv2 as the default protocol setting. The `set` subcommand changes the protocol setting of all the MIBs, unless you use the *mib* operand to specify MIB names.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`show`
Displays information for MIBs on the specified nodes.

You can use this subcommand only in the global zone.

The `show` subcommand displays the name of the MIB and its SNMP protocol version. By default, this subcommand shows information for all MIBs on the nodes.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

Options The following options are supported:

`-?`
`--help`
Displays help information.

You can specify this option with or without a subcommand.

- If you use this option without a subcommand, the list of available subcommands is displayed.
- If you use this option with a subcommand, the usage options for that subcommand are displayed.

When you use this option, no other processing is performed.

`-n` *node*[,…]
`--node[s]` *node*`-[,…]`
Specifies a node or a list of nodes. You can specify each node as a node name or a node ID. All forms of the `clsnmpmib` command accept this option. You can use the `-n` option to specify on which node[s] you want the action to be performed. Without the `-n` option, the command assumes the current node.

`-o` {`-` | *clconfigfile*}
`--output {- |` *clconfigfile*`-}`
Specifies the location where information about the cluster MIB configuration is to be written. This location can be a file or the standard output. To specify the standard output, specify the minus sign (`-`) instead of a file name. If you specify the standard output, all other standard output for the command is suppressed. If you do not specify the `-o` option , the output is sent to the standard output. You can specify this option only with the `export` subcommand.

Configuration information is written in the format that is defined in the `clconfiguration`(5CL) man page.

`-p` *name*=*value*
`--property=`*name*`-=`*value*
`--property` *name*`-=`*value*
Specifies the version of the SNMP protocol to use with the MIBs. Oracle Solaris Cluster supports the SNMPv2 and SNMPv3 protocol versions.

Multiple instances of `-p` *name*=*value* are allowed.

You can set the following property with this option:

`version`
Specifies the version of the SNMP protocol to use with the MIBs. You specify *value* as follows:

- `version=SNMPv2`

- `version=snmpv2`
- `version=2`
- `version=SNMPv3`
- `version=snmpv3`
- `version=3`

`-V`
`--version`
Displays the version of the command.

Do not specify this option with subcommands, operands, or other options because they are ignored. The `-V` option displays only the version of the command. No other operations are performed.

`-v`
`--verbose`
Prints verbose information to the standard output.

You can specify this option with any form of the command, although some subcommands might not produce expanded output. For example, the `export` subcommand does not produce expanded output when you specify the verbose option.

Operands The following operands are supported:

mib	Specifies the name of the MIB or MIBs to which to apply the subcommand. If you do not specify this operand, the subcommand uses the default plus sign (+), which means all MIBs. If you use the *mib* operand, specify the MIB in a space-delimited list after all other command-line options.
+	All cluster MIBs.

Exit Status If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

6 `CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su(1M)` and `rbac(5)` man pages for more information.

18 `CL_EINTERNAL`
Internal error was encountered

An internal error indicates a software defect or other defect.

35 `CL_EIO`
I/O error

A physical input/output error has occurred.

36 `CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

Examples

EXAMPLE 1 Listing MIBs

The following command lists all MIBs on the cluster node.

```
# clsnmpmib list
Event
```

EXAMPLE 2 Enabling a MIB

The following command enables the Event MIB on the current node.

```
# clsnmpmib enable event
```

The names of cluster MIBs are not case sensitive.

EXAMPLE 3 Changing the Protocol

The following command changes the protocol of the `Event` MIB on cluster node `phys-cluster-2` to `SNMPv3`.

```
# clsnmpmib set -n phys-cluster-2 -p version=SNMPv3 Event
```

If you use the `-n` option, you can alternatively use the node ID instead of the node name.

EXAMPLE 4 Showing the Configuration

The following command displays the configuration information on cluster nodes `phys-cluster-1` and `phys-cluster-2`.

```
# clsnmpmib show -n phys-cluster-1,phys-cluster-2
--- SNMP MIB Configuration on myhost ---

SNMP MIB Name:                phys-cluster-1
  State:                        Event
  Enabled:                      yes
  Protocol:                     SNMPv3

SNMP MIB Name:                phys-cluster-2
  State:                        Event
  Enabled:                      yes
  Protocol:                     SNMPv3
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

Files

`/usr/cluster/lib/mib/sun-cluster-event-mib.mib`
Oracle Solaris Cluster SNMP Event MIB definition file

See Also

`clsnmphost(1CL)`, `clsnmpuser(1CL)`, `Intro(1CL)`, `cluster(1CL)`, `sceventmib(1M)`, `scha_calls(3HA)`, `attributes(5)`, `rbac(5)`, `clconfiguration(5CL)`

Notes

The superuser can run all forms of this command.

All users can run this command with the `-?` (help) or `-V` (version) option.

To run the `clsnmpmib` command with other subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
`disable`	`solaris.cluster.modify`
`enable`	`solaris.cluster.modify`
`export`	`solaris.cluster.read`
`list`	`solaris.cluster.read`
`set`	`solaris.cluster.modify`

Subcommand	RBAC Authorization
`show`	`solaris.cluster.read`

Name clsnmpuser – administer Oracle Solaris Cluster SNMP users

Synopsis

```
/usr/cluster/bin/clsnmpuser  -V

/usr/cluster/bin/clsnmpuser  [subcommand] -?

/usr/cluster/bin/clsnmpuser  [subcommand] [options]
 -v [operand]

/usr/cluster/bin/clsnmpuser create  -i {- |  clconfigfile}
 [-a authentication] -f passwdfile [-n node[,...]]
 {+ |  user ...}

/usr/cluster/bin/clsnmpuser delete  [-a authentication]
 [-n node[,...] ] {+ |  user ...}

/usr/cluster/bin/clsnmpuser export  [-o  {- |  clconfigfile}]
 [-a authentication] [-n node[,...] ] [ {+ |  user ...}]

/usr/cluster/bin/clsnmpuser list  [-a authentication]
 [-n node[,...] ] {-d |  + |  user ...}

/usr/cluster/bin/clsnmpuser set  [-a authentication]
 [-n node[,...] ] {+ |  user ...}

/usr/cluster/bin/clsnmpuser set-default  {-l seclevel [,...] }
 {+ |  user ...}

/usr/cluster/bin/clsnmpuser show  [-a authentication]
 [-n node[,...] ] [-d |  + |  user ...]
```

Description The `clsnmpuser` command administers the roles of Simple Network Management Protocol (SNMP) users who can administer the control mechanisms on cluster Management Information Bases (MIBs). For more information about cluster MIBs, see the `clsnmpmib`(1CL) man page. If the cluster contains a MIB that is configured to use SNMP Version 3 (SNMPv3), you must define an SNMP user. SNMP users are not the same users as Solaris OS users, and SNMP users do not need to have the same user names as existing OS users.

This command has no short form.

The general form of this command is as follows:

`clsnmpuser` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the option `-?` or `-V`.

Each option of this command has a long form and a short form. Both forms of each option are provided with the description of the option in the OPTIONS section.

See the `Intro`(1CL) man page for more information.

You can use this command only in the global zone.

Subcommands The following subcommands are supported:

`create`
Creates a user and adds the user to the SNMP user configuration on the specified node.

You can use this subcommand only in the global zone.

Use the `-n` option with this subcommand to specify the cluster node on which to create the SNMP user. If you do not specify the `-n` option, the user is created and added only to the SNMP configuration on the current node.

To create and add all of the users that are configured in the `clconfiguration` file, use the `-i` option and the `-n` option.

To assign an authentication type to the SNMP user that you are creating, specify the `-a` option.

You can include the password for the SNMP user by specifying the `-f` option. The `-f` option is required if you are using the `-i` option.

If you specify the `-i` option, the configuration information from the `clconfiguration(5CL)` file is used. When you specify the `-i` option, you can also specify the plus sign (+) operand or a list of users.

Users other than superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization to use this command. See the `rbac(5)` man page.

`delete`
Deletes an SNMPv3 user from the specified node.

You can use this subcommand only in the global zone.

When you use the `delete` subcommand and specify only a user name, the subcommand removes all instances of the user. To delete users by authentication type, use the `-a` option. If you do not use the `-n` option, the user is deleted from only the current node.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`export`
Exports the SNMP user information from the specified node.

You can use this subcommand only in the global zone.

If you do not use the `-n` option, the SNMP user information is exported only from the current node. For the format of the output from the `export` subcommand, see the `clconfiguration(5CL)` man page. By default, all output is sent to standard output. Use the `-o` option followed by a file name to redirect the output to the file.

You can use the `-a` option to provide output only for those users with a specific authentication type. If you specify one or more users as operands, the output is restricted to only the information about those users.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`list`
Prints a list of SNMPv3 users that are configured on the specified node.

You can use this subcommand only in the global zone.

By default, the `list` subcommand displays all SNMPv3 users on the specified node. To display only the default SNMP user, specify the `-d` option with no operands. To restrict the output to a specified authentication type, use the `-a` option.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`set`
Changes the configuration of a user on the specified node.

You can use this subcommand only in the global zone.

If you do not specify the `-n` option, the configuration of a user is modified only on the current node.

Users other than superuser require `solaris.cluster.modify` RBAC auhorization to use this subcommand. See the `rbac(5)` man page.

`set-default`
Specifies the name of the default SNMP user and the security level that is used when a MIB sends a trap notification.

You can use this subcommand only in the global zone.

You use the `-l` option to specify the security level.

If the MIB is configured to use SNMPv3, you must specify a specific user name and security level with which to authenticate the traps. If a configuration has more than one user, you must specify the default user that the MIB will use when it sends the trap notifications.

If the configuration contains only one user, that user automatically becomes the default SNMP user. If the default SNMP user is deleted, another existing user, if any, becomes the default.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`show`

Prints information about the users on the specified node.

You can use this subcommand only in the global zone.

By default, the `show` subcommand displays information about all users on the node. To display information about only the default SNMP user, specify the `-d` option and do not provide an operand. To limit the output to specific authentication types, use the `-a` option. If you do not use the `-n` option, the command displays only user information from the current node.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

Options The following options are supported:

`-?`
`--help`

Prints help information.

You can specify this option with or without a subcommand.

- If you use this option without a subcommand, the list of available subcommands is displayed.
- If you use this option with a subcommand, the usage options for that subcommand are displayed.

When this option is used, no other processing is performed.

`-a` *authentication*
`--authentication` *authentication*

Specifies the authentication protocol that is used to authorize the user. The value of the authentication protocol can be `SHA` or `MD5`.

`-d`
`--default`

Specify the default SNMP user that is used when a MIB sends a trap notification.

`-f` *passwdfile*
`--file` *passwdfile*

Specifies a file that contains one or more SNMP user passwords. If you do not specify this option when you create a new user, the command prompts for a password. This option is valid only with the `create` subcommand.

User passwords must be specified on separate lines in the following format:

user:*password*

Passwords cannot contain the following characters or a space:

- `;` (semicolon)

- `:` (colon)
- `\` (backslash)
- `\n` (newline)

`-i` {`-` | *clconfigfile*}
`--input {- | `*clconfigfile*`-}`
Specifies configuration information that is to be used to validate or modify the SNMP hosts configuration. This information must conform to the format that is defined in the `clconfiguration`(5CL) man page. This information can be contained in a file or supplied through standard input. To specify standard input, specify the minus sign (`-`) instead of a file name.

`-l` *seclevel*
`--securitylevel` *seclevel*
Specifies the user's security level. You specify one of the following values for *seclevel*:

- `noAuthNoPriv`
- `AuthNoPriv`
- `authPriv`

For more information about SNMP security levels, see the `snmpcmd`(1M) man page.

`-n` *node*[,…]
`--node[s]` *node*`-[…]`
Specifies a node or a list of nodes. You can specify each node as a node name or as a node ID.

All forms of this command accept this option.

`-o` {`-` | *clconfigfile*}
`--output {- | `*clconfigfile*`-}`
Writes the cluster SNMP host configuration information in the format that is described by the `clconfiguration`(5CL) man page. This information can be written to a file or to standard output.

To write to standard output, specify the minus sign (`-`) instead of a file name. If you specify standard output, all other standard output for the command is suppressed.

`-V`
`--version`
Prints the version of the command.

Do not specify this option with subcommands, operands, or other options because they are ignored. The `-V` option displays only the version of the command. No other operations are performed.

`-v`
`--verbose`
Prints verbose messages and information.

You can specify this option with any form of the command, although some subcommands might not produce expanded output. For example, the `export` subcommand does not produce expanded output if you specify the verbose option.

Operands The following operands are supported:

+	Specifies all SNMP users.
user	Specifies the name of the SNMP user.

Exit Status If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

`6 CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su(1M)` and `rbac(5)` man pages for more information.

`18 CL_EINTERNAL`
Internal error was encountered

An internal error indicates a software defect or other defect.

`35 CL_EIO`
I/O error

A physical input/output error has occurred.

`36 CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

Examples

EXAMPLE 1 Creating an SNMPv3 User

The following command creates a new user `newuser1` and adds the user to the configuration on the current node. The authentication type is `SHA`.

```
# clsnmpuser create -a SHA newuser1
Enter password for user 'newuser1':
```

This example requires that you enter a password for the user to be created. To automate this process, use the `-f` option.

EXAMPLE 2 Listing Users

The following command lists all users with an authentication type of `MD5`.

```
# clsnmpuser list -a MD5 +
user1
mySNMPusername
```

The plus sign (+) is optional, as it is the default.

EXAMPLE 3 Showing Users

The following command displays the user information for all users on the current node.

```
# clsnmpuser show

--- SNMP User Configuration on phys-schost-1 ---

SNMP User Name:                                  newuser1
  Authentication Protocol:                          SHA
  Default User:                                     Yes
  Default Security Level:                           authPriv
```

EXAMPLE 4 Changing a User's Authentication Protocol and Status

The following command modifies the authentication protocol and default user status of the user `newuser1`.

```
# clsnmpuser set -a MD5 newuser1
```

EXAMPLE 5 Deleting SNMP Users

The following command deletes all SNMP users.

```
# clsnmpuser delete +
```

EXAMPLE 5 Deleting SNMP Users *(Continued)*

The plus sign (+) is used in this example to specify all users.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

`clsnmphost(1CL)`, `clsnmpmib(1CL)`, `cluster(1CL)`, `Intro(1CL)`, `sceventmib(1M)`, `snmpcmd(1M)`, `su(1M)`, `scha_calls(3HA)`, `attributes(5)`, `rbac(5)`, `clconfiguration(5CL)`

Notes

The superuser can run all forms of this command.

All users can run this command with the `-?` (help) or `-V` (version) option.

To run the `clsnmpmib` command with other subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
`create`	`solaris.cluster.modify`
`delete`	`solaris.cluster.modify`
`export`	`solaris.cluster.read`
`list`	`solaris.cluster.read`
`set`	`solaris.cluster.modify`
`set-default`	`solaris.cluster.modify`
`show`	`solaris.cluster.read`

Name cltelemetryattribute, clta – configure system resource monitoring

Synopsis

```
/usr/cluster/bin/cltelemetryattribute  -V

/usr/cluster/bin/cltelemetryattribute [subcommand]
 -?

/usr/cluster/bin/cltelemetryattribute subcommand
 [options] -v [telemetry-attribute ...]

/usr/cluster/bin/cltelemetryattribute disable  [-i
 {- |  clconfigfile}] [-t object-type] {+ |  telemetry-attribute ...}

/usr/cluster/bin/cltelemetryattribute enable  [-i
 {- |  clconfigfile}] [-t object-type] {+ |  telemetry-attribute ...}

/usr/cluster/bin/cltelemetryattribute export  [-o
 {- |  clconfigfile}] [-t object-type[,...]]
 [+ |  telemetry-attribute ...]

/usr/cluster/bin/cltelemetryattribute list  [-t object-type[,...]]
 [+ |  telemetry-attribute ...]

/usr/cluster/bin/cltelemetryattribute print  [-b object-instance[,...]]
 [-a] [-d period] [-u] [-n node[,...]] [-t object-type[,...]]
 [+ |  telemetry-attribute ...]

/usr/cluster/bin/cltelemetryattribute set-threshold
 -b object-instance [-n node] {-p name=value}
 [-p name=value ] [...] -t object-type telemetry-attribute

/usr/cluster/bin/cltelemetryattribute show  [-b object-instance[,...]]
 [-n node[,...]] [-t object-type[,...]] [+
 |  telemetry-attribute ...]

/usr/cluster/bin/cltelemetryattribute status  -b object-instance
 [-n node] {-p name} -t object-type [+ |  telemetry-attribute ...]
```

Description This command configures the monitoring of system resources.

You can monitor the use of system resources on different types of objects, including the following:

- Disks
- File systems
- IP addresses
- Network interfaces
- Nodes
- Solaris zones
- Resource groups

The aspects of system resources that you can monitor are called telemetry attributes.

This command does the following:

- Enables or disables telemetry attributes
- Sets or modifies thresholds for telemetry attributes
- Displays a list of the attributes that are being monitored, the thresholds that are applied, and the data that is collected about objects

You select the aspects of system resource usage that you want to monitor by identifying the corresponding telemetry attribute. To monitor system resource usage on an object, you enable the corresponding telemetry attributes on that type of object. The Oracle Solaris Cluster software collects usage data for these attributes on all objects of that type in the cluster.

For a system resource, a particular value might be critical for the performance of your cluster. You can set a threshold for a telemetry attribute so that you are notified if the critical value is crossed. See the `set-threshold` subcommand and the description of the `-p` option for information about thresholds.

You can omit *subcommand* only if *options* is the `-?` option or the `-V` option.

Each option has a long and a short form. Both forms of each option are given with the description of the option in OPTIONS.

The `clta` command is the short form of the `cltelemetryattribute` command.

Before you refine the configuration of system resource monitoring, you must initialize monitoring. See the `sctelemetry(1M)` man page.

You can use this command only in the global zone.

Subcommands The following subcommands are supported:

`disable`

Disables the specified telemetry attribute for the specified object type.

You can use this subcommand only in the global zone.

The Oracle Solaris Cluster software collects usage data for system resources that are set to an `enabled` state. If you set a system resource for an object type to the `disabled` state, Oracle Solaris Cluster software does not collect data for any instance that corresponds to that object instance.

The `cltelemetryattribute` command also disables the data collection on these attributes when both of the following conditions are met:

- You specify a configuration file with the `-i` option.
- The telemetry attributes are set to `disabled` in the input file.

You create the configuration file by using the `export` subcommand.

When you set a telemetry attribute to `disabled`, the settings of its configured thresholds remain unaltered.

Users other than superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization to use this subcommand. See the rbac(5) man page.

`enable`

Enables data collection of the specified telemetry attribute of the specified object type.

You can use this subcommand only in the global zone.

By default, selected attributes are enabled for selected object types.

To enable data collection of telemetry attributes, set the telemetry attributes to `enabled`.

The Oracle Solaris Cluster software collects data on only an object type for the telemetry attributes that are enabled for that object type. When you enable an attribute for an object type, Oracle Solaris Cluster software collects data for that attribute for all object instances of that type on all nodes.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the rbac(5) man page.

`export`

Exports the configuration of the telemetry attributes of object types and object instances to a file or to the standard output (`stdout`).

You can use this subcommand only in the global zone.

The configuration includes whether an attribute is enabled or disabled for an object type. The configuration can also include the limits that are set for the threshold configuration.

Specify a file by using the `-o` option to write the configuration information to a file. If you do not specify the `-o` option, the `cltelemetryattribute` command writes the configuration information to the standard output (`stdout`).

The `export` subcommand does not modify cluster configuration data.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the rbac(5) man page.

`list`

Displays the telemetry attributes that you can configure for the specified object types.

You can use this subcommand only in the global zone.

If you specify the verbose option `-v`, the `list` subcommand displays the type of object to which you can apply the attribute.

The properties of a threshold are displayed in the following format:

`Threshold:` *severity*`,` *direction*`,` *value*`,` *rearm*

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the rbac(5) man page.

`print`

Displays system resource usage for the specified telemetry attributes that are enabled for the specified object instances or object types.

You can use this subcommand only in the global zone.

The output includes the following data:

- Date and timestamp
- Object instance
- Object type
- Telemetry attribute
- Node
- Value

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`set-threshold`

Modifies the settings of a threshold for a specified telemetry attribute for a specified object on a node.

You can use this subcommand only in the global zone.

Use the `-p` option to specify the threshold to be modified. Also use the `-p` option to specify the threshold properties that you want to modify. You can modify only the `value` and `rearm` threshold properties.

You must change at least one of these properties for the specified threshold. If at least one property is configured, output is displayed when you run the `status` subcommand.

To deactivate a threshold, specify a blank for `value` and `rearm`, as follows:

```
-y value=,rearm=
```

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`show`

Displays the properties that are configured for telemetry attributes on object types or object instances.

You can use this subcommand only in the global zone.

These attributes include whether the system resources are enabled for an object type. If you specify the verbose option `-v`, the `show` subcommand displays the threshold settings for the telemetry attributes that are enabled for object instances.

The properties of a threshold are displayed in the following format:

`Threshold:` *severity*`,` *direction*`,` *value*`,` *rearm*

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`status`

Displays the current status of object types on which thresholds are configured on the standard output. If you do not set at least one threshold, there is no output to display when you run the `status` subcommand.

You can use this subcommand only in the global zone.

Use this subcommand without arguments to display the status for all active thresholds that currently have a warning or a fatal severity level. Possible output for thresholds includes the current severity level of the thresholds.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

Options The following options are supported:

`-?`
`--help`

Displays help information.

You can specify this option with or without a *subcommand*.

If you specify this option without a *subcommand*, the list of all available subcommands is displayed.

If you specify this option with a *subcommand*, the usage for that *subcommand* is displayed.

If you specify this option with the `set-threshold` subcommand, help information is displayed for all resource group properties.

If you specify this option with other options, with subcommands, or with operands, they are all ignored. No other processing occurs.

`-a`
`--average`

Prints the average of the data collected over a three-hour period and the standard deviation that is associated with this average.

If you specify the `-a` option and the `-d` option together, data that is averaged over three-hour intervals within the specified *period* is printed.

If you do not specify the `-a` option, the data that is printed is the latest data.

`-b` *object-instance*
`--object-instance=`*object-instance*
`--object-instance` *object-instance*

Specifies an object instance about which you want to display information or for which you want to set a threshold.

An object instance is always of a certain type. For example, a cluster node `phys-schost-1` is an object instance of type `node`. The Oracle Solaris Cluster software monitors system resources of an object instance only if the corresponding telemetry attributes are enabled for the object type.

`-d` *period*
`--date-range=`*period*
`--date-range` *period*

Specifies the period during which you want the Oracle Solaris Cluster software to collect monitoring data.

The format of the dates and times that you specify for the *period* argument must conform to the International Organization for Standardization (ISO) 8601 International Date Format.

begin-time`,`*end-time*]	The period is between the two times that are separated by the comma (`,`).
begin-time+	The period is between the specified begin time and the current time.
end-time-	The period is between the time that the Oracle Solaris Cluster software starts and begins collecting data and the specified end time.

Examples of the format of *period* are as follows:

`-d` **`2006-04-30T18:00,2006-06-16T18:00`**
From 6:00 p.m. on 30 April 2006 to 6:00 p.m. on 16 June 2006

`-d` **`2006-06-16+`**
From 12:00 midnight on 16 June 2006 onwards

`-d` **`2006-07-31T18:00+`**
From 6:00 p.m. on 31 July 2006 onwards

`-d` **`2006-06-16T18:00—`**
From the time that the Oracle Solaris Cluster software starts to 6:00 p.m. on 16 June 2006

`-d` **`2006-05-31T12:00,2006-06-16T11:59`**
From 12:00 midnight on 31 May 2006 to 11:59 p.m. on 16 June 2006

You can use this option only with the `print` subcommand.

`-i` {- | *clconfigfile*}
`--input={- |` *clconfigfile*`-}`

`--input {- | `*clconfigfile*`-}`
Specifies that you want to use the configuration information that is located in the *clconfigfile* file to specify the telemetry attribute and threshold configuration. See the `clconfiguration(5CL)` man page.

Specify a dash (`-`) with this option to provide configuration information through the standard input (`stdin`). If you specify other options, they take precedence over the options and information in *clconfigfile*.

`-n` *node*
`--node=`*node*
`--node` *node*
Specifies the node name on which Oracle Solaris Cluster collects usage data. You can specify a name or a node identifier.

Do not use the `-n` option when specifying subcommands on object instances of type `node`, a resource, or a resource group.

`-o` {- | *clconfigfile*}
`--output={- | `*clconfigfile*`-}`
`--output {- | `*clconfigfile*`-}`
Writes the telemetry attribute and threshold configuration data to a file or to the standard output (`stdout`). The format of the configuration information is described in the `clconfiguration(5CL)` man page.

If you specify a file name with this option, this option creates a new file. Configuration information is then placed in that file. If you specify `-` with this option, the configuration information is sent to the standard output (`stdout`). All other standard output for the command is suppressed.

You can use this option only with the `export` subcommand.

`-p` *name*
`--property=`*name*
`--property` *name*
Specifies a list of properties for the `status` subcommand.

For information about the properties for which you can set thresholds with the `set-threshold` subcommand, see the description of the `-p` *name*=*value* option.

`-p` *name*=*value*
`--property=`*name*`-=`*value*
`--property` *name*`-` *value*
Specifies the properties of a threshold.

Multiple instances of `-p` *name*=*value* are allowed.

For information about the properties about which you can display information with the `status` subcommand, see the description of the `-p` *name* option.

For each threshold, you must specify a `severity` property and a `direction` property to identify the threshold. You cannot modify these properties after a threshold has been set.

Set a `value` for each threshold. You can also set a `rearm` for each threshold. Use the `set-threshold` subcommand to modify the `value` and `rearm` properties. Properties and values that you can specify with this option are as follows:

`severity`
The severity level of a threshold. The possible values to which you can set this property are `fatal` and `warning`. A threshold with a severity level of `fatal` is more critical than a threshold with a severity level of `warning`.

The severity level is displayed as a visual alarm in Oracle Solaris Cluster Manager.

`direction`
The direction of the threshold that is to be applied. The possible values to which you can set this property are `falling` and `rising`. By setting the `direction` property to `falling`, you specify that the `fatal` severity level has a lower value than the `warning` severity level. By setting the `direction` property to `rising`, you specify that the `fatal` severity level has a higher value than the `warning` severity level.

`value`
The value for which you want to set a threshold on a telemetry attribute. If the threshold value is crossed, the severity of the telemetry attribute changes. You can associate up to four thresholds with a particular telemetry attribute on an object.

Use the `set-threshold` subcommand to set or modify the `value` property.

`rearm`
A means of clearing the severity on a telemetry attribute. By specifying a rearm value, the severity on a telemetry attribute is cleared when the value of the telemetry attribute crosses the rearm value in the direction opposed to that set in the `direction` property. If you do not specify the rearm value, the rearm value is as if the threshold value and the rearm value are set to the same value.

The frequency of notifications follows the principle of *hysteresis*, that is, the frequency is determined by a double-valued function. One value applies when the function is increasing. The other value applies when the function is the same as the value.

Set the values of `rearm` and `value` to suit your system. If you do not specify the optional `rearm` property, it takes `value` as the default. However, if you set the `rearm` property to the same value as the `value` property, or if you do not assign a value to `rearm`, you receive a notification every time that the value of the monitored telemetry attribute goes above or below the value that is set for `value`. To avoid receiving a large number of notifications, set `rearm` to a value other than `value`.

If you specify `rearm` with the `set-threshold` subcommand, the `cltelemetryattribute` command ensures that the value of `rearm` complies with the following requirements:

- If `direction` is `rising`, `value` has a value that is greater than or equal to the `rearm`.
- If `direction` is `falling`, `value` has a value that is smaller than or equal to `value`.

Use the `set-threshold` subcommand to change the `rearm`.

`-t` *object-type*
`--object-type=`*object-type*
`--object-type` *object-type*

Specifies the type of object on which the Oracle Solaris Cluster software is to collect usage data. All object instances are of a certain type.

Use this option to limit the output of subcommands to objects of the specified type.

The object types for which you can monitor system resources and each object type's associated telemetry attributes are as follows:

Object Type	Description	Telemetry Attribute
`disk`	Disk	`rbyte.rate`, `wbyte.rate`, `read.rate`, `write.rate`,
`filesystem`	File system	`block.used`, `inode.used`
`ipaddr`	IP address	`ipacket.rate`, `opacket.rate`
`netif`	Network interface	`ipacket.rate`, `opacket.rate`, `rbyte.rate`, `wbyte.rate`
`node`	Node	`cpu.idle`, `cpu.iowait`, `cpu.used`, `loadavg.1mn`, `loadavg.5mn`, `loadavg.15mn`, `mem.used`, `mem.free`, `swap.used`, `swap.free`
`resourcegroup`	Resource group	`cpu.used`, `mem.used`, `swap.used`
`zone`	Zone	`cpu.idle`, `cpu.iowait`, `cpu.used`, `loadavg.1mn`, `loadavg.5mn`, `loadavg.15mn`

The telemetry attributes that you can monitor are as follows:

Telemetry Attribute	Description
`block.used`	Percentage of blocks that are used on a device
`cpu.idle`	Amount of free CPU
`cpu.iowait`	Amount of CPU waiting for input/output completion

Telemetry Attribute	Description
`cpu.used`	Amount of CPU that is used
`inode.used`	Percentage of inodes that are used on a device
`ipacket.rate`	Number of incoming packets per second
`loadavg.1mn`	Number of processes that waited for the CPU in the last minute
`loadavg.5mn`	Number of processes that waited for the CPU in the last five minutes
`loadavg.15mn`	Number of processes that waited for the CPU in the last fifteen minutes
`mem.free`	Number of Mbytes of free memory
`mem.used`	Number of Mbytes of memory that is used
`opacket.rate`	Number of outgoing packets per second
`rbyte.rate`	Number of Mbits that are read per second
`read.rate`	Number of read operations per second
`swap.free`	Number of Mbytes of free swap memory
`swap.used`	Number of Mbytes of swap memory that is used
`wbyte.rate`	Number of Mbits that are written per second
`write.rate`	Number of write operations per second

You cannot monitor all telemetry attributes that are listed in the preceding table for all object types. Use the `list` subcommand to display object types on which you can collect data, and telemetry attributes that you can monitor on each type of object.

`-u`
`--utc`
Display the date and time that is shown with usage data in Coordinated Universal Time (UTC) or in Greenwich Mean Time (GMT). By specifying this option, you bypass the conversion of the date and time to, or from, the local date and time. By default, Oracle Solaris Cluster software displays the local date and time.

You can use this option only with the `print` subcommand.

`-v`
`--verbose`
Displays verbose information on the standard output (`stdout`).

`-V`
`--version`
Displays the version of the command.

If you specify this option with other options, with subcommands, or with operands, they are all ignored. Only the version of the command is displayed. No other processing occurs.

Operands The following operands are supported:

telemetry-attribute Particular telemetry attribute about which you want usage data.

The Oracle Solaris Cluster software contains particular types of objects on which you can collect usage data. For each object type, you can enable monitoring of telemetry attributes. The Oracle Solaris Cluster software only collects data for attributes that are enabled.

`+` All telemetry groups.

Exit Status The complete set of exit status codes for all commands in this command set are listed on the `Intro(1CL)` man page.

If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

`1 CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

`3 CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

`6 CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su(1M)` and `rbac(5)` man pages for more information.

`18 CL_EINTERNAL`
Internal error was encountered

An internal error indicates a software defect or other defect.

35 `CL_EIO`
I/O error

A physical input/output error has occurred.

36 `CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

38 `CL_EBUSY`
Object busy

You attempted to remove a cable from the last cluster interconnect path to an active cluster node. Or, you attempted to remove a node from a cluster configuration from which you have not removed references.

39 `CL_EEXIST`
Object exists

The device, device group, cluster interconnect component, node, cluster, resource, resource type, resource group, or private string that you specified already exists.

41 `CL_ETYPE`
Unknown type

The type that you specified with the `-t` or `-p` option does not exist.

Examples

EXAMPLE 1 Displaying System Resources That Are Configured for an Object Type

The following command displays the system resources that are applicable to an object type, in this case a disk.

```
# cltelemetryattribute list -t disk
rbyte.rate
wbyte.rate
write.rate
read.rate
```

EXAMPLE 2 Enabling Telemetry Attributes for an Object Type

The following command enables data collection for the specified telemetry attributes on all disks in the cluster.

```
# cltelemetryattribute enable -t disk rbyte.rate wbyte.rate
```

EXAMPLE 3 Setting a Threshold for a Telemetry Attribute of an Object Type

The following command sets a threshold for the telemetry attribute `wbyte.rate` on disk `d4` in the cluster. The default value of `rearm` is set to the value of `value`. Consequently, when the number of bytes that are written to disk `d4` exceeds or falls below 100, the Oracle Solaris Cluster software issues a fatal notification.

```
# cltelemetryattribute set-threshold -t disk -b d4 \
-p severity=fatal,direction=rising,value=100 wbyte.rate
```

EXAMPLE 4 Showing the Non-Verbose List of Configured Telemetry Attributes

The following command shows the non-verbose list of telemetry attributes that are configured on all the disks in a cluster.

```
# cltelemetryattribute show -t disk

=== Telemetry Attributes ===

Telemetry Attribute:                            read.rate
  Unit:                                           read/s
  Enabled Object Types:                           disk

Telemetry Attribute:                            write.rate
  Unit:                                           writes/s
  Enabled Object Types:                           disk

Telemetry Attribute:                            wbyte.rate
  Unit:                                           KBytes/s
  Enabled Object Types:                           disk

Telemetry Attribute:                            rbyte.rate
  Unit:                                           KBytes/s
  Enabled Object Types:                           disk
```

EXAMPLE 5 Showing the Verbose List of Configuration of Telemetry Attributes

The following command shows the verbose list of telemetry attributes that are configured on all the disks in the cluster.

```
# cltelemetryattribute show -v -t disk

=== Telemetry Attributes ===

Telemetry Attribute:                            read.rate
  Unit:                                           read/s
  Enabled Object Types:                           disk

Telemetry Attribute:                            write.rate
  Unit:                                           writes/s
```

EXAMPLE 5 Showing the Verbose List of Configuration of Telemetry Attributes *(Continued)*

```
  Enabled Object Types:                             disk

Telemetry Attribute:                              wbyte.rate
  Unit:                                             KBytes/s
  Enabled Object Types:                             disk

Telemetry Attribute:                              rbyte.rate
  Unit:                                             KBytes/s
  Enabled Object Types:                             disk
```

```
% cltelemetryattribute show -v -t disk

=== Telemetry Attributes ===

Telemetry Attribute:                              read.rate
  Unit:                                             read/s
  Enabled Object Types:                             disk

Telemetry Attribute:                              write.rate
  Unit:                                             writes/s
  Enabled Object Types:                             disk

  --- Object Instances of Type "disk" ---

  Object Instance:                                d4
    Thresholds:                                   <Direction, Severity, Value, Rearm>
      Threshold 1:                                  <rising, fatal, 1000, 500>

Telemetry Attribute:                              wbyte.rate
  Unit:                                             KBytes/s
  Enabled Object Types:                             disk

Telemetry Attribute:                              rbyte.rate
  Unit:                                             KBytes/s
  Enabled Object Types:                             disk
```

EXAMPLE 6 Showing the Status of Telemetry Attributes

The following command shows the status of telemetry attributes that are configured on all the disks in the cluster.

```
# cltelemetryattribute status

=== Telemetry Attributes Thresholds ===

Attribute   Obj-Instance   Obt-Type   Node     Threshold                   Status
Status
```

EXAMPLE 6 Showing the Status of Telemetry Attributes *(Continued)*

```
---------   ------------   --------   -------   --------------------------   -------
mem.used    phys-schost-1  node       16-v2-4   <rising, fatal, 1000, 1000>   warning
```

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also cluster(1CL), Intro(1CL), sctelemetry(1M), su(1M), attributes(5), rbac(5), SUNW.SCTelemetry(5), clconfiguration(5CL)

Notes The superuser can run all forms of this command.

All users can run this command with the -? (help) or -V (version) option.

To run the cltelemetryattribute command with other subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
disable	solaris.cluster.modify
enable	solaris.cluster.modify
export	solaris.cluster.read
list	solaris.cluster.read
print	solaris.cluster.read
set-threshold	solaris.cluster.modify
show	solaris.cluster.read
status	solaris.cluster.read

Name cluster – manage the global configuration and status of a cluster

Synopsis

```
/usr/cluster/bin/cluster -V

/usr/cluster/bin/cluster  [subcommand] -?

/usr/cluster/bin/cluster subcommand [options] -v [clustername ...]

/usr/cluster/bin/cluster check [-F] [-C checkid[,...]]|-E checkid[,...]]
[-e explorerpath[,...]] [-j jarpath[,...]] [-k keyword[,...]] [-n node[,...]]
[-o outputdir] [-s severitylevel] [clustername]

/usr/cluster/bin/cluster create -i {- | clconfigfile} [clustername]

/usr/cluster/bin/cluster export [-o {- | configfile}]
 [-t objecttype[,...]] [clustername]

/usr/cluster/bin/cluster monitor-heartbeat [-v] [clustername]

/usr/cluster/bin/cluster list [clustername]

/usr/cluster/bin/cluster list-checks [-F] [-K] [-C checkid[,...]|-E checkid[,...]]
[-j jar-path[,...]] [-o outputdir] [clustername]

/usr/cluster/bin/cluster list-cmds [clustername]

/usr/cluster/bin/cluster rename -c newclustername [clustername]

/usr/cluster/bin/cluster restore-netprops [clustername]

/usr/cluster/bin/cluster set {-p name=value} [-p name=value] [...] [clustername]

/usr/cluster/bin/cluster set-netprops {-p name=value}
 [-p name=value ] [...] [clustername]

/usr/cluster/bin/cluster show [-t objecttype[,...]] [clustername]

/usr/cluster/bin/cluster show-netprops [clustername]

/usr/cluster/bin/cluster shutdown [-y] [-g graceperiod]
 [-m message] [clustername]

/usr/cluster/bin/cluster status [-t objecttype[,...]] [clustername]
```

Description The `cluster` command displays and manages cluster-wide configuration, status information. This command also shuts down a global cluster.

The following `cluster` subcommands work within a zone cluster:

- cluster show - Lists the zone cluster, nodes, resource groups, resource types, and resource properties.
- `cluster status` - Displays the status of zone cluster components.
- `cluster shutdown` - Shuts down the zone cluster in an orderly fashion.
- `cluster list` - Displays the name of the zone cluster.

- `cluster list-cmds` - Lists the following commands, which are supported inside a zone cluster:
  - `clnode`
  - `clreslogicalhostname`
  - `clresource`
  - `clresourcegroup`
  - `clresourcetype`
  - `clressharedaddress`
  - `cluster`

Almost all subcommands that you use with the `cluster` command operate in cluster mode. You can run these subcommands from any node in the cluster. However, the `create`, `set-netprops`, and `restore-netprops` subcommands are an exception. You must run these subcommands in noncluster mode.

You can omit *subcommand* only if *options* is the `-?` option or the `-V` option.

The `cluster` command does not have a short form.

Each option has a long and a short form. Both forms of each option are given with the description of the option in OPTIONS.

Use this command in the global zone.

Subcommands The following subcommands are supported:

`check`

Checks and reports whether the cluster is configured correctly.

You can use this command only in the global zone.

This subcommand has three modes: basic checks, interactive checks, and functional checks.

- Basic checks are run when the `-k interactive` or `-k functional` keyword is not specified. Basic checks read and evaluate certain configuration information to identify possible errors or unmet requirements.
- Interactive checks are specified by the `-k interactive` option. If the `-C -E` option are not specified, all available interactive checks are run.

  Interactive checks are similar to basic checks, but require information from the user that the checks cannot determine. For example, a check might prompt the user to specify the firmware version. Cluster functionality is not interrupted by interactive checks.
- A functional check is specified by the `-k functional -C` *checkid* options. The `-k functional` option requires the `-C` option with no more than one check ID of a functional check. The `-E` option is not valid with the `-k functional` option.

Functional checks exercise a specific function or behavior of the cluster configuration, such as by triggering a failover or panicking a node. These checks require user input to provide certain cluster configuration information, such as which node to fail over to, and to confirm whether to begin or continue the check.

Because some functional checks involve interrupting cluster service, do not start a functional check until you have read the detailed description of the check and determined whether to first take the cluster out of production. Use the `cluster list-checks -v -C` *checkID* command to display the full description of a functional check.

When issued from an active member of a running cluster, this subcommand runs configuration checks. These checks ensure that the cluster meets the minimum requirements that are required to successfully run the cluster.

When issued from a node that is not running as an active cluster member, this subcommand runs preinstallation checks on that node. These checks identify vulnerabilities that you should repair to prepare the cluster for installation and to avoid possible loss of availability.

Each configuration check produces a set of reports that are saved in the specified or default output directory. Each report contains a summary that shows the total number of checks that were executed and the number of failures, grouped by severity level.

Each report is produced in both ordinary text and in XML. The DTD for the XML format is available in the `/usr/cluster/lib/cfgchk/checkresults.dtd` file. The reports are produced in English only.

Users other than superuser require `solaris.cluster.read` Role-Based Access Control (RBAC) authorization to use this subcommand. See the `rbac(5)` man page.

`create`

Creates a new cluster by using configuration information that is stored in a *clconfigfile* file.

The format of this configuration information is described in the `clconfiguration(5CL)` man page.

You can use this subcommand only in the global zone.

You must run this subcommand in noncluster mode. You must also run this subcommand from a host that is not already configured as part of a cluster. Oracle Solaris Cluster software must already be installed on every node that is going to be a part of the cluster.

If you do not specify a cluster name, the name of the cluster is taken from the *clconfigfile* file.

Users other than superuser require `solaris.cluster.modify` role-based access control (RBAC) authorization to use this subcommand. See the `rbac(5)` man page.

`export`

Exports the configuration information.

You can use this subcommand only in the global zone.

If you specify a file with the `-o` option, the configuration information is written to that file. If you do not specify the `-o` option, the output is written to the standard output (`stdout`).

The following option limits the information that is exported:

`-t` *objecttype*[,…]

Exports configuration information only for components that are of the specified types.

You can export configuration information only for the cluster on which you issue the `cluster` command. If you specify the name of a cluster other than the one on which you issue the `cluster` command, this subcommand fails.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`list`

Displays the name of the cluster.

You can use this subcommand in the global zone or in a zone cluster.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`list-checks`

Prints a list with the check ID and description of each available check.

You can use this command only in the global zone.

Check IDs begin with a letter that indicates the type of check.

F	Functional check
I	Interactive check
M	Basic check on multiple nodes
S	Basic check on a single node

The `-v` option displays details of a check's operation, including a check's keywords. It is important to display the verbose description of a functional check, to determine whether to remove the cluster from production before you run that check.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`list-cmds`
Prints a list of all available Oracle Solaris Cluster commands.

You can use this subcommand in the global zone or in a zone cluster.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`monitor-heartbeat`
Manually re-enables heartbeat timeout monitoring for cluster nodes during Dynamic Reconfiguration (DR).

When you perform a DR operation on a CPU or memory board, the affected node becomes unresponsive so heartbeat monitoring for that node is suspended on all other nodes. After DR is completed, the heartbeat monitoring of the affected node is automatically re-enabled. If the DR operation does not complete, you might need to manually re-enable the heartbeat monitoring with the `monitor-heartbeat` subcommand. If the affected node is unable to rejoin the cluster, it is ejected from the cluster membership.

Use this command only in the global zone. The `monitor-heartbeat` subcommand in not supported in an exclusive-IP zone cluster.

For instructions on re-enabling heartbeat timeout monitoring, see "Kernel Cage DR Recovery" in *Oracle Solaris Cluster Hardware Administration Manual*. For general information about DR, see "Dynamic Reconfiguration Support" in *Oracle Solaris Cluster Concepts Guide*.

`rename`
Renames the cluster.

You can use this subcommand only in the global zone.

Use the `-c` option with this subcommand to specify a new name for the cluster.

Note – If your cluster is configured as part of an active Oracle Solaris Cluster Geographic Edition partnership, see "Renaming a Cluster That Is in a Partnership" in *Oracle Solaris Cluster Geographic Edition System Administration Guide*. This section describes how to correctly rename a cluster that is configured as a member of an Oracle Solaris Cluster Geographic Edition partnership.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`restore-netprops`
Resets the cluster private network settings of the cluster.

You can use this subcommand only in the global zone.

You must run this subcommand in noncluster mode.

Use this subcommand only when the `set-netprops` subcommand fails and the following conditions exist:

- You are attempting to modify the private network properties.
- The failure indicates an inconsistent cluster configuration on the nodes. In this situation, you need to run the `restore-netprops` subcommand.

You must run this subcommand on every node in the cluster. This subcommand repairs the cluster configuration. This subcommand also removes inconsistencies that are caused by the failure of the modification of the IP address range. In case of a failure, any attempts that you make to change the configuration settings are not guaranteed to work.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`set`

Modifies the properties of the cluster.

You can use this subcommand only in the global zone.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`set-netprops`

Modifies the private network properties.

You can use this subcommand only in the global zone.

You must run this subcommand in noncluster mode. However, when setting the `num_zoneclusters` property, you can also run this subcommand in cluster mode.

Users other than superuser require `solaris.cluster.modify` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`show`

Displays detailed configuration information about cluster components.

You can use this subcommand only in the global zone.

The following option limits the information that is displayed:

`-t` *objecttype*[,…]

Displays configuration information only for components that are of the specified types.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`show-netprops`

Displays information about the private network properties of the cluster.

You can use this subcommand only in the global zone.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`shutdown`

Shuts down the global cluster in an orderly fashion.

You can use this subcommand only in the global zone.

If you issue this subcommand in the global cluster, Oracle Solaris Cluster software shuts down the entire global cluster including all zone clusters that are associated with that global cluster. You cannot use the `cluster` command in a zone cluster.

If you provide the name of a cluster other than the cluster on which you issue the `cluster` command, this subcommand fails.

Run this subcommand from only one node in the cluster.

This subcommand performs the following actions:

- Takes offline all functioning resource groups in the cluster. If any transitions fail, this subcommand does not complete and displays an error message.
- Unmounts all cluster file systems. If an unmount fails, this subcommand does not complete and displays an error message.
- Shuts down all active device services. If any transition of a device fails, this subcommand does not complete and displays an error message.
- Halts all nodes in the cluster.

Before this subcommand starts to shut down the cluster, it issues a warning message on all nodes. After issuing the warning, this subcommand issues a final message that prompts you to confirm that you want to shut down the cluster. To prevent this final message from being issued, use the `-y` option.

By default, the `shutdown` subcommand waits 60 seconds before it shuts down the cluster. You can use the `-g` option to specify a different delay time.

To specify a message string to appear with the warning, use the `-m` option.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

`status`

Displays the status of cluster components.

You can use this subcommand in the global zone.

The option `-t` *objecttype*[,…] displays status information for components that are of the specified types only.

Users other than superuser require `solaris.cluster.read` RBAC authorization to use this subcommand. See the `rbac(5)` man page.

Options The following options are supported:

Note – Both the short and the long form of each option are shown in this section.

`-?`
`--help`
Displays help information.

You can specify this option with or without a *subcommand*.

If you do not specify a *subcommand*, the list of all available subcommands is displayed.

If you specify a *subcommand*, the usage for that subcommand is displayed.

If you specify this option and other options, the other options are ignored.

`-C` *checkid*[,…]
`--checkID=`*checkid*[,…]
`--checkID` *checkid*[,…]
Specifies the checks to run. Checks that are not specified are not run. If the `-E` option is specified with the `-C` option, the `-C` option is ignored.

For the `-k functional` keyword, the `-C` option is required and you must specify only one *checkid* to run.

You can use this option only with the `check` and `list-checks` subcommands.

`-c` *newclustername*
`--newclustername=`*newclustername*
`--newclustername` *newclustername*
Specifies a new name for the cluster.

Use this option with the `rename` subcommand to change the name of the cluster.

`-E` *checkid*[,…]
`--excludeCheckID=`*checkid*[,…]
`--excludeCheckID` *checkid*[,…]
Specifies the checks to exclude. All checks except those specified are run. If the `-C` option is specified with the `-E` option, the `-C` option is ignored.

The `-E` option is not valid with the `-k functional` keyword.

You can use this option only with the `check` and `list-checks` subcommands.

`-e` *explorerpath*[,…]
`--explorer=`*explorerpath*[,…]
`--explorer` *explorerpath*[,…]
Specifies the path to an unpacked Oracle Explorer or Sun Explorer archive, to use as an alternative source of data for the system. The value of *explorerpath* must be a fully qualified path location.

You can use this option only with the `check` subcommand.

`-F`
`--force`
Forces the execution of the subcommand by ignoring the `/var/cluster/logs/cluster_check/cfgchk.lck` file, if it exists. Use this option only if you are sure that the `check` and `list-checks` subcommands are not already running.

`-g` *graceperiod*
`--graceperiod=`*graceperiod*
`--graceperiod` *graceperiod*
Changes the length of time before the cluster is shut down from the default setting of 60 seconds.

You specify *graceperiod* in seconds.

`-i` {- | *clconfigfile*}
`--input={- |` *clconfigfile*`-}`
`--input {- |` *clconfigfile*`-}`
Uses the configuration information in the *clconfigfile* file. See the `clconfiguration`(5CL) man page.

To provide configuration information through the standard input (`stdin`), specify a dash (`-`) with this option.

If you specify other options, they take precedence over the options and information in the cluster configuration file.

`-j` *jarpath*[,…]
`--jar=`*jarpath*[,…]
`--jar` *jarpath*[,…]
Specifies the path to an additional jar file that contains checks. The *jarpath* must be fully qualified.

You can use this option only with the `check` and `list-checks` subcommands.

`-K` *keyword*[,…]
`--list-keywords=`*keyword*
`--keyword` *keyword*
Lists all keywords in the available checks. This option overrides all other options.

You can use this option only with the `list-checks` subcommand.

`-k` *keyword*[,…]
`--keyword=`*keyword*
`--keyword` *keyword*
Runs only checks that contain the specified keyword. Use the `cluster list-checks -k` command to determine what keywords are assigned to available checks.

The `-k functional` keyword requires the `-C` option with a single *checkid*. You cannot specify more than one functional check at a time or specify any other keyword in the same command.

You can use this option only with the `check` and `list-checks` subcommands.

`-m` *message*
`--message=`*message*
`--message` *message*

Specifies a message string that you want to display with the warning that is displayed when you issue the `shutdown` subcommand.

The standard warning message is `system will be shut down in` ….

If *message* contains more than one word, delimit it with single (') quotation marks or double (“) quotation marks. The `shutdown` command issues messages at 7200, 3600, 1800, 1200, 600, 300, 120, 60, and 30 seconds before a shutdown begins.

`-n` *node*[,…]
`--node=`*node*[,…]
`--node` *node*[,…]

Runs checks only on the specified node or list of nodes. The value of *node* can be the node name or the node ID number.

You can use this option only with the `check` subcommand.

`-o` {- | *clconfigfile*}
`--output={- |` *clconfigfile*`-}`
`--output {- |` *clconfigfile*`-}`

Writes cluster configuration information to a file or to the standard output (`stdout`). The format of the configuration information is described in the `clconfiguration`(5CL) man page.

If you specify a file name with this option, this option creates a new file. Configuration information is then placed in that file. If you specify `-` with this option, the configuration information is sent to the standard output (`stdout`). All other standard output for the command is suppressed.

You can use this form of the `-o` option only with the `export`subcommand.

`-o` *outputdir*
`--output=`*outputdir*
`--output` *outputdir*

Specifies the directory in which to save the reports that the `check` subcommand generates.

You can use this form of the `-o` option only with the `check` and `list-checks` subcommands.

The output directory *outputdir* must already exist or be able to be created. Previous reports that are located in *outputdir* are overwritten by the new reports.

If you do not specify the `-o` option, the directory `/var/cluster/logs/cluster_check/`*datestamp*`/` is used as *outputdir* by default.

`-p` *name*=*value*
`--property=`*name*=*value*
`--property` *name*=*value*

Modifies cluster-wide properties.

Multiple instances of `-p` *name*=*value* are allowed.

Use this option with the `set` and the `set-netprops` subcommands to modify the following properties:

`concentrate_load`

Specifies how the Resource Group Manager (RGM) distributes the resource group load across the available nodes. The `concentrate_load` property can be set only in a global cluster. In zone clusters, the `concentrate_load` property has the default value of *FALSE*. If the value is set to `FALSE`, the RGM attempts to spread resource group load evenly across all available nodes or zones in the resource groups' node lists. If the value is set to `TRUE` in the global cluster, the resource group load is concentrated on the fewest possible nodes or zones without exceeding any configured hard or soft load limits. The default value is `FALSE`.

If a resource group `RG2` declares a ++or +++affinity for a resource group `RG1`, avoid setting any nonzero load factors for `RG2`. Instead, set larger load factors for `RG1` to account for the additional load that would be imposed by `RG2` coming online on the same node as `RG1`. This will allow the `Concentrate_load`feature to work as intended. Alternately, you can set load factors on `RG2`, but avoid setting any hard load limits for those load factors; set only soft limits. This will allow `RG2` to come online even if the soft load limit is exceeded.

Hard and soft load limits for each node are created and modified with the `clnode create-loadlimit`, `clnode set-loadlimit`, and `clnode delete-loadlimit` command. See the `clnode(1CL)` man page for instructions.

`global_fencing`

Specifies the global default fencing algorithm for all shared devices.

Acceptable values for this property are `nofencing`, `nofencing-noscrub`, `pathcount`, or `prefer3`.

After checking for and removing any Persistent Group Reservation (PGR) keys, the `nofencing` setting turns off fencing for the shared device.

The `nofencing-noscrub` setting turns off fencing for the shared device *without* first checking for or removing PGR keys.

The pathcount setting determines the fencing protocol by the number of DID paths that are attached to the shared device. For devices that use three or more DID paths, this property is set to the SCSI-3 protocol.

The prefer3 setting specifies the SCSI-3 protocol for device fencing for all devices. The pathcount setting is assigned to any devices that do not support the SCSI-3 protocol.

By default, this property is set to prefer3.

heartbeat_quantum
Defines how often to send heartbeats, in milliseconds.

Oracle Solaris Cluster software uses a 1 second, or 1,000 milliseconds, heartbeat quantum by default. Specify a value between 100 milliseconds and 10,000 milliseconds.

heartbeat_timeout
Defines the time interval, in milliseconds, after which, if no heartbeats are received from the peer nodes, the corresponding path is declared as down.

Oracle Solaris Cluster software uses a 10 second, or 10,000 millisecond, heartbeat timeout by default. Specify a value between 2,500 milliseconds and 60,000 milliseconds.

The set subcommand allows you to modify the global heartbeat parameters of a cluster, across all the adapters.

Oracle Solaris Cluster software relies on heartbeats over the private interconnect to detect communication failures among cluster nodes. If you reduce the heartbeat timeout, Oracle Solaris Cluster software can detect failures more quickly. The time that is required to detect failures decreases when you decrease the values of heartbeat timeout. Thus, Oracle Solaris Cluster software recovers more quickly from failures. Faster recovery increases the availability of your cluster.

Even under ideal conditions, when you reduce the values of heartbeat parameters by using the set subcommand, there is always a risk that spurious path timeouts and node panics might occur. Always test and thoroughly qualify the lower values of heartbeat parameters under relevant workload conditions before actually implementing them in your cluster.

The value that you specify for heartbeat_timeout must always be greater than or equal to five times the value that you specify for heartbeat_quantum (heartbeat_timeout >= (5*heartbeat_quantum)).

installmode
Specifies the installation-mode setting for the cluster. You can specify either enabled or disabled for the installmode property.

While the installmode property is enabled, nodes do not attempt to reset their quorum configurations at boot time. Also, while in this mode, many administrative functions are blocked. When you first install a cluster, the installmode property is enabled.

After all nodes have joined the cluster for the first time, and shared quorum devices have been added to the configuration, you must explicitly disable the installmode property. When you disable the installmode property, the quorum vote counts are set to default values. If quorum is automatically configured during cluster creation, the installmode property is disabled as well after quorum has been configured.

resource_security
Specifies a security policy for execution of programs by RGM resources. Permissible values of resource_security are SECURE, WARN, OVERRIDE, or COMPATIBILITY.

Resource methods such as Start and Validate always run as root. If the method executable file has non-root ownership or group or world write permissions, an insecurity exists. In this case, if the resource_security property is set to SECURE, execution of the resource method fails at run time and an error is returned. If resource_security has any other setting, the resource method is allowed to execute with a warning message. For maximum security, set resource_security to SECURE.

The resource_security setting also modifies the behavior of resource types that declare the application_user resource property. A resource type that declares the application_user resource property is typically an agent that uses the scha_check_app_user(1HA) interface to perform additional checks on the executable file ownership and permissions of application programs. For more information, see the application_user section of the r_properties(5) man page.

udp_session_timeout
Specifies the time lapse, in seconds, after which any inactive UDP sessions are removed.

This property can optionally be set to any integer.

This property only applies to UDP services and to the load balancing policy Lb_weighted for which the Round robin load-balancing scheme is enabled.

By default, this property is set to 480 (8 minutes).

Private network properties
You modify private network properties with the set-netprops subcommand only.

You must modify these private network settings only if the default private network address collides with an address that is already in use. You must also modify these private network settings if the existing address range is not sufficient to accommodate the growing cluster configuration.

All nodes of the cluster are expected to be available and in noncluster mode when you modify network properties. You modify the private network settings on only one node of the cluster, as the settings are propagated to all nodes.

When you set the private_netaddr property, you can also set the private_netmask property or the max_nodes and max_privatenets properties, or all properties. If you attempt to set the private_netmask property and either the max_nodes or the max_privatenets property, an error occurs. You must always set both the max_nodes and the max_privatenets properties together.

The default private network address is 172.16.0.0, with a default netmask of 255.255.240.0.

If you fail to set a property due to an inconsistent cluster configuration, in noncluster mode, run the cluster restore-netprops command on each node.

Private network properties are as follows:

max_nodes
: Specify the maximum number of nodes that you expect to be a part of the cluster.You can set this property only in conjunction with the private_netaddr and max_privatenets properties, and optionally with the private_netmask property. The maximum value for max_nodes is 64. The minimum value is 2.

max_privatenets
: Specifies the maximum number of private networks that you expect to be used in the cluster. You can set this property only in conjunction with the private_netaddr and max_nodes properties, and optionally with the private_netmask property. The maximum value for max_privatenets is 128. The minimum value is 2.

num_zoneclusters
: Specifies the number of zone clusters that you intend to configure for a global cluster. Oracle Solaris Cluster software uses a combination of this value, the number of nodes, and the number of private networks that you specify for the global cluster to calculate the private network netmask.

Oracle Solaris Cluster software uses the private network netmask to determine the range of private network IP addresses to hold for cluster use.

You can set this property in cluster mode or in noncluster mode.

If you do not specify a value for this property, it is set to 12 by default. You can specify 0 for this property.

private_netaddr
: Specifies the private network address.

private_netmask
: Specifies the cluster private network mask. The value that you specify in this case must be equal to or greater than the default netmask 255.255.240.0. You can set this property only in conjunction with the private_netaddr property.

If you want to assign a smaller IP address range than the default, you can use the max_nodes and max_privatenets properties instead of or in addition to the private_netmask property.

`num_xip_zoneclusters`
Specifies the number of exclusive-IP zone clusters that can be configured on the physical cluster. The command invokes a shell script called `modify_xip_zc`, and it updates the `clprivnet` configuration file with entries for the number of configurable exclusive-IP zone clusters. The `num_xip_zoneclusters` property must be a subset of the `num_zoneclusters` property.

The command performs the following tasks for each combination of private network properties:

`-p private_netaddr=`*netaddr*
The command assigns the default netmask, `255.255.240.0`, to the private interconnect. The default IP address range accommodates a maximum of 64 nodes and 10 private networks.

`-p private_netaddr=`*netaddr*`,private_netmask=`*netmask*
If the specified netmask is less than the default netmask, the command fails and exits with an error.

If the specified netmask is equal to or greater than the default netmask, the command assigns the specified netmask to the private interconnect. The resulting IP address range accommodates a maximum of 64 nodes and 10 private networks.

To assign a smaller IP address range than the default, specify the `max_nodes` and `max_privatenets` properties instead of or in addition to the `private_netmask` property.

`-p private_netaddr=`*netaddr*`,max_nodes=`*nodes*`,`
`max_privatenets=`*privatenets*`,num_xip_zoneclusters=`*xip_zoneclusters*
The command calculates the minimum netmask to support the specified number of nodes and private networks. The command then assigns the calculated netmask to the private interconnect. It also specifies the number of exclusive-IP zone clusters that can be configured on the physical cluster.

`-p private_netaddr=`*netaddr*`,private_netmask=`*netmask*`,`
`max_nodes=`*nodes*`,max_privatenets=`*privatenets*
The command calculates the minimum netmask that supports the specified number of nodes and private networks.

The command compares that calculation to the specified netmask. If the specified netmask is less than the calculated netmask, the command fails and exits with an error. If the specified netmask is equal to or greater than the calculated netmask, the command assigns the specified netmask to the private interconnect.

`-s` *severitylevel*
`--severity=`*severitylevel*
`--severity` *severitylevel*
Reports only violations that are at least the specified *severitylevel*.

You can use this option only with the `check` subcommand.

Each check has an assigned severity level. Specifying a severity level excludes any failed checks of lesser severity levels from the report. The value of *severity* is one of the following values, which are listed in order from lowest severity to highest severity:

`information`

`warning`

`low`

`medium`

`high`

`critical`

When you do not specify this option, a severity level of `information` is used by default. A severity level of `information` specifies that failed checks of all severity levels are to be included in the report.

`-t` *objecttype*[,…]
`--type=`*objecttype*`-[,…]`
`--type` *objecttype*`-[,…]`

Specifies object types for the `export`, `show`, and `status` subcommands.

Use this option to limit the output of the `export`, `show`, and `status` subcommands to objects of the specified type only. The following object or component types are supported. Note that the status is not available for some of the object types.

Object Type	Short Object Type	Available Status
`access`	`access`	No
`device`	`dev`	Yes
`devicegroup`	`dg`	Yes
`global`	`global`	No
`interconnect`	`intr`	Yes
`nasdevice`	`nas`	No
`node`	`node`	Yes
`quorum`	`quorum`	Yes
`reslogicalhostname`	`rslh`	Yes
`resource`	`rs`	Yes

Object Type	Short Object Type	Available Status
`resourcegroup`	`rg`	Yes
`resourcetype`	`rt`	No
`ressharedaddress`	`rssa`	Yes

`-v`
`--verbose`
Displays verbose information on the standard output (`stdout`). When used with the `check` subcommand, displays verbose progress during execution. When used with the `list-checks` subcommand, provides more detailed information about checks.

`-V`
`--version`
Displays the version of the command.

If you specify this option with other options, with subcommands, or with operands, they are all ignored. Only the version of the command is displayed. No other processing occurs.

`-y`
`--yes`
Prevents the prompt that asks you to confirm a shutdown from being issued. The cluster is shut down immediately, without user intervention.

Operands The following operands are supported:

clustername
The name of the cluster that you want to manage.

For all subcommands except `create`, the *clustername* that you specify must match the name of the cluster on which you issue the `cluster` command.

You specify a new and a unique cluster name by using the `create` subcommand.

Exit Status The complete set of exit status codes for all commands in this command set are listed in the `Intro(1CL)` man page. Returned exit codes are also compatible with the return codes that are described in the `scha_calls(3HA)` man page.

If the command is successful for all specified operands, it returns zero (`CL_NOERR`). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

`0 CL_NOERR`
No error

The command that you issued completed successfully.

1 `CL_ENOMEM`
Not enough swap space

A cluster node ran out of swap memory or ran out of other operating system resources.

3 `CL_EINVAL`
Invalid argument

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the `-i` option was incorrect.

6 `CL_EACCESS`
Permission denied

The object that you specified is inaccessible. You might need superuser or RBAC access to issue the command. See the `su(1M)` and `rbac(5)` man pages for more information.

35 `CL_EIO`
I/O error

A physical input/output error has occurred.

36 `CL_ENOENT`
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the `-o` option does not exist.
- The configuration file that you attempted to access with the `-i` option contains errors.

In addition, the `check` subcommand creates a text file named `cluster_check_exit_code.log` in the same output directory where it places check reports. If the subcommand itself exits `CL_NOERR`, a code is reported in this file that indicates the highest severity level of all violated checks. The following are the possible check codes:

`100`	No violations were reported. There might be check output for the `information` or `warning` severity level in the report.
`101`	`critical`
`102`	`high`
`103`	`medium`
`104`	`low`

Examples

EXAMPLE 1 Displaying Cluster Configuration Information

The following command displays all available configuration information for the cluster.

```
# cluster show
=== Cluster ===

Cluster Name:                                   schost
  clusterid:                                       0x4FA7C35F
  installmode:                                     disabled
  heartbeat_timeout:                               9999
  heartbeat_quantum:                               1000
  private_netaddr:                                 172.16.0.0
  private_netmask:                                 255.255.240.0
  max_nodes:                                       64
  max_privatenets:                                 10
  num_zoneclusters:                                12
  udp_session_timeout:                             480
  concentrate_load:                                True
  resource_security:                               SECURE
  global_fencing:                                  prefer3
  Node List:                                       phys-schost-1, phys-schost-2

  === Host Access Control ===

  Cluster name:                                 schost
    Allowed hosts:                                 None
    Authentication Protocol:                       sys

  === Cluster Nodes ===

  Node Name:                                    phys-schost-1
    Node ID:                                       1
    Enabled:                                       yes
    privatehostname:                               clusternode1-priv
    reboot_on_path_failure:                        disabled
    globalzoneshares:                              1
    defaultpsetmin:                                1
    quorum_vote:                                   1
    quorum_defaultvote:                            1
    quorum_resv_key:                               0x4FA7C35F00000001
    Transport Adapter List:                        net3, net1

  Node Name:                                    phys-schost-2
    Node ID:                                       2
    Enabled:                                       yes
    privatehostname:                               clusternode2-priv
    reboot_on_path_failure:                        disabled
```

EXAMPLE 1 Displaying Cluster Configuration Information *(Continued)*

```
    globalzoneshares:                              1
    defaultpsetmin:                                1
    quorum_vote:                                   1
    quorum_defaultvote:                            1
    quorum_resv_key:                               0x4FA7C35F00000002
    Transport Adapter List:                        net3, net1

  === Transport Cables ===

  Transport Cable:                              phys-schost-1:net3,switch1@1
    Endpoint1:                                     phys-schost-1:net3
    Endpoint2:                                     switch1@1
    State:                                         Enabled

  Transport Cable:                              phys-schost-1:net1,switch2@1
    Endpoint1:                                     phys-schost-1:net1
    Endpoint2:                                     switch2@1
    State:                                         Enabled

  Transport Cable:                              phys-schost-2:net3,switch1@2
    Endpoint1:                                     phys-schost-2:net3
    Endpoint2:                                     switch1@2
    State:                                         Enabled

  Transport Cable:                              phys-schost-2:net1,switch2@2
    Endpoint1:                                     phys-schost-2:net1
    Endpoint2:                                     switch2@2
    State:                                         Enabled

  === Transport Switches ===

  Transport Switch:                             switch1
    State:                                         Enabled
    Type:                                          switch
    Port Names:                                    1 2
    Port State(1):                                 Enabled
    Port State(2):                                 Enabled

  Transport Switch:                             switch2
    State:                                         Enabled
    Type:                                          switch
    Port Names:                                    1 2
    Port State(1):                                 Enabled
    Port State(2):                                 Enabled
```

EXAMPLE 1 Displaying Cluster Configuration Information *(Continued)*

```
=== Quorum Devices ===

Quorum Device Name:                             d4
  Enabled:                                         yes
  Votes:                                           1
  Global Name:                                     /dev/did/rdsk/d4s2
  Type:                                            shared_disk
  Access Mode:                                     scsi3
  Hosts (enabled):                                 phys-schost-1, phys-schost-2

=== Device Groups ===

=== Registered Resource Types ===

Resource Type:                                  SUNW.LogicalHostname:4
  RT_description:                                  Logical Hostname Resource Type
  RT_version:                                      4
  API_version:                                     2
  RT_basedir:                                      /usr/cluster/lib/rgm/rt/hafoip
  Single_instance:                                 False
  Proxy:                                           False
  Init_nodes:                                      All potential masters
  Installed_nodes:                                 <All>
  Failover:                                        True
  Pkglist:                                         <NULL>
  RT_system:                                       True
  Global_zone:                                     True

Resource Type:                                  SUNW.SharedAddress:2
  RT_description:                                  HA Shared Address Resource Type
  RT_version:                                      2
  API_version:                                     2
  RT_basedir:                                      /usr/cluster/lib/rgm/rt/hascip
  Single_instance:                                 False
  Proxy:                                           False
  Init_nodes:                                      <Unknown>
  Installed_nodes:                                 <All>
  Failover:                                        True
  Pkglist:                                         <NULL>
  RT_system:                                       True
  Global_zone:                                     True

=== Resource Groups and Resources ===

=== DID Device Instances ===
```

EXAMPLE 1 Displaying Cluster Configuration Information *(Continued)*

```
DID Device Name:                              /dev/did/rdsk/d1
  Full Device Path:                              phys-schost-2:/dev/rdsk/
                                                 c0t600A0B8000485B6A000058584EDCBD7Ed0
  Full Device Path:                              phys-schost-1:/dev/rdsk/
                                                 c0t600A0B8000485B6A000058584EDCBD7Ed0
  Replication:                                   none
  default_fencing:                               global

DID Device Name:                              /dev/did/rdsk/d2
  Full Device Path:                              phys-schost-2:/dev/rdsk/
                                                 c0t600A0B8000485B6A0000585A4EDCBDA4d0
  Full Device Path:                              phys-schost-1:/dev/rdsk/
                                                 c0t600A0B8000485B6A0000585A4EDCBDA4d0
  Replication:                                   none
  default_fencing:                               global

DID Device Name:                              /dev/did/rdsk/d3
  Full Device Path:                              phys-schost-2:/dev/rdsk/
                                                 c0t600A0B8000485B6A0000585C4EDCBDCAd0
  Full Device Path:                              phys-schost-1:/dev/rdsk/
                                                 c0t600A0B8000485B6A0000585C4EDCBDCAd0
  Replication:                                   none
  default_fencing:                               global

DID Device Name:                              /dev/did/rdsk/d4
  Full Device Path:                              phys-schost-2:/dev/rdsk/
                                                 c0t600A0B8000485B6A0000585E4EDCBDF1d0
  Full Device Path:                              phys-schost-1:/dev/rdsk/
                                                 c0t600A0B8000485B6A0000585E4EDCBDF1d0
  Replication:                                   none
  default_fencing:                               global

DID Device Name:                              /dev/did/rdsk/d5
  Full Device Path:                              phys-schost-2:/dev/rdsk/
                                                 c0t600A0B8000485B6A000058604EDCBE1Cd0
  Full Device Path:                              phys-schost-1:/dev/rdsk/
                                                 c0t600A0B8000485B6A000058604EDCBE1Cd0
  Replication:                                   none
  default_fencing:                               global

DID Device Name:                              /dev/did/rdsk/d6
  Full Device Path:                              phys-schost-2:/dev/rdsk/
                                                 c0t600A0B8000486F08000073014EDCBED0d0
  Full Device Path:                              phys-schost-1:/dev/rdsk/
```

EXAMPLE 1 Displaying Cluster Configuration Information *(Continued)*

```
                                                c0t600A0B8000486F08000073014EDCBED0d0
    Replication:                                none
    default_fencing:                            global

  DID Device Name:                            /dev/did/rdsk/d7
    Full Device Path:                           phys-schost-2:/dev/rdsk/
                                                c0t600A0B8000486F08000073034EDCBEFAd0
    Full Device Path:                           phys-schost-1:/dev/rdsk/
                                                c0t600A0B8000486F08000073034EDCBEFAd0
    Replication:                                none
    default_fencing:                            global

  DID Device Name:                            /dev/did/rdsk/d8
    Full Device Path:                           phys-schost-2:/dev/rdsk/
                                                c0t600A0B8000486F08000073054EDCBF1Fd0
    Full Device Path:                           phys-schost-1:/dev/rdsk/
                                                c0t600A0B8000486F08000073054EDCBF1Fd0
    Replication:                                none
    default_fencing:                            global

  DID Device Name:                            /dev/did/rdsk/d9
    Full Device Path:                           phys-schost-2:/dev/rdsk/
                                                c0t600A0B8000486F08000073074EDCBF46d0
    Full Device Path:                           phys-schost-1:/dev/rdsk/
                                                c0t600A0B8000486F08000073074EDCBF46d0
    Replication:                                none
    default_fencing:                            global

  DID Device Name:                            /dev/did/rdsk/d10
    Full Device Path:                           phys-schost-2:/dev/rdsk/
                                                c0t600A0B8000486F08000073094EDCBF71d0
    Full Device Path:                           phys-schost-1:/dev/rdsk/
                                                c0t600A0B8000486F08000073094EDCBF71d0
    Replication:                                none
    default_fencing:                            global

  DID Device Name:                            /dev/did/rdsk/d11
    Full Device Path:                           phys-schost-1:/dev/rdsk/c3t0d0
    Replication:                                none
    default_fencing:                            global

  DID Device Name:                            /dev/did/rdsk/d12
    Full Device Path:                           phys-schost-1:/dev/rdsk/c4t0d0
    Replication:                                none
    default_fencing:                            global
```

EXAMPLE 1 Displaying Cluster Configuration Information *(Continued)*

```
DID Device Name:                                  /dev/did/rdsk/d13
  Full Device Path:                                  phys-schost-1:/dev/rdsk/c4t1d0
  Replication:                                       none
  default_fencing:                                   global

DID Device Name:                                  /dev/did/rdsk/d14
  Full Device Path:                                  phys-schost-2:/dev/rdsk/c3t0d0
  Replication:                                       none
  default_fencing:                                   global

DID Device Name:                                  /dev/did/rdsk/d15
  Full Device Path:                                  phys-schost-2:/dev/rdsk/c4t0d0
  Replication:                                       none
  default_fencing:                                   global

DID Device Name:                                  /dev/did/rdsk/d16
  Full Device Path:                                  phys-schost-2:/dev/rdsk/c4t1d0
  Replication:                                       none
  default_fencing:                                   global

=== NAS Devices ===

Nas Device:                                       netapps21
  Type:                                              netapp
  userid:                                            root

Nas Device:                                       qualfugu
  Type:                                              sun_uss
  userid:                                            osc_agent

=== Zone Clusters ===

Zone Cluster Name:                                zc1
  zonename:                                          zc1
  zonepath:                                          /zones/zc1
  autoboot:                                          TRUE
  brand:                                             solaris10
  bootargs:                                          <NULL>
  pool:                                              <NULL>
  limitpriv:                                         <NULL>
  scheduling-class:                                  <NULL>
  ip-type:                                           shared
  enable_priv_net:                                   TRUE
  resource_security:                                 COMPATIBILITY
```

EXAMPLE 1 Displaying Cluster Configuration Information *(Continued)*

```
    --- Solaris Resources for zc1 ---

    Resource Name:                                net
      address:                                       schost-1
      physical:                                      auto

    Resource Name:                                net
      address:                                       schost-2
      physical:                                      auto

    --- Zone Cluster Nodes for zc1 ---

    Node Name:                                    phys-schost-1
      physical-host:                                 phys-schost-1
      hostname:                                      vzschost1a

      --- Solaris Resources for phys-schost-1 ---

    Node Name:                                    phys-schost-2
      physical-host:                                 phys-schost-2
      hostname:                                      vzschost2a

      --- Solaris Resources for phys-schost-2 ---

  Zone Cluster Name:                              zc2
    zonename:                                        zc2
    zonepath:                                        /zones/zc2
    autoboot:                                        TRUE
    brand:                                           solaris
    bootargs:                                        <NULL>
    pool:                                            <NULL>
    limitpriv:                                       <NULL>
    scheduling-class:                                <NULL>
    ip-type:                                         shared
    enable_priv_net:                                 TRUE
    resource_security:                               COMPATIBILITY

    --- Solaris Resources for zc2 ---

    --- Zone Cluster Nodes for zc2 ---

    Node Name:                                    phys-schost-1
      physical-host:                                 phys-schost-1
      hostname:                                      vzschost1b
```

EXAMPLE 1 Displaying Cluster Configuration Information *(Continued)*

```
      --- Solaris Resources for phys-schost-1 ---

    Node Name:                                  phys-schost-2
      physical-host:                               phys-schost-2
      hostname:                                    vzschost2b

      --- Solaris Resources for phys-schost-2 ---

  Zone Cluster Name:                            zc3
    zonename:                                      zc3
    zonepath:                                      /zones/zc3
    autoboot:                                      TRUE
    brand:                                         solaris
    bootargs:                                      <NULL>
    pool:                                          <NULL>
    limitpriv:                                     <NULL>
    scheduling-class:                              <NULL>
    ip-type:                                       shared
    enable_priv_net:                               TRUE
    resource_security:                             COMPATIBILITY

    --- Solaris Resources for zc3 ---

    --- Zone Cluster Nodes for zc3 ---

    Node Name:                                  phys-schost-2
      physical-host:                               phys-schost-2
      hostname:                                    vzschost1c

      --- Solaris Resources for phys-schost-2 ---
```

EXAMPLE 2 Displaying Configuration Information About Selected Cluster Components

The following command displays information about resources, resource types, and resource groups. Information is displayed for only the cluster.

```
# cluster show -t resource,resourcetype,resourcegroup
  Single_instance:                                 False
  Proxy:                                           False
  Init_nodes:                                      <Unknown>
  Installed_nodes:                                 <All>
  Failover:                                        True
  Pkglist:                                         <NULL>
  RT_system:                                       True
```

EXAMPLE 2 Displaying Configuration Information About Selected Cluster Components *(Continued)*

```
Resource Type:                                SUNW.qfs
  RT_description:                                SAM-QFS Agent on SunCluster
  RT_version:                                    3.1
  API_version:                                   3
  RT_basedir:                                    /opt/SUNWsamfs/sc/bin
  Single_instance:                               False
  Proxy:                                         False
  Init_nodes:                                    All potential masters
  Installed_nodes:                               <All>
  Failover:                                      True
  Pkglist:                                       <NULL>
  RT_system:                                     False

=== Resource Groups and Resources ===

Resource Group:                               qfs-rg
  RG_description:                                <NULL>
  RG_mode:                                       Failover
  RG_state:                                      Managed
  Failback:                                      False
  Nodelist:                                      phys-schost-2 phys-schost-1

  --- Resources for Group qfs-rg ---

  Resource:                                   qfs-res
    Type:                                        SUNW.qfs
    Type_version:                                3.1
    Group:                                       qfs-rg
    R_description:
    Resource_project_name:                       default
    Enabled{phys-schost-2}:                      True
    Enabled{phys-schost-1}:                      True
    Monitored{phys-schost-2}:                    True
    Monitored{phys-schost-1}:                    True
```

EXAMPLE 3 Displaying Cluster Status

The following command displays the status of all cluster nodes.

```
# cluster status -t node
=== Cluster Nodes ===

--- Node Status ---

Node Name                                     Status
---------                                     ------
```

EXAMPLE 3 Displaying Cluster Status *(Continued)*

```
phys-schost-1                                   Online
phys-schost-2                                   Online

--- Node Status ---

Node Name                                       Status
---------                                       ------
```

Alternately, you can also display the same information by using the `clnode` command.

```
# clnode status
=== Cluster Nodes ===

--- Node Status ---

Node Name                                       Status
---------                                       ------
phys-schost-1                                   Online
phys-schost-2                                   Online
```

EXAMPLE 4 Creating a Cluster

The following command creates a cluster that is named `cluster-1` from the cluster configuration file `suncluster.xml`.

```
# cluster create -i /suncluster.xml cluster-1
```

EXAMPLE 5 Changing a Cluster Name

The following command changes the name of the cluster to `cluster-2`.

```
# cluster rename -c cluster-2
```

EXAMPLE 6 Disabling a Cluster's installmode Property

The following command disables a cluster's `installmode` property.

```
# cluster set -p installmode=disabled
```

EXAMPLE 7 Modifying the Private Network

The following command modifies the private network settings of a cluster. The command sets the private network address to `172.10.0.0`. The command also calculates and sets a minimum private netmask to support the specified eight nodes and four private networks and specifies that you want to configure eight zone clusters for the global cluster. The command also identifies the number of exclusive-IP zone clusters that can be configured on the physical cluster in non-cluster mode.

EXAMPLE 7 Modifying the Private Network *(Continued)*

```
# cluster set-netprops \
-p private_netaddr=172.10.0.0 \
-p max_nodes=8 \
-p max_privatenets=4 \
-p num_zoneclusters=8 \
-p num_xip_zoneclusters=3
```

You can also specify this command as follows in non-cluster mode:

```
# cluster set-netprops \
-p private_netaddr=172.10.0.0 \
-p max_nodes=8,\
-p max_privatenets=4 \
-p num_zoneclusters=8 \
-p num_xip_zoneclusters=3
```

EXAMPLE 8 Listing Available Checks

The following command lists all checks, shown in single-line format, that are available on the cluster. The actual checks that are available vary by release or update.

```
# cluster list-checks
 M6336822  :   (Critical)   Global filesystem /etc/vfstab entries are
not consistent across all Oracle Solaris Cluster nodes.
 S6708689  :   (Variable)   One or more Oracle Solaris Cluster resources
cannot be validated
 M6708613  :   (Critical)   vxio major numbers are not consistent across
all Oracle Solaris Cluster nodes.
 S6708255  :   (Critical)   The nsswitch.conf file 'hosts' database
entry does not have 'cluster' specified first.
 S6708479  :   (Critical)   The /etc/system rpcmod:svc_default_stksize
parameter is missing or has an incorrect value for Oracle Solaris Cluster.
 F6984121  :   (Critical)   Perform cluster shutdown
 F6984140  :   (Critical)   Induce node panic
...
```

EXAMPLE 9 Running Basic Checks on a Cluster

The following command runs in verbose mode all available basic checks on all nodes of the `schost` cluster , of which `phys-schost-1` is a cluster member. The output is redirected to the file `basicchks.18Nov2011.schost`.

```
phys-schost-1# cluster check -v -o basicchks.18Nov2011.schost
```

EXAMPLE 10 Running Interactive Checks on a Cluster

The following command runs all available interactive checks except those checks that have the `vfstab` keyword. Output from the check is saved to the file `interactive.chk.18Nov2011`.

```
# cluster check -k interactive -E vfstab -o interactive.chk.18Nov2011 cluster-1
```

User supplies information when prompted

EXAMPLE 11 Running a Functional Check on a Cluster

The following commands display the detailed description of functional check `F6968101` and runs the check on the cluster of which `phys-schost-1`, `phys-schost-2`, and `phys-schost-3` are the cluster members. Output from the check is saved to the file `F6968101.failovertest.19Nov2011`. Because the check involves failing over a cluster node, you do not start the check until after you take the cluster out of production.

```
phys-schost-1# cluster list-checks -v -C F6968101
 initializing...
 F6968101: (Critical) Perform resource group switchover
Keywords: SolarisCluster4.x, functional
Applicability: Applicable if multi-node cluster running live.
Check Logic: Select a resource group and destination node.
Perform '/usr/cluster/bin/clresourcegroup switch' on specified
resource group either to specified node or to all nodes in succession.
Version: 1.113
Revision Date: 12/07/26

 cleaning up...
```

Take the cluster out of production

```
phys-schost-1# cluster check -k functional -C F6968101 -o F6968101.failovertest.19Nov2011

  initializing...
  initializing xml output...
  loading auxiliary data...
  starting check run...
     phys-schost-1, phys-schost-2, phys-schost-3:     F6968101.... starting:
 Perform resource group switchover

 ============================================================

   >>> Functional Check <<<
```

Follow onscreen directions

```
...
```

EXAMPLE 12 Running Limited Checks on Specified Nodes

The following command runs, in verbose mode, all checks that are of the severity level `high` or higher. These checks run only on the node `phys-schost-1`.

```
# cluster check -v -n phys-schost-1 -s high
 initializing...
 initializing xml output...
 loading auxiliary data...
 filtering out checks with severity less than High
 starting check run...
    phys-schost-1:     M6336822.... starting:  Global filesystem /etc/vfstab entries...
    phys-schost-1:     M6336822       not applicable
    phys-schost-1:     S6708689.... starting:  One or more Oracle Solaris Cluster...
    phys-schost-1:     S6708689       passed
...
    phys-schost-1:     S6708606       skipped: severity too low
    phys-schost-1:     S6708638       skipped: severity too low
    phys-schost-1:     S6708641.... starting:  Cluster failover/switchover might...
    phys-schost-1:     S6708641       passed
...
```

Files

`/usr/cluster/lib/cfgchk/checkresults.dtd`

`/var/cluster/logs/cluster_check/`

/*outputdir*/`cluster_check_exit_code.log`

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/system/core`
Interface Stability	Evolving

See Also

`Intro(1CL)`, `init(1M)`, `su(1M)`, `scha_calls(3HA)`, `attributes(5)`, `rbac(5)`, `clconfiguration(5CL)`

Notes

The superuser can run all forms of this command.

All users can run this command with the `-?` (help) or `-V` (version) option.

To run the `cluster` command with subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
`check`	`solaris.cluster.read`
`create`	`solaris.cluster.modify`
`export`	`solaris.cluster.read`
`list`	`solaris.cluster.read`
`list-checks`	`solaris.cluster.read`
`list-cmds`	`solaris.cluster.read`
`rename`	`solaris.cluster.modify`
`restore-netprops`	`solaris.cluster.modify`
`set`	`solaris.cluster.modify`
`set-netprops`	`solaris.cluster.modify`
`show`	`solaris.cluster.read`
`show-netprops`	`solaris.cluster.read`
`shutdown`	`solaris.cluster.admin`
`status`	`solaris.cluster.read`

Name clzonecluster, clzc – create and manage zone clusters

Synopsis `/usr/cluster/bin/clzonecluster [`*subcommand*`] -?`

`/usr/cluster/bin/clzonecluster -V`

`/usr/cluster/bin/clzonecluster` *subcommand* `[`*options*`] -v [`*zoneclustername*`]`

`/usr/cluster/bin/clzonecluster boot [-n` *nodename*`[,...]] [-o] {+ |` *zoneclustername* `[...]}`

`/usr/cluster/bin/clzonecluster clone -Z` *target-zoneclustername* `[-m` *method*`]`
`[-n` *nodename*`[,...]] {` *source-zoneclustername* `}`

`/usr/cluster/bin/clzonecluster configure [-f` *commandfile*`]` *zoneclustername*

`/usr/cluster/bin/clzonecluster delete [-F]` *zoneclustername*

`/usr/cluster/bin/clzonecluster export [-f` *commandfile*`]` *zoneclustername*

`/usr/cluster/bin/clzonecluster halt [-n` *nodename*`[,...]] {+ |` *zoneclustername*`}`

`/usr/cluster/bin/clzonecluster install [-c` *config_profile*`.xml] [-M` *manifest*`.xml]`
zoneclustername

`/usr/cluster/bin/clzonecluster install [ -n` *nodename*`] -a` *absolute_path_to_archive*
s10zoneclustername

`/usr/cluster/bin/clzonecluster install [ -n` *nodename*`] -d` *absolute_root_path*
s10zoneclustername

`/usr/cluster/bin/clzonecluster install-cluster [-d` *dvd-image*`] [-n` *nodename*`[,...]]`
`[-p patchdir=`*patchdir*`[,patchlistfile=` *filename*`]] [-s` *software-component*`[,...]] [-v]`
zoneclustername

`/usr/cluster/bin/clzonecluster install-cluster [-p patchdir=`*patchdir*`[,patchlistfile=`
filename`] [-n` *nodename*`[,...]] [-v]` *zoneclustername*

`/usr/cluster/bin/clzonecluster list [+ |` *zoneclustername* `[...]]`

`/usr/cluster/bin/clzonecluster move -f` *zonepath* *zoneclustername*

`/usr/cluster/bin/clzonecluster ready [-n` *nodename*`[,...]] {+ |` *zoneclustername* `[...]}`

`/usr/cluster/bin/clzonecluster reboot [-n` *nodename*`[,...]] [-o] {+ |` *zoneclustername* `[...]}`

`/usr/cluster/bin/clzonecluster set {-p` *name*`=`*value*`} [-p` *name*`=`*value*`] [...] [`*zoneclustername*`]`

`/usr/cluster/bin/clzonecluster show [+ |` *zoneclustername* `[...]]`

`/usr/cluster/bin/clzonecluster show-rev [-v] [-n` *nodename*`[,...]] [+ |` *zoneclustername* `...]`

`/usr/cluster/bin/clzonecluster status [+ |` *zoneclustername* `[...]]`

`/usr/cluster/bin/clzonecluster uninstall [-F] [-n` *nodename*`[,...]]` *zoneclustername*

`/usr/cluster/bin/clzonecluster verify [-n` *nodename*`[,...]] {+ |` *zoneclustername* `[...]}`

Description The clzonecluster command creates and modifies zone clusters for Oracle Solaris Cluster configurations. The clzc command is the short form of the clzonecluster command; the commands are identical. The clzonecluster command is cluster-aware and supports a single source of administration. You can issue all forms of the command from one node to affect a single zone-cluster node or all nodes.

You can omit *subcommand* only if *options* is the -? option or the -V option.

The subcommands require at least one operand, except for the list, show, and status subcommands. However, many subcommands accept the plus sign operand (+) to apply the subcommand to all applicable objects. The clzonecluster commands can be run on any node of a zone cluster and can affect any or all of the zone cluster.

Each option has a long and a short form. Both forms of each option are given with the description of the option in OPTIONS.

Subcommands The following subcommands are supported:

boot
: Boots the zone cluster.

  The boot subcommand boots the zone cluster. The boot subcommand uses the -n flag to boot the zone cluster for a specified list of nodes.

  You can use the boot subcommand only from a global-cluster node.

clone
: Clones the zone cluster.

  The clone command installs a zone cluster by copying an existing installed zone cluster. This subcommand is an alternative to installing a zone cluster. The clone subcommand does not itself create the new zone cluster. Ensure that the source zone cluster used for cloning is in the *Installed* state (not running) before you clone it. You must first use the configure subcommand to create the new zone cluster. Then use the clone subcommand to apply the cloned configuration to the new zone cluster.

  You can use the clone subcommand only from a global-cluster node.

configure
: Launches an interactive utility to configure a solaris10 or labeled brand zone cluster.

  The configure subcommand uses the zonecfg command to configure a zone on each specified machine. The configure subcommand lets you specify properties that apply to each node of the zone cluster. These properties have the same meaning as established by the zonecfg command for individual zones. The configure subcommand supports the configuration of properties that are unknown to the zonecfg command.

  The configure subcommand launches an interactive shell if you do not specify the -f option. The -f option takes a command file as its argument. The configure subcommand uses this file to create or modify zone clusters non-interactively.

You can use the `configure` subcommand only from a global-cluster node. For more information, see *Oracle Solaris Cluster Software Installation Guide*.

To specify a `solaris10` brand zone cluster, you can use a default template when you configure the zone cluster. The default template is located at `/etc/cluster/zone_cluster/ORCLcls10default.xml`. You can use the `-t` option to specify the default `solaris10` zone cluster template, or another existing `solaris10` zone cluster on the cluster. If another `solaris10` zone cluster is specified, the zone cluster configuration is imported from the specified zone cluster. You must also specify the root password in the `sysid` property, so that the `verify` or `commit` operations do not fail. Type the following commands to apply the template:

```
# /usr/cluster/bin/clzc configure sczone2
sczone2: No such zone cluster configured
Use 'create' to begin configuring a new zone cluster.
clzc:sczone2> create -t ORCLcls10default
clzc:sczone2> info
zonename: sczone2
zonepath:
autoboot: true
hostid:
brand: solaris10
```

Both the interactive and noninteractive forms of the `configure` command support several subcommands to edit the zone cluster configuration. See `zonecfg`(1M) for a list of available configuration subcommands.

The interactive `configure` utility enables you to create and modify the configuration of a zone cluster. Zone-cluster configuration consists of a number of resource types and properties. The `configure` utility uses the concept of *scope* to determine where the subcommand applies. There are three levels of scope that are used by the `configure` utility: cluster, resource, and node-specific resource. The default scope is cluster. The following list describes the three levels of scope:

- Cluster scope – Properties that affect the entire zone cluster. If the *zoneclustername* is `sczone`, the interactive shell of the `clzonecluster` command looks similar to the following:

  ```
  clzc:sczone>
  ```

- Node scope – A special resource scope that is nested inside the node resource scope. Settings inside the node scope affect a specific node in the zone cluster. For example, you can add a net resource to a specific node in the zone cluster. The interactive shell of the `clzonecluster` command looks similar to the following:

  ```
  clzc:sczone:node:net>
  ```

- Resource scope – Properties that apply to one specific resource. A resource scope prompt has the name of the resource type appended. For example, the interactive shell of the `clzonecluster` command looks similar to the following:

```
clzc:sczone:net>
```

`delete`
Removes a specific zone cluster.

This subcommand deletes a specific zone cluster. When you use a wild card operand (*), the `delete` command removes the zone clusters that are configured on the global cluster. The zone cluster must be in the configured state before you run the `delete` subcommand.

You can use the `delete` subcommand only from a global-cluster node.

`export`
Exports the zone cluster configuration into a command file.

The exported *commandfile* can be used as the input for the `configure` subcommand. Modify the file as needed to reflect the configuration that you want to create. See the `clconfiguration`(5CL) man page for more information.

You can use the `export` subcommand only from a global-cluster node.

`halt`
Stops a zone cluster or a specific node on the zone cluster.

When you specify a specific zone cluster, the `halt` subcommand applies only to that specific zone cluster. You can halt the entire zone cluster or just halt specific nodes of a zone cluster. If you do not specify a zone cluster, the `halt` subcommand applies to all zone clusters. You can also halt all zone clusters on specified machines.

The `halt` subcommand uses the `-n` option to halt zone clusters on specific nodes. By default, the `halt` subcommand stops all zone clusters on all nodes. If you specify the + operand in place of a zone name, all the zone clusters are stopped.

You can use the `halt` subcommand only from a global-cluster node.

`install`
Installs a zone cluster.

This subcommand installs a zone cluster.

If you use the `install -M` *manifest*`.xml` option, the manifest you specify is used for installation on all nodes of the zone cluster. A manifest file describes `solaris` package information that the administrator requires for installation, such as the `certificate_file`, `key_file`, publisher, and any additional packages. The *manifest*`.xml` file must also specify the Oracle Solaris Cluster group package `ha-cluster-full`, `ha-cluster-framework-full`, `ha-cluster-data-services-full`, or `ha-cluster-minimal` for a zone cluster installation. For more information about the Automated Installer manifest, see "Creating a Custom AI Manifest" in *Installing Oracle Solaris 11.1 Systems*.

If you do not use the `-M` option (which is the default), the Automated Installer manifest at `/usr/share/auto_install/manifest/zone_default.xml` is used for the installation. When this `zone_default.xml` manifest is used, all of the `ha-cluster/*` packages that are installed in the global zone of the issuing zone-cluster node are installed in all nodes of the zone cluster. If you use a custom manifest when installing the zone cluster and do not specify an Oracle Solaris Cluster group package, the installation fails.

The underlying global zones of all zone-cluster nodes that you want to install must have the identical set of Oracle Solaris Cluster packages installed as are in the global zone of the zone-cluster node that issues the `install` subcommand. Zone-cluster installation might fail on any zone-cluster node that does not meet this requirement.

You can use the `install` subcommand only from a global-cluster node. The `-M` and `-c` options can be used only for `solaris` brand zone clusters.

If the brand of the zone cluster is `solaris10`, you must use the `-a` or `-d` option.

`-a` archive
The absolute path to an archive to be used for the installation. See the `solaris10(5)` man page for details regarding supported archive types. The absolute path of the archive should be accessible on all the physical nodes of the cluster where the zone cluster will be installed.

`-d` path
The path to the root directory of an installed Oracle Solaris 10 system. The path should be accessible on all the physical nodes of the cluster where the zone cluster will be installed.

The same archive or installed Oracle Solaris 10 system will be used as a source for installation of all the `solaris10` brand zones in the zone cluster. The installation will override the system identification parameters in the source archive or installed Oracle Solaris 10 system with the system identification parameters specified in the `sysid` resource type during zone cluster configuration.

`install-cluster`

The `install-cluster` subcommand installs in a `solaris10` brand zone-cluster node Oracle Solaris Cluster software that supports the Oracle Solaris 10 OS. The software that is installed includes the core packages, cluster software components (such as agents that are supported in the zone cluster and Geographic Edition software), and patches.

Note – The `install-cluster` subcommand does not support installing Oracle Solaris Cluster version 3.3 or 3.3 5/11 software in a `solaris10` brand zone-cluster node. Check the *Oracle Solaris Cluster 4.1 Release Notes* for more information on supported releases for `solaris10` brand zone clusters.

Use this subcommand when the `solaris10` brand zone is installed with an Oracle Solaris 10 system that does not have cluster software installed. To use this subcommand, the Solaris OS software of an Oracle Solaris 10 system must have been installed to the `solaris10` zone with the `clzonecluster install` command, and the zone must be booted to an `online` state.

If the cluster core packages are not yet installed in the `solaris10` brand zone, you can install the core packages, all the cluster software components, and the patches all at once by specifying the `-d` option for the cluster release DVD directory, the `-s` option for cluster software components, and the `-p` option for patches. The options for installing cluster software components and patches are optional.

If you have already installed the cluster core packages, you can still use this subcommand to install patches and any cluster software components that are supported in the zone cluster. When patching information is specified, the cluster nodes of the zone cluster must be booted into an `offline-running` state with the `-o` option.

A `solaris10` brand zone cluster supports only the shared-IP zone type (for more information on exclusive-IP and shared-IP zone clusters, see the *Oracle Solaris Cluster Software Installation Guide*).

This subcommand can be run only from the global zone.

`list`
Displays the names of configured zone clusters.

This subcommand reports the names of zone clusters that are configured in the cluster.

- If you run the `list` subcommand from a global-cluster node, the subcommand displays a list of all the zone clusters in the global cluster.
- If you run the `list` subcommand from a zone-cluster node, the subcommand displays only the name of the zone cluster.

To see the list of nodes where the zone cluster is configured, use the `-v` option.

`move`
Moves the zonepath to a new zonepath.

This subcommand moves the zonepath to a new zonepath.

You can use the `move` subcommand only from a global-cluster node.

`ready`
Prepares the zone for applications.

This subcommand prepares the zone for running applications.

You can use the `ready` subcommand only from a global-cluster node.

`reboot`
Reboots a zone cluster.

This subcommand reboots the zone cluster and is similar to issuing a `halt` subcommand, followed by a `boot` subcommand. See the `halt` subcommand and the `boot` subcommand for more information.

You can use the `reboot` subcommand only from a global-cluster node.

`set`
Sets values of properties specified with the `-p` option for a zone cluster. You can use the `set` subcommand from the global zone or from a zone cluster. See the description of `-p` in the OPTIONS section for information about the properties you can set.

`show`
Displays the properties of zone clusters.

Properties for a zone cluster include zone cluster name, brand, IP type, node list, zonepath, and allowed address. The `show` subcommand runs from a zone cluster but applies only to that particular zone cluster. The zonepath is always `/` when you use this subcommand from a zone cluster. If zone cluster name is specified, this command applies only for that zone cluster.

You can use the `show` subcommand only from a global-cluster node.

`show-rev`

Displays the cluster release information for each node of the zone cluster.

This feature is useful for listing the release version and patches installed in the zone cluster. For example:

```
# clzonecluster show-rev
=== Zone Clusters ===
Zone Cluster Name:   zc1
Release at vznode1a on node pnode1:  3.3u2_40u1_zc:2012-04-01
Release at vznode2a on node pnode2:  3.3u2_40u1_zc:2012-04-01
```

You can use the `show-rev` subcommand from a global-cluster node or from a zone-cluster node.

`status`
Determines whether the zone-cluster node is a member of the zone cluster and displays if the zone cluster is a `solaris`, `solaris10`, or `labeled` brand .

The zone state can be one of the following: `Configured`, `Installed`, `Ready`, `Running`, `Shutting Down`, and `Unavailable`. The state of all the zone clusters in the global cluster is displayed so you can see the state of your virtual cluster.

To check zone activity, instead use the `zoneadm` command.

You can use the `status` subcommand only from a global-cluster node.

`uninstall`
Uninstalls a zone cluster.

This subcommand uninstalls a zone cluster. The `uninstall` subcommand uses the `zoneadm` command.

You can use the `uninstall` subcommand only from a global-cluster node.

`verify`

Checks that the syntax of the specified information is correct.

This subcommand invokes the `zoneadm verify` command on each node in the zone cluster to ensure that each zone cluster member can be installed safely. For more information, see `zoneadm`(1M).

You can use the `verify` subcommand only from a global-cluster node.

Options **Note –** The short and long form of each option are shown in this section.

The following options are supported:

`-?`
`--help`

Displays help information.

You can specify this option with or without a *subcommand*.

If you do not specify a *subcommand*, the list of all available subcommands is displayed.

If you specify a *subcommand*, the usage for that subcommand is displayed.

If you specify this option and other options, the other options are ignored.

`-a` *absolute_path_to_archive s10zoneclustername*

Specifies the path to a `flash_archive`(4), `cpio`(1), `pax`(1), `xus-tar`, `zfs archive`, or a `level 0 ufsdump(1M)` of an installed Oracle Solaris 10 system, an installed Solaris 10 native zone, or a `solaris10` branded zone. For more information, see the following man pages: `solaris10`(5), `flash_archive`(4), `cpio`(1), and `pax`(1).

`-c` *config_profile*`.xml`
`--configprofile` *config_profile*`.xml`

Specifies a configuration profile template for a `solaris` brand zone cluster. After installation from the repository, the template applies the system configuration information to all nodes of the zone cluster. If *config_profile*`.xml` is not specified, you must manually configure each zone-cluster node by running from the global zone on each node the `zlogin -C` *zoneclustername* command. All profiles must have a `.xml` extension.

The `-c` option replaces the hostname of the zone-cluster node in the configuration profile template. The profile is applied to the zone-cluster node after booting the zone-cluster node.

`-d` *absolute_root_path*
`--dirpath` *dirpatch*

When the `-d` option is used with the `cluster` subcommand, it specifies the path to the root directory of an installed Oracle Solaris 10 system. The path should be accessible on all the physical nodes of the cluster where the zone cluster will be installed.

`-d`
`--dvd-directory` *dvd-directory*
Specifies the DVD image directory.

When the `-d` option is used with the `install-cluster` subcommand, it specifies the DVD image directory for an Oracle Solaris Cluster release that supports `solaris10` brand zones. The DVD image includes core packages and other cluster software components, such as agents, that are supported in the zone cluster and Geographic Edition software. The DVD directory must be accessible from the global zone of the node where you run the command.

`-f`{*commandfile* | *zonepath*}
`--file-argument` {*commandfile* | *zonepath*}
When used with the `configure` subcommand, the `-f` option specifies the command file argument. For example, `clzonecluster configure -f` *commandfile*. When used with the `move` subcommand, the `-f` option specifies the *zonepath*.

`-F`
`--force`
You can use the `-F` option during `delete` and `uninstall` operations. The `-F` option forcefully suppresses the `Are you sure you want to` *do this operation* `[y/n]?` questions.

`-m` *method*
`--method` *method*
Use the `-m` option to clone a zone cluster. The only valid method for cloning is the `copy` command. Before you run the `clone` subcommand, you must halt the source zone cluster.

`-M` *manifest*`.xml`
`--manifest` *manifest*`.xml`
Use the `-M` option to specify a manifest for all nodes of a `solaris` brand zone cluster. The manifest specifies the Oracle Solaris package information and the Oracle Solaris Cluster package for a zone cluster installation.

`-n` *nodename*[…]
`--nodelist` *nodename*[,…]
Specifies the node list for the subcommand.

For example, `clzonecluster boot -n` *phys-schost-1*, *phys-schost-2 zoneclustername*.

`-o`
`--offline`
Boots or reboots a zone cluster into `offline-running` mode.

The `offline-running` mode occurs when the zone-cluster node is out of zone cluster membership but the Oracle Solaris zone state is running. Zone clusters share the boot mode (cluster or non-cluster mode) with the physical cluster, so being offline is different from the cluster being in non-cluster mode.

To boot the zone cluster into offline-running mode, type the following.

clzonecluster boot [-n *phys-schost-1*,**...] [-o]** *zoneclustername*

To reboot the zone cluster into offline-running mode, type the following.

clzonecluster reboot [-n *phys-schost-1*,**...] [-o]** *zoneclustername*

To boot an `offline-running` zone cluster back into `online-running` mode, run the `clzonecluster reboot` command without the `-o` option.

`-p` *name=value*
`--property=`*name=value*
`--property` *name=value*

The `-p` option is used with the `install-cluster` subcommand and the `set` subcommand. For information about usage of `-p` with the `install-cluster` subcommand, see the description for `-p patchdir=`*patchdir*[,`patchlistfile=`*patchlistfile*].

The `-p` option is used with the set subcommand to specify values of properties. Multiple instances of `-p` *name=value* are allowed.

Use this option with the `set` subcommand to modify the following properties:

`resource_security`

Specifies a security policy for execution of programs by RGM resources. Permissible values of `resource_security` are `SECURE`, `WARN`, `OVERRIDE`, or `COMPATIBILITY`.

Resource methods such as Start and Validate always run as root. If the method executable file has non-root ownership or group or world write permissions, an insecurity exists. In this case, if the `resource_security` property is set to `SECURE`, execution of the resource method fails at run time and an error is returned. If `resource_security` has any other setting, the resource method is allowed to execute with a warning message. For maximum security, set `resource_security` to `SECURE`.

The `resource_security` setting also modifies the behavior of resource types that declare the `application_user` resource property. For more information, see the `application_user` section of the `r_properties(5)` man page.

`-p patchdir=`*patchdir*[,`patchlistfile=`*patchlistfile*]
`--patch-specification=patchdir=`*patchdir*[`,patchlistfile=`*patchlistfile*]
`--patch-specification patchdir=`*patchdir*[`,patchlistfile=`*patchlistfile*]

The `patchdir` and `patchlistfile` properties specified by the `-p` option are used only with the `install-cluster` subcommand. If you install patches after the core packages have been installed, the zone cluster must be booted to an `offline-running` state in order to apply patches.

Multiple instances of `-p` *name=value* are allowed.

`patchdir`

Specifies the directory that contains Oracle Solaris Cluster patches that you want to apply to the `solaris10` brand zone. The `patchdir` directory is required, and must be accessible from inside the `solaris10` brand zone on all nodes of the zone cluster.

`patchlistfile`
Specifies the `patchlistfile`. The `patchlistfile` specifies a file containing the list of patches to install. If the optional `patchlistfile` is not specified, the command attempts to install all the patches inside the `patchdir` directory. You can also create a `patchlistfile` in the `patchdir` directory to list the patch IDs, one per line, to indicate the patches you want to install.

`-s`
`--software-component` {`all` | *software-component*[,...]}
Specifies the software components to install from the DVD image.

These components are in addition to the core packages, and can be data services that are supported in zone clusters or Geographic Edition software. When you use `-s all`, no other components can be specified and all data services and Geographic Edition software are installed. For data service agents, the component name is the agent name. For Geographic Edition software, specify it as `-s geo`. If you do not specify the `-s` option, only cluster framework software is installed.

`-v`
`--verbose`
Displays verbose information on the standard output (`stdout`).

`-V`
`--version`
Displays the version of the command.

If you specify this option with other options, with subcommands, or with operands, they are all ignored. Only the version of the command is displayed. No other processing occurs.

`-Z` *target-zoneclustername*
`--zonecluster` *target-zoneclustername*
The zone cluster name that you want to clone.

Use the source zone-cluster name for cloning. The source zone cluster must be halted before you use this subcommand.

Resources and Properties

The `clzonecluster` command supports several resources and properties for zone clusters.

You must use the `clzonecluster` command to configure any resources and properties that are supported by the `clzonecluster` command. See the `zonecfg`(1M) man page for more information on configuring resources or properties that are not supported by the `clzonecluster` command.

The following subsections, "Resources" and "Properties", describe those resources and properties that are supported by the `clzonecluster` command.

Resources The following lists the resource types that are supported in the resource scope and where to find more information:

admin

For more information, see the `zonecfg(1M)` man page. This resource can be used in both the cluster scope and the node scope. This resource is passed down to the individual Oracle Solaris zone level. When the resource is specified in both cluster and node scope, the node scope resource information is passed down to the Oracle Solaris zone of the specific node of the zone cluster.

The `auths` property of the `admin` resource can be set to one of the following values:

`clone` Equivalent to `solaris.zone.clonefrom`

`login` Equivalent to `solaris.zone.login`

`manage` Equivalent to `solaris.zone.manage`

capped-cpu

For more information, see the `zonecfg(1M)` man page. This resource can be used in both the cluster scope and the node scope. This resource is passed down to the individual Oracle Solaris zone level. When the resource is specified in both cluster and node scope, the node scope resource information is passed down to the Oracle Solaris zone of the specific node of the zone cluster.

capped-memory

For more information, see the `zonecfg(1M)` man page. This resource can be used in the cluster scope and the node scope. This resource is passed down to the individual Oracle Solaris zone level. When the resource is specified in both cluster and node scope, the node scope resource information is passed down to the Oracle Solaris zone of the specific node of the zone cluster.

dataset

For more information, see the `zonecfg(1M)` man page. This resource can be used in the cluster scope or the node scope. You cannot specify a data set in both cluster and node scope.

The resource in cluster scope is used to export a ZFS data set to be used in the zone cluster for a highly-available ZFS file system. The exported data set is managed by the Oracle Solaris Cluster software, and is not passed down to the individual Oracle Solaris zone level when specified in the cluster scope. A data set cannot be shared between zone clusters.

The resource in node scope is used to export a local ZFS dataset to a specific zone-cluster node. The exported data set is not managed by the Oracle Solaris Cluster software, and is passed down to the individual Oracle Solaris zone level when specified in the node scope.

dedicated-cpu

For more information, see the `zonecfg(1M)` man page. You can use a fixed number of CPUs that are dedicated to the zone cluster on each node.

This resource can be used in the cluster scope and the node scope. This resource is passed down to the individual Oracle Solaris zone level. When the resource is specified in both cluster and node scope, the node scope resource information is passed down to the Oracle Solaris zone of the specific node of the zone cluster.

device

For more information, see the `zonecfg(1M)` man page. This resource is passed down to the individual Oracle Solaris zone level and can be specified in the cluster scope or the node scope. The resource in the node scope is used to add devices specific to a zone-cluster node. You can add a device to only one zone cluster. You cannot add the same device to both the cluster scope and the node scope.

fs

For more information, see the `zonecfg(1M)` man page. You can specify this resource in the cluster scope or the node scope. You cannot specify the `fs` resource in both cluster and node scope.

The resource in cluster scope is generally used to export a file system to be used in the zone cluster. The exported file system is managed by the Oracle Solaris Cluster software, and is not passed down to the individual Oracle Solaris zone level, except for an `lofs` file system with the `cluster-control` property set to`false`. For more information about the `cluster-control` property, see the description for `fs` in the Resources section of this man page.

The resource in node scope is used to export a local file system to a specific zone cluster node. The exported file system is not managed by the Oracle Solaris Cluster software, and is passed down to the individual Oracle Solaris zone level when specified in the node scope.

You can export a file system to a zone cluster by using either a direct mount or a loopback mount. A direct mount makes the file system accessible inside the zone cluster by mounting the specified file system at a location that is under the root of the zone, or some subdirectory that has the zone root in its path. A direct mount means that the file system belongs exclusively to this zone cluster. When a zone cluster runs on Oracle Solaris Trusted Extensions, the use of direct mounts is mandatory for files mounted with both read and write privileges. Zone clusters support direct mounts for UFS, QFS standalone file system, QFS shared file system, and ZFS (exported as a data set).

A loopback mount is a mechanism for making a file system already mounted in one location appear to be mounted in another location. You can export a single file system to multiple zone clusters through the use of one loopback mount per zone cluster. This makes it possible to share a single file system between multiple zone clusters. The administrator must consider the security implications before sharing a file system between multiple zone clusters. Regardless of how the real file system is mounted, the loopback mount can restrict access to read-only.

fs: cluster-control

The `cluster-control` property applies only to loopback mounts specified in the cluster scope. The default value for the `cluster-control` property is `true`.

When the property value is `true`, Oracle Solaris Cluster manages this file system and does not pass the file system information to the `zonecfg` command. Oracle Solaris Cluster mounts and unmounts the file system in the zone-cluster node as needed after the zone boots.

Oracle Solaris Cluster can manage loopback mounts for QFS shared file systems, UFS, QFS standalone file systems, and PxFS on UFS.

When the property value is `false`, Oracle Solaris Cluster does not manage the file system. The cluster software passes this file system information and all associated information to the `zonecfg` command, which creates the zone-cluster zone on each machine. In this case, the Oracle Solaris software mounts the file system when the zone boots. The administrator can use this option with the UFS file system.

The administrator can specify a loopback mount in the cluster scope. Configuring the loopback mount with a `cluster-control` property value of `false` is useful for read-only mounts of common local directories (such as directories that contain executable files). This information is passed to the `zonecfg` command, which performs the actual mounts. Configuring the loopback mount with a `cluster-control` property value of `true` is useful for making the global file systems (PxFS) or shared QFS file systems available to a zone cluster that is under cluster control.

QFS shared file sytems, UFS, QFS standalone file systems, and ZFS are configured in at most one zone cluster.

net

For more information about net resources, see the `zonecfg(1M)` man page.

Any net resource managed by Oracle Solaris Cluster, such as Logical Host or Shared Address, is specified in the cluster scope. Any net resource managed by an application, such as an Oracle RAC VIP, is specified in the cluster scope. These net resources are not passed to the individual Oracle Solaris zone level.

The administrator can specify the Network Interface Card (NIC) to use with the specified IP Address. The system automatically selects a NIC that satisfies the following two requirements:

- The NIC already connects to the same subnet.
- The NIC has been configured for this zone cluster.

node

The node resource performs the following two purposes:

- Identifies a scope level. Any resource specified in a node scope belongs exclusively to this specific node.

- Identifies a node of the zone cluster. The administrator identifies the machine where the zone will run by identifying the global cluster global zone on that machine. Specifying an IP address and NIC for each zone-cluster node is optional. The administrator also specifies information identifying network information for reaching this node.

Note – If the administrator does not configure an IP address for each zone-cluster node, two things will occur:

1. That specific zone cluster will not be able to configure NAS devices for use in the zone cluster. The cluster uses the IP address of the zone-cluster node when communicating with the NAS device, so not having an IP address prevents cluster support for fencing NAS devices.
2. The cluster software will activate any Logical Host IP address on any NIC.

priv-net

This resource can be used in the node scope. This resource specifies the data link device that can be used as the private adapter of the zone cluster. The resource must be available in the global zone before it is assigned to the zone cluster. When the exclusive-IP zone cluster is configured, the `enable_priv_net` property is set to `true` by default to enable private network communication between the nodes of the zone cluster.

`add node`
add privnet
set physical=vnic1
end
add privnet
set physical=vnic5
end
`end`

The ordering of the resource property `privnet` is used to form paths between zone cluster nodes. The first `privnet` adapter specified in the first node will try to form a path with the first `privnet` path specified in the second node. The ordering of the `privnet` resource is preserved across add and delete operations.

Note – The `privnet` resource cannot be shared among multiple exclusive-IP zones. You must assign it to a specific exclusive-IP zone.

rctl

For more information, see the `zonecfg`(1M) man page. This resource can be used in both the cluster scope and the node scope. This resource is passed down to the individual Oracle Solaris zone level. When the resource is specified in both cluster and node scope, the node scope resource information is passed down to the Oracle Solaris zone of the specific node of the zone cluster.

sysid

See the `sysidcfg`(4) man page. This resource specifies the system identification parameters for all zones of the `solaris10` zone cluster.

Properties

Each resource type has one or more properties. The following properties are supported for cluster:

(cluster)
admin

For more information, see the `zonecfg`(1M) man page.

(cluster)
allowed-address

Specifies the IP addresses that can be plumbed on the adapter. Only specific IP addresses are allowed. This optional property is used for the node scope net resource. For example:

```
set allowed-address=1.2.2.3/24
```

For more information, see the `zonecfg`(1M) man page.

(cluster)
attr

For more information, see the `zonecfg`(1M) man page. The zone cluster will use the property `name` set to `cluster`, property `type` set to `boolean`, and property `value` set to `true`. These properties are set by default when the zone cluster is configured with the `create` option. These properties are mandatory for a zone cluster configuration and cannot be changed.

(cluster)
autoboot

For more information, see the `zonecfg`(1M) man page.

(cluster)
bootargs

For more information, see the `zonecfg`(1M) man page.

(cluster)
brand

For more information, see the `zonecfg`(1M) man page. The solaris, solaris10, and `labeled` brands are the only brand types supported.

(cluster)
cpu-shares

For more information, see the `zonecfg`(1M) man page.

(cluster)
device

`zonecfg`(1M).

(cluster)
enable_priv_net

When set to true, Oracle Solaris Cluster private network communication is enabled between the nodes of the zone cluster. The Oracle Solaris Cluster private hostnames and IP addresses for the zone cluster nodes are automatically generated by the system. Private network is disabled if the value is set to false. The default value is true.

(cluster)
ip-type

For more information, see the `zonecfg`(1M) man page. shared is the only value supported.

(cluster)
limitpriv

For more information, see the `zonecfg`(1M) man page.

(cluster)
max-lwps

For more information, see the `zonecfg`(1M) man page.

(cluster)
max-msg-ids

For more information, see the `zonecfg`(1M) man page.

(cluster)
max-sem-ids

For more information, see the `zonecfg`(1M) man page.

(cluster)
max-shm-ids

For more information, see the `zonecfg`(1M) man page.

(cluster)
monitor_quantum

Defines the number of milliseconds for the quantum value.

(cluster)
monitor_timeout

Specifies the number of milliseconds for the monitor timeout.

(cluster)
max-shm-memory

For more information, see the `zonecfg`(1M) man page.

(cluster)
pool

For more information, see the zonecfg(1M) man page.

(cluster)
zonename

The name of the zone cluster, as well as the name of each zone in the zone cluster.

(cluster)
zonepath

The zonepath of each zone in the zone cluster.

admin
For more information, see the zonecfg(1M) man page.

capped-cpu
For more information, see the zonecfg(1M) man page.

capped-memory
For more information, see the zonecfg(1M) man page.

dataset
For more information, see the zonecfg(1M) man page.

dedicated-cpu
For more information, see the zonecfg(1M) man page.

device
For more information, see the zonecfg(1M) man page.

fs
For more information, see the zonecfg(1M) man page.

inherit pkg-dir
For more information, see the zonecfg(1M) man page.

net
For more information, see the zonecfg(1M) man page.

node
Includes `physical-host`, `hostname`, and `net`.

- `physical-host` – This property specifies a global cluster node that will host a zone-cluster node.
- `hostname` – This property specifies the public host name of the zone-cluster node on the global cluster node specified by the physical-host property.

- net – This resource specifies a network address and physical interface name for public network communication by the zone-cluster node on the global cluster node specified by physical-host.

rctl

See zonecfg(1M).

sysid

Use the /usr/bin/sysconfig configure command. See sysidcfg(4). Includes root_password, name_service, security_policy, system_locale, timezone, terminal, and nfs4_domain. The administrator can later manually change any sysidcfg config value following the normal Oracle Solaris procedures one node at a time.

- root_password – This property specifies the encrypted value of the common root password for all nodes of the zone cluster. Do not specify a clear text password. Encrypted password string from /etc/shadow must be used. This is a required property.
- name_service – This optional property specifies the naming service to be used in the zone cluster. However, the settings in the global zone's /etc/sysidcfg file might be stale. To ensure that this property has the correct setting, enter the value manually by using the clzonecluster command.
- security_policy – The value is set to none by default.
- system_locale – The value is obtained from the environment of the clzonecluster command by default.
- timezone – This property specifies the time zone to be used in the zone cluster. The value by default is obtained from the environment of the clzonecluster command.
- terminal – The value is set to xterm by default.
- nfs4_domain – The value is set to dynamic by default.

Examples

In all the examples, the *zoneclustername* is sczone. The first global-cluster node is phys-schost-1 and the second node is phys-schost-2. The first zone-cluster node is zc-host-1 and the second one is zc-host-2.

EXAMPLE 1 Creating a New Zone Cluster

The following example demonstrates how to create a two-node solaris10 brand zone cluster. A zpool "tank" is delegated to the zone to be used as a highly-available ZFS file system. Memory capping is used to limit the amount of memory that can be used in the zone cluster. Default system identification values are used, except for the root password.

```
phys-schost-1# clzonecluster configure sczone
sczone: No such zone cluster configured
Use 'create' to begin configuring a new zone cluster.
clzc:sczone> create -b
clzc:sczone> set zonepath=/zones/timuzc
clzc:sczone> set brand=solaris10
```

EXAMPLE 1 Creating a New Zone Cluster *(Continued)*

```
clzc:sczone> set autoboot=true
clzc:sczone> set bootargs="-m verbose"
clzc:sczone> set limitpriv="default,proc_priocntl,proc_clock_highres"
clzc:sczone> set enable_priv_net=true
clzc:sczone> set ip-type=shared
clzc:sczone> add dataset
clzc:sczone:dataset> set name=tank
clzc:sczone:dataset> end
clzc:sczone> add capped-memory
clzc:sczone:capped-memory> set physical=3G
clzc:sczone:capped-memory> end
clzc:sczone> add rctl
clzc:sczone:rctl> set name=zone.max-swap
clzc:sczone:rctl> add value (priv=privileged,limit=4294967296,action=deny)
clzc:sczone:rctl> end
clzc:sczone> add rctl
clzc:sczone:rctl> set name=zone.max-locked-memory
clzc:sczone:rctl> add value (priv=privileged,limit=3221225472,action=deny)
clzc:sczone:rctl> end
clzc:sczone> add attr
clzc:sczone:attr> set name=cluster
clzc:sczone:attr> set type=boolean
clzc:sczone:attr> set value=true
clzc:sczone:attr> end
clzc:sczone> add node
clzc:sczone:node> set physical-host=ptimu1
clzc:sczone:node> set hostname=zc-host-1
clzc:sczone:node> add net
clzc:sczone:node:net> set address=vztimu1a
clzc:sczone:node:net> set physical=sc_ipmp0
clzc:sczone:node:net> end
clzc:sczone:node> end
clzc:sczone> add node
clzc:sczone:node> set physical-host=ptimu2
clzc:sczone:node> set hostname=zc-host-2
clzc:sczone:node> add net
clzc:sczone:node:net> set address=vztimu2a
clzc:sczone:node:net> set physical=sc_ipmp0
clzc:sczone:node:net> end
clzc:sczone:node> end
clzc:sczone> add fs
clzc:sczone:fs> set dir=/opt/local
clzc:sczone:fs> set special=/usr/local
clzc:sczone:fs> set type=lofs
clzc:sczone:fs> add options [ro,nodevices]
clzc:sczone:fs> set cluster-control=false
```

EXAMPLE 1 Creating a New Zone Cluster *(Continued)*

```
clzc:sczone:fs> end
clzc:sczone> add sysid
clzc:sczone> set root_password=ZiitH.NOLOrRg
clzc:sczone> set name_service="NIS{domain_name=mycompany.com name_server=
     ns101c-90(10.100.10.10)}"
clzc:sczone> set nfs4_domain=dynamic
clzc:sczone> set security_policy=NONE
clzc:sczone> set system_locale=C
clzc:sczone> set terminal=xterms
clzc:sczone> set timezone=US/Pacific
clzc:sczone> end
```

If you were to use the `create` subcommand (rather than the `create -b` subcommand shown above), the default template would be used and it already has the `attr` properties set.

The zone cluster is now configured. The following commands install and then boot the zone cluster from a global-cluster node:

```
phys-schost-1# clzonecluster install -a absolute_path_to_archive install sczone
```

```
phys-schost-1# clzonecluster boot sczone
```

EXAMPLE 2 Modifying an Existing Zone Cluster

The following example shows how to modify the configuration of the zone cluster created in Example 1. An additional public IP address is added to the zone-cluster node on `phys-schost-2`.

A UFS file system is exported to the zone cluster for use as a highly-available file system. It is assumed that the UFS file system is created on an Oracle Solaris Volume Manager metadevice.

```
phys-schost-1# clzonecluster configure sczone
clzc:sczone> add device
clzc:sczone:device> set match=/dev/md/1/dsk/d100
clzc:sczone:device> end
clzc:sczone> add device
clzc:sczone:device> set match=/dev/md/oraset/dsk/d100
clzc:sczone:device> end
clzc:sczone> select node physical-host=phys-schost-2
clzc:sczone:node> add net
clzc:sczone:node:net> set address=192.168.0.3/24
clzc:sczone:node:net> set physical=bge0
clzc:sczone:node:net> end
clzc:sczone:node> end
clzc:sczone> add fs
clzc:sczone:fs> set dir=/qfs/ora_home
clzc:sczone:fs> set special=oracle_home
clzc:sczone:fs> set type=samfs
```

EXAMPLE 2 Modifying an Existing Zone Cluster *(Continued)*

```
clzc:sczone:fs> end
clzc:sczone> exit
```

EXAMPLE 3 Creating a New Zone Cluster Using an Existing Zone Cluster as a Template

The following example shows how to create a zone cluster called `sczone1`, using the `sczone` zone cluster created in Example 1 as a template. The new zone cluster's configuration will be the same as the original zone cluster. Some properties of the new zone cluster need to be modified to avoid conflicts. When the administrator removes a resource type without specifying a specific resource, the system removes all resources of that type. For example, **`remove net`** causes the removal of all net resources.

```
phys-schost-1# clzonecluster configure sczone1
sczone1: No such zone cluster configured
Use 'create' to begin configuring a new zone cluster.

clzc:sczone1> create -t sczone
clzc:sczone1>set zonepath=/zones/sczone1

clzc:sczone1> select node physical-host=phys-schost-1
clzc:sczone1:node> set hostname=zc-host-3
clzc:sczone1:node> select net address=zc-host-1
clzc:sczone1:node:net> set address=zc-host-3
clzc:sczone1:node:net> end
clzc:sczone1:node> end
clzc:sczone1> select node physical-host=phys-schost-2
clzc:sczone1:node> set hostname=zc-host-4
clzc:sczone1:node> select net address=zc-host-2
clzc:sczone1:node:net> set address=zc-host-4
clzc:sczone1:node:net> end
clzc:sczone1:node> remove net address=192.168.0.3/24
clzc:sczone1:node> end
clzc:sczone1> remove dataset name=tank/home
clzc:sczone1> remove net
clzc:sczone1> remove device
clzc:sczone1> remove fs dir=/qfs/ora_home
clzc:sczone1> exit
```

Operands

The following operands are supported:

zoneclustername — The name of the zone cluster. You specify the name of the new zone cluster. The *zoneclustername* operand is supported for all subcommands.

+ — All nodes in the cluster. The + operand is supported only for a subset of subcommands.

Exit Status

The complete set of exit status codes for all commands in this command set are listed on the Intro(1CL) man page.

If the command is successful for all specified operands, it returns zero (CL_NOERR). If an error occurs for an operand, the command processes the next operand in the operand list. The returned exit code always reflects the error that occurred first.

This command returns the following exit status codes:

0 CL_NOERR
No error.

The command that you issued completed successfully.

1 CL_ENOMEM
Not enough swap space.

A cluster node ran out of swap memory or ran out of other operating system resources.

3 CL_EINVAL
Invalid argument.

You typed the command incorrectly, or the syntax of the cluster configuration information that you supplied with the -i option was incorrect.

18 CL_EINTERNAL
Internal error was encountered.

36 CL_ENOENT
No such object

The object that you specified cannot be found for one of the following reasons:

- The object does not exist.
- A directory in the path to the configuration file that you attempted to create with the -o option does not exist.
- The configuration file that you attempted to access with the -i option contains errors.

37 CL_EOP
Operation not allowed

You tried to perform an operation on an unsupported configuration, or you performed an unsupported operation.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Interface Stability	Evolving

See Also `clnode(1CL)`, `cluster(1CL)`, `Intro(1CL)`, `scinstall(1M)`, `zoneadm(1M)`, `zonecfg(1M)`, `clconfiguration(5CL)`

Notes The superuser can run all forms of this command.

All users can run this command with the `-?` (help) or `-V` (version) option.

To run the `clzonecluster` command with subcommands, users other than superuser require RBAC authorizations. See the following table.

Subcommand	RBAC Authorization
`boot`	`solaris.cluster.admin`
`check`	`solaris.cluster.read`
`clone`	`solaris.cluster.admin`
`configure`	`solaris.cluster.admin`
`delete`	`solaris.cluster.admin`
`export`	`solaris.cluster.admin`
`halt`	`solaris.cluster.admin`
`install`	`solaris.cluster.admin`
`list`	`solaris.cluster.read`
`monitor`	`solaris.cluster.modify`
`move`	`solaris.cluster.admin`
`ready`	`solaris.cluster.admin`
`reboot`	`solaris.cluster.admin`
`show`	`solaris.cluster.read`
`status`	`solaris.cluster.read`
`uninstall`	`solaris.cluster.admin`
`unmonitor`	`solaris.cluster.modify`
`verify`	`solaris.cluster.admin`

REFERENCE

OSC4 1ha

Name rt_callbacks – callback interface for management of services as Oracle Solaris Cluster resources

Synopsis *method-path* `-R` *resource* `-T` *type* `-G` *group* `[-Z` *zonename*`]`

validate-path `[-c | -u] -R` *resource* `-T` *type* `-G` *group* `[-r` *prop*=*val*`] [-x` *prop*=*val*`] [-g` *prop*=*val*`] [-Z` *zonename*`] [-X` *prop*{*nodeid*}=*val*`]`

Description The callback interface for Oracle Solaris Cluster resource types defines the interface that the Resource Group Manager (RGM) uses to control services as cluster resources. The implementor of a resource type provides programs or scripts that serve as the callback methods.

method-path The path to the program that is declared in the resource-type registration file. This program is registered with the `clresourcetype` command as one of the following callback methods for the resource type: `START`, `STOP`, `INIT`, `FINI`, `BOOT`, `PRENET_START`, `POSTNET_STOP`, `MONITOR_START`, `MONITOR_STOP`, `MONITOR_CHECK`, or `UPDATE`. See the `clresourcetype(1CL)` and `rt_reg(4)` man pages.

validate-path The path to the program that is declared as a resource type's `VALIDATE` method in the resource-type registration file. This program is registered with the `clresourcetype` command.

The callback methods are passed prescribed options and are expected to take specific actions to control the operation of the service on the cluster.

The resource-type developer declares the paths to the callback method programs in the resource-type registration file. The cluster administrator uses the `clresourcetype` command to register the resource type in the cluster configuration. The cluster administrator can then use this registered resource type to create resources. These resources are configured in resource groups that the RGM manages.

The RGM responds to events by automatically invoking the callback methods of the resources in the resource groups that the RGM manages. The callback methods are expected to take specific actions on the service that is represented by the resource. Examples of these actions include stopping and starting the service on a cluster node.

The exit status code that is returned from the callback method indicates to the RGM whether the callback method succeeded or failed. The RGM takes action if a method fails, or it reports the failure in the resource state. As a result, the cluster administrator can note the failure and take appropriate action.

Options The following options are supported:

`-c`
Specifies that the method is called when the cluster administrator creates the resource to validate the initial settings of *all* resource and resource-group properties.

The RGM specifies either the `-c` option or the `-u` option, but never both options at the same time.

When the cluster administrator creates a resource and the `VALIDATE` method is called, *all* system-defined, extension, and resource-group properties are passed to the `VALIDATE` method. When the cluster administrator updates a resource and the `VALIDATE` method is called, only the properties that are being updated are passed to the `VALIDATE` method.

`-g` *prop*=*val*
Specifies the value of a resource-group property that is passed to a `VALIDATE` method.

prop The name of a resource-group property.

val The value that is passed to the method when the cluster administrator creates or updates the resource.

`-G` *group*
Specifies the name of the resource group in which the resource is configured.

`-r` *prop*=*val*
Specifies the value of a system-defined resource property that is passed to a `VALIDATE` method.

prop The name of a system-defined resource property.

val The value that is passed to the method when the cluster administrator creates or updates the resource.

`-R` *resource*
Specifies the name of the resource for which the method is invoked.

`-T` *type*
Specifies the name of the resource type of the resource.

`-u`
Specifies that the method is called when the cluster administrator updates a property of an existing resource or an existing resource group.

The RGM specifies either the `-c` option or the `-u` option, but never both options at the same time.

When the cluster administrator creates a resource and the `VALIDATE` method is called, *all* system-defined, extension, and resource-group properties are passed to the `VALIDATE` method. When the cluster administrator updates a resource and the `VALIDATE` method is called, only the properties that are being updated are passed to the `VALIDATE` method.

`-x` *prop*=*val*
Specifies the value of a resource extension property for the local node.

prop The name of a resource extension property. An extension property is defined by the resource-type implementation. This extension property is declared in the parameters table of the resource-type registration file.

val The value that is passed to the method when the cluster administrator creates or updates the resource.

`-X` *prop*{*nodeid*}=*val*
Specifies the value of a resource per-node extension property for a specified node.

prop The name of a resource extension property. An extension property is defined by the resource-type implementation. This extension property is declared as a per-node property in the parameters table of the resource-type registration file.

node An integer node ID. This specifies the node on which the per-node property value is set.

val The value that is passed to the method when the cluster administrator creates or updates the resource.

`-Z` *zonename*
Specifies the name of the non-global zone in which a resource group is configured to run.

If the `Global_zone` resource-type property is set to `TRUE`, methods execute in the global zone, even if the resource group that contains the resource runs in a non-global zone. This option provides the name of the non-global zone in which the resource group is configured to run.

The `-Z` option is not passed whenever either of the following conditions is met:

- The `Global_zone` property is set to `FALSE`.
- The resource group is configured to run in the global zone.

Usage The callback methods are defined by the RGM mechanism that invokes them. These methods are expected to execute operations on a cluster resource. These methods are also expected to return an exit status that reports whether the method succeeded or failed. The following section describes each callback method.

`BOOT`
This method is invoked when a node joins or rejoins the cluster when it is booted or rebooted. This method is called on nodes that are specified by the `Init_nodes` resource-type property. Similar to `INIT`, this method is intended to initialize the resource on nodes that join the cluster after the resource group that contains the resource has been brought online. This method is invoked on resources that are in managed resource groups but not on resources that are in unmanaged resource groups.

`FINI`
This method is invoked when the resource group that contains the resource is removed from management by the RGM. This method is called on nodes that are specified by the

Init_nodes resource-type property. This method unconfigures the resource and cleans up any persistent settings that are made by the INIT method or the BOOT method.

INIT
This method is invoked when the resource group that contains the resource is put under the management of the RGM. This method is called on nodes that are specified by the Init_nodes resource-type property. This method initializes the resource.

MONITOR_CHECK
This method is called before the resource group that contains the resource is relocated to a new node. This method is called when the fault monitor executes the GIVEOVER option of either the scha_control command or the scha_control() function. See the scha_control(1HA) and the scha_control(3HA) man pages.

This method is called on any node that is a potential new master for the resource group. The MONITOR_CHECK method assesses whether a node is healthy enough to run a resource. The MONITOR_CHECK method must be implemented in such a way that it does not conflict with the running of another method concurrently.

If the MONITOR_CHECK method fails, it vetoes the relocation of the resource group to the node where the callback was invoked.

MONITOR_START
This method is called after the resource is started, on the same node where the resource is started. This method starts a monitor for the resource.

MONITOR_START failure causes the RGM to set the resource state to MONITOR_FAILED.

MONITOR_STOP
This method is called before the resource is stopped, on the same node where the resource is running. This method stops a monitor for the resource. This method is also called when monitoring is disabled by the cluster administrator.

The action that the RGM takes when a MONITOR_STOP method fails depends on the setting of the Failover_mode property for the resource. If Failover_mode is set to HARD, the RGM attempts to forcibly stop the resource by rebooting the node. Otherwise, the RGM sets the resource's state to STOP_FAILED.

POSTNET_STOP
An auxiliary to the STOP method, this method is intended to perform shutdown actions that are needed after the related network address is configured down. This method is called on nodes where the STOP method has been called. This method is invoked after the network addresses in the resource group have been configured down, and after the STOP method for the resource has been called. However, this method is invoked before the network addresses have been unplumbed. The POSTNET_STOP method is called after the STOP method for the resource and after the POSTNET_STOP method of any resource that depends on the resource.

The action that the RGM takes when a POSTNET_STOP method fails depends on the setting of the Failover_mode property for the resource. If Failover_mode is set to HARD, the RGM attempts to forcibly stop the resource by aborting the node. Otherwise, the RGM sets the resource's state to STOP_FAILED.

PRENET_START
An auxiliary to the START method, this method is intended to perform startup actions that are needed before the related network address is configured up. This method is called on nodes where the START method is to be called. This method is invoked after network addresses in the same resource group have been plumbed. However, this method is invoked before the addresses have been configured up and before the START method for the resource is called. The PRENET_START method is called before the START method for the resource and before the PRENET_START method of any resource that depends on the resource.

The action that the RGM takes when a PRENET_START method fails depends on the setting of the Failover_mode property for the resource. If Failover_mode is set to SOFT or HARD, the RGM attempts to relocate the resource group that contains the resource to another node. Otherwise, the RGM sets the resource's state to START_FAILED.

START
This method is invoked on a cluster node when the resource group that contains the resource is brought online on that node. The cluster administrator can toggle the state between on and off by using the clresourcegroup command. The START method activates the resource on a node.

The action that the RGM takes when a START method fails depends on the setting of the Failover_mode property for the resource. If Failover_mode is set to SOFT or HARD, the RGM attempts to relocate the resource's group to another node. Otherwise, the RGM sets the resource's state to START_FAILED.

STOP
This method is invoked on a cluster node when the resource group that contains the resource is brought offline on that node. The cluster administrator can toggle the state between on and off by using the clresourcegroup command. This method deactivates the resource if the resource is active.

The action that the RGM takes when a STOP method fails depends on the setting of the Failover_mode property for the resource. If Failover_mode is set to HARD, the RGM attempts to forcibly stop the resource by rebooting the node. Otherwise, the RGM sets the resource's state to STOP_FAILED.

UPDATE
This method is called to notify a running resource that properties have been changed. The UPDATE method is invoked after the RGM succeeds in setting properties of a resource or its resource group. This method is called on nodes where the resource is online. This method

can call the `scha_resource_get` and `scha_resourcegroup_get` commands to read property values that can affect an active resource and adjust the running resource accordingly.

`VALIDATE`

This method is called when a resource is created or when a resource or its containing resource group is updated. `VALIDATE` is called on the set of cluster nodes that are specified by the `Init_nodes` property of the resource's type.

The `VALIDATE` method is called before the creation or update of the resource is applied. If the method fails on a node and a failure exit status code is generated, the creation or update is canceled.

When the cluster administrator creates a resource and the `VALIDATE` method is called, *all* system-defined, extension, and resource-group properties are passed to the `VALIDATE` method. When the cluster administrator updates a resource and the `VALIDATE` method is called, only the properties that are being updated are passed to the `VALIDATE` method. You can use the `scha_resource_get` and `scha_resourcegroup_get` commands to retrieve the properties of the resource that are not being updated.

Resource dependency properties are passed in two different `-r` options on the `VALIDATE` command line. One `-r` option lists only the resource names, and represents the dependencies which are applicable on the local node. The other `-r` option includes the entire dependency list with qualifiers such as `{LOCAL_NODE}`. The property names `Resource_dependencies`, `Resource_dependencies_offline_restart`, `Resource_dependencies_restart`, and `Resource_dependencies_weak` provide the dependency names without qualifiers for the local node. The corresponding property names `Resource_dependencies_Q`, `Resource_dependencies_Q_offline_restart`, `Resource_dependencies_Q_restart`, and `Resource_dependencies_Q_weak` provide the same lists of dependencies with qualifiers.

For example, you set the following:

```
# clresource set -p Resource_dependencies=r1@node1,r2@node2,r3{local_node},r4
```

On node1, the following arguments are passed to the `VALIDATE` method:

```
... -r Resource_dependencies=r1,r3,r4
```

```
-r Resource_dependencies_Q=r1@node1,r2@node2,r3{local_node},r4 ...
```

On node2, the value of the `Resource_dependencies` property will be `r2,r3,r4`, while the value of the `Resource_dependencies_Q` property is the same on all nodes. Similarly, the property names `Resource_dependencies_Q_weak`, `Resource_dependencies_Q_restart`, and `Resource_dependencies_Q_offline_restart` correspond to the dependency properties `Resource_dependencies_weak`, `Resource_dependencies_restart`, and `Resource_dependencies_offline_restart`, respectively.

If you do not explicitly set the `Network_resources_used` property, its value is derived from the four `Resource_dependencies` properties and contains all network address resources appearing in any of those four properties. The derived value of the `Network_resources_used` property on each node reflects any per-node dependencies and might differ from one node to another.

When you implement the `VALIDATE` method, any message that you write to `stdout` or `stderr` is passed back to the user command. This action is useful to explain the reason for a validation failure or to provide instructions to the user regarding the resource.

Environment Variables The Oracle Solaris Cluster resource management callback methods are executed with superuser permission by the RGM. The programs that implement the methods are expected to be installed with appropriate execution permissions, and for security, should not be writable.

Environment variables that are set for callback method execution are as follows:

```
HOME=/
PATH=/usr/bin:/usr/cluster/bin
LD_LIBRARY_PATH=/usr/cluster/lib
```

Signals If a callback method invocation exceeds its timeout period, the process is first sent a `SIGTERM` signal. If the `SIGTERM` signal fails to stop the method execution within ten seconds, the process is sent a `SIGKILL` signal.

Exit Status The following exit status codes are returned.

`0` The command completed successfully.

nonzero An error occurred.

The specific value of a failure exit status does not affect the RGM's action on failure. However, the exit status is recorded in the cluster log when the method fails. A resource-type implementation might define different nonzero exit codes to communicate error information to the cluster administrator through the cluster log.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Evolving

See Also `clresourcegroup(1CL)`, `clresourcetype(1CL)`, `scha_cmds(1HA)`, `scha_control(1HA)`, `scha_resource_get(1HA)`, `scha_resourcegroup_get(1HA)`, `signal(3C)`, `stdio(3C)`, `scha_calls(3HA)`, `scha_control(3HA)`, `rt_reg(4)`, `attributes(5)`

Name scdsbuilder – launch GUI version of Oracle Solaris Cluster Agent Builder

Synopsis `scdsbuilder`

Description The `scdsbuilder` command launches the GUI version of the Oracle Solaris Cluster Agent Builder.

Before you use Agent Builder, verify the following requirements:

- The Java runtime environment is included in your `$PATH` variable. Agent Builder depends on the Java Development Kit, starting with Version 1.6. If the Java Development Kit is not included in your `$PATH` variable, the Agent Builder command (`scdsbuilder`) returns and displays an error message.
- You have installed the Developer System Support software group of the Oracle Solaris OS.
- The `cc` compiler is included in your `$PATH` variable. Agent Builder uses the first occurrence of `cc` in your `$PATH` variable to identify the compiler with which to generate C binary code for the resource type. If `cc` is not included in `$PATH`, Agent Builder disables the option to generate C code.

Note – You can use a different compiler with Agent Builder than the standard `cc` compiler. To use a different compiler, create a symbolic link in `$PATH` from `cc` to a different compiler, such as `gcc`. Or, change the compiler specification in the makefile (currently, `CC=cc`) to the complete path for a different compiler. For example, in the makefile that is generated by Agent Builder, change `CC=cc` to `CC=`*pathname*`/gcc`. In this case, you cannot run Agent Builder directly. Instead, you must use the `make` and `make pkg` commands to generate data service code and the package.

Exit Status This command returns the following exit status codes:

`0` The command completed succesfully.

nonzero An error occurred.

Files *install-directory*`/rtconfig` Contains information from the previous session. This information facilitates the tool's quit and restart feature.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Evolving

See Also `cc`(1B), `scdscreate`(1HA), `scdsconfig`(1HA), `attributes`(5)

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Name scdsconfig – configure resource type template

Synopsis

```
scdsconfig  -s start-command [-u start-method-timeout]
 [-e validate-command] [-y validate-method-timeout]
 [-t stop-command] [-v stop-method-timeout] [-m probe-command]
 [-n probe-timeout] [-d working-directory]
```

Description The `scdsconfig` command configures the resource type template that you created with the `scdscreate(1HA)` command. The `scdsconfig` command enables you to configure C, Generic Data Service (GDS), or Korn shell-based templates for both network aware (client-server model) and non-network aware (clientless) applications.

The `scdsconfig` command configures application-specific commands to start, stop, validate, and probe the application. You can also use the `scdsconfig` command to set timeout values for the `start`, `stop`, `validate`, and `probe` commands. The `scdsconfig` command supports both network aware (client-server model) and non-network aware (clientless) applications. You can run the `scdsconfig` command from the same directory where the `scdscreate` command was run. You can also specify that same directory by using the `-d` option. The `scdsconfig` command configures the resource type template by placing the user-specified parameters at correct locations in the generated code. If C was the type of generated source code, this command also compiles the code. The `scdsconfig` command puts the output into a Solaris package that you can then install. This command creates the package in the `pkg` subdirectory under the $*vendor-id*$*resource-type-name* directory created by the `scdscreate` command.

Options The following options are supported:

`-d` *working-directory*

Specifies the directory where the `scdscreate` command was run.

You must specify this option if you run the `scdsconfig` command from a directory other than the directory where the `scdscreate` command was run.

`-e` *validate-command*

Specifies the absolute path to a command to invoke to validate the application. If you do not specify an absolute path, the application is not validated. The *validate-command* returns with an exit status of `0` if the application is running successfully. An exit status other than `0` indicates that the application is failing to perform correctly. In this case, one of two results occur, depending on the failure history of the application in the past:

- The resources of this resource type are either restarted on the same node.
- The resource group that contains the resource has failed over to another healthy node.

`-m` *probe-command*
: Specifies a command to periodically check the health of the network aware or non-network aware application. It must be a complete command line that can be passed directly to a shell to probe the application. The *probe-command* returns with an exit status of `0` if the application is running successfully. An exit status other than `0` indicates that the application is failing to perform correctly. In this case, one of two results occur, depending on the failure history of the application in the past:

  - The resources of this resource type are either restarted on the same node.
  - The resource group that contains the resource is failed over to another healthy node.

`-n` *probe-timeout*
: Specifies the timeout, in seconds, for the probe command. The timeout must take into account system overloads to prevent false failures. The default value is 30 seconds.

`-s` *start-command*
: Specifies the command that starts the application. The start command must be a complete command line that can be passed directly to a shell to start the application. You can include command-line arguments to specify host names, port numbers, or other configuration data that is necessary to start the application. To create a resource type with multiple independent process trees, you specify a text file that contains the list of commands, one per line, to start the different process trees.

`-t` *stop-command*
: Specifies the stop command for the application. The stop command must be a complete command line that can be passed directly to a shell to stop the application. If you omit this option, the generated code stops the application by issuing signals. The stop command is allotted 80 percent of the timeout value to stop the application. If the stop command fails to stop the application within this period, a `SIGKILL` is allotted 15 percent of the timeout value to stop the application. If `SIGKILL` also fails to stop the application, the stop method returns with an error.

`-u` *start-method-timeout*
: Specifies the timeout, in seconds, for the start command. The timeout must take into account system overloads to prevent false failures. The default value is 300 seconds.

`-v` *stop-method-timeout* — Specifies the timeout, in seconds, for the stop command. The timeout must take into account system overloads to prevent false failures. The default value is 300 seconds.

`-y` *validate-method-timeout* — Specifies the timeout, in seconds, for the validate command. The timeout must take into account system overloads to prevent false failures. The default value is 300 seconds.

Exit Status The following exit status codes are returned:

`0` — The command completed successfully.

nonzero — An error occurred.

Files *working-directory*/`rtconfig` — Contains information from the previous session. Facilitates the tool's quit and restart feature.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Evolving

See Also `ksh(1)`, `scdsbuilder(1HA)`, `scdscreate(1HA)`, `attributes(5)`

Name scdscreate – create an Oracle Solaris Cluster resource type template

Synopsis `scdscreate -V` *vendor-id* `-T` *resource-type-name* `-a [-s]`
`[-n` *RT-version*`] [-d` *working-directory*`] [-k | -g]`

Description The `scdscreate` command creates a template for making an application highly available (HA) or scalable. This command enables you to create C-, Generic Data Service (GDS)-, or Korn shell-based templates for both network aware (client-server model) and non-network aware (clientless) applications.

You can create the template in one of two fundamentally different ways:

GDS
: `scdscreate` creates a set of three driving scripts that work from a single resource type `SUNW.gds`, which is pre-installed on the cluster. These scripts are named start*RT-Name*, stop*RT-Name*, and remove*RT-Name* and starts, stops, and removes an instance of that application. In this model, the implementation of the `SUNW.gds` resource type that is pre-installed on the cluster is immutable.

Generated Source Code
: `scdscreate` creates a template for an Oracle Solaris Cluster resource type, whose instantiations run under the control of the Resource Group Manager (RGM) to make the given application highly available and scalable.

Either model can create templates for network aware (client-server model) and non-network aware (client-less) applications.

`scdscreate` creates a directory of the form $*vendor-id*$*resource-type-name* under *working-directory*. This directory contains the driving scripts, or the generated source, binary, and package files for the resource type. `scdscreate` also creates a configuration file, `rtconfig`, in which you can store configuration information for the resource type. `scdscreate` allows you to create only one resource type per directory. You must create different resource types in different directories.

Options The following options are supported:

`-a`
: This parameter specifies that the resource type that is being created is not network aware. `scdscreate` disables all the networking related code in the template that is created.

`-n` *RT-version*
: This optional parameter specifies the version of the generated resource's type. If you omit this parameter, and you're creating a C- or Korn shell-based application, the text string `1.0` is used by default. If you omit this parameter, and you're creating a GDS-based application, the `RT_version` string of the GDS is used by default. The *RT-version*

distinguishes between multiple registered versions, or upgrades, of the same base resource type.

You cannot include the following characters in *RT-version*: blank, tab, slash (`/`), backslash (`\`), asterisk (`*`), question mark (`?`), comma (`,`), semicolon (`;`), left square bracket (`[`), or right square bracket (`]`).

`-d` *working-directory*
: Creates the template for the resource type in a directory other than the current directory. If you omit this argument, `scdscreate` creates the template in the current directory.

`-g`
: This optional parameter generates the GDS-based form of the template to make an application highly available or scalable.

`-k`
: This optional parameter generates source code in Korn shell command syntax rather than in C. See `ksh(1)`.

`-s`
: This optional parameter indicates that the resource type is scalable. You can configure an instance (resource) of a scalable resource type into a failover resource group, and hence, turn off the scalability feature. If you omit this argument, `scdscreate` creates the template for a failover resource type.

`-T` *resource-type-name*
: The resource type name and resource type version, in conjunction with the vendor ID, uniquely identifies the resource type that is being created.

`-V` *vendor-id*
: The vendor ID is typically the stock symbol, or some other identifier of the vendor that is creating the resource type. `scdscreate` affixes the vendor ID, followed by a period (`.`) to the beginning of the resource type name. This syntax ensures that the resource type name remains unique if more than one vendor uses the same resource type name.

Exit Status

`0`
: The command completed successfully.

nonzero
: An error occurred.

Files

working-directory/`rtconfig`
: Contains information from the previous session and facilitates the quit and restart feature of `scdscreate`.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also ksh(1), scdsbuilder(1HA), scdsconfig(1HA), attributes(5), rt_properties(5)

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Name scha_check_app_user – fetch application username and check ownership and permissions

Synopsis
```
scha_check_app_user [-R resource] [-U username]
 [-Z zoneclustername] cmd-path
```

Description The `scha_check_app_user` command obtains the configured application user name for use by a resource that is under the control of the Resource Group Manager (RGM). It also checks ownership and permissions on an executable file specified by *cmd-path*. This executable file is typically an application program that is intended to be executed by a method or monitor of the resource, using a wrapper such as su(1M) to set the user ID to the configured user. The resource method or monitor invokes `scha_check_app_user` prior to execution of the application program. Depending on the output of `scha_check_app_user`, the method or monitor may return an error or output a warning message if security-related problems are detected.

The `scha_check_app_user` command writes the name of the configured user to standard output (file descriptor 1) and writes any security warnings or error messages to standard error (file descriptor 2). The exit code indicates whether configured security policy allows the command to be executed. If the exit code is 0, the caller can attempt to execute the command as the application user. If the exit code is non-zero, the caller should not attempt to execute the command as the application user, and should return an error.

Usage A script that invokes `scha_check_app_user` can use the command's output to determine the following:

- What user ID should execute the command
- Whether to permit command execution or throw an error
- What error or warning message to pass back to the user if a security issue is found

The `scha_check_app_user` command works with the `Resource_security` and `Application_user` properties described in the `r_properties(5)` man page.

The behavior of the `scha_check_app_user` command depends on the setting of the `Resource_security` property. The `Resource_security` property might have a different value in the global cluster and in each zone cluster. The value of `Resource_security` that is used by `scha_check_app_user` is the value of that property in the cluster in which the command is executed.

The `scha_check_app_user` command is meant to be invoked in the same context in which the application program is going to be executed. For example, if the application program executes in the global zone, then `scha_check_app_user` should also execute in the global zone.

The normal use case is one of the following:

- The resource and its resource group are configured in the global cluster, and the `scha_check_app_user` program is executing in the global cluster.
- The resource and its resource group are configured in a zone cluster, and the `scha_check_app_user` program is executing in a zone of that zone cluster.

In both use cases, there is no need to specify the `-Z` *zoneclustername* option on the command.

The `-Z` *zoneclustername* option is used when the application program is to be executed in the global zone but is associated with a resource in a zone cluster. This is not usually required, but might be necessary for a resource type that has the `Global_zone` property set to `TRUE`. For more information, see `rt_properties(5)`.

See the OPTIONS section for details about the use of `-Z` and the interaction with the other command options.

Options The following options are supported:

`-Z` *zoneclustername*
Specifies the cluster in which the resource is configured. This option is needed only when the command is executed in the global zone but needs to access the `Application_user` property of a resource in a zone cluster. The `-Z` option cannot be used within a zone cluster to access a different zone cluster.

If the `-Z` option is omitted, the resource is assumed to exist in the cluster in which the `scha_check_app_user` command is executed — either the global cluster or a zone cluster.

If the `scha_check_app_user` command is executing in the global zone and the `-Z` and `-R` options are both specified, the *resource* specified with `-R` resides in the zone cluster specified by `-Z`, not in the global cluster. In this case, the agent developer should alert the end user to the fact that the username specified by the `Application_user` property needs to be valid in the global zone even though the resource is configured in a zone cluster.

If the `scha_check_app_user` command is executing in the global zone and the `-Z` option is specified, the *cmd-path* argument identifies a file pathname in the global zone, not in the zone specified by `-Z`.

`-U` *username*
If specified, this username is taken to be the application user name regardless of the executable file owner, the `Application_user` property setting, or the `Resource_security` property setting. The `-U` option can be used when the caller has its own mechanism for determining the application user name and it only wants to check ownership and permission of the executable program. An error results if the effective user ID of the caller is non-root and the `-U` option specifies root.

If the `-U` option is used together with `-Z` option, the specified *username* must be valid in the zone in which the command is executing, not necessarily in the *zoneclustername* specified by the `-Z` option.

`-R` *resource*
The name of an RGM resource associated with this command execution. If the `-U` option is not also specified, the application user name is obtained from the `Application_user` property of this resource. If the resource does not have an `Application_user` property or that property is not set, the application user name is the owner of the executable file.

If -U is not specified and Resource_security is set to COMPATIBILITY, regardless of the Application_user property setting, the application user name is set to the effective user ID of the invoking process. If -U is not specified and the Resource_security property is set to OVERRIDE, regardless of the Application_user property setting, the application user name is set to the owner of the executable file.

If the -R option is specified together with -Z, the resource's Application_user property must specify a username that is valid in the zone in which the command is executing, not necessarily in the *zoneclustername* specified by the -Z option.

cmd-path
A full pathname to an executable file that the caller proposes to execute as the application user. If the -Z option is specified, the *cmd-path* is evaluated relative to the zone in which the command is executing, not the *zoneclustername* specified by the -Z option.

If neither -R nor -U is specified, the application user name is the owner of the executable file, unless Resource_security is set to COMPATIBILITY, in which case the application user name is set to the effective user ID of the invoking process.

If the computed application user is root (superuser) but the effective user ID of the caller is non-root, the application user name becomes the effective user ID of the caller.

Examples

EXAMPLE 1 Using scha_check_app_user with su in a Script

The following bash script invokes scha_check_app_user prior to using su(1M) to execute a command named mycommand that is associated with the RGM resource named myresource:

```
COMMANDPATH=/opt/mypkg/bin/mycommand
RESOURCENAME=myresource
TMPFILE=$(/usr/bin/mktemp)

# Here we are redirecting the error/warning messages into
# a temp file and will write them later.
# Instead, we could just let them flow out to stderr.
APPUSER=$(/usr/cluster/bin/scha_check_app_user \
        -R $RESOURCENAME $COMMANDPATH 2>$TMPFILE)
errcode=$?

if [[ errcode -ne 0 ]]; then
    # Security checks failed -- do not execute the program
    printf "Security checks failed on program %s:\n" $COMMANDPATH
    # Output the error messages
    /usr/bin/cat $TMPFILE
    /usr/bin/rm $TMPFILE
    exit errcode
fi

# There may still be warning messages in TMPFILE.
# Write them for the user.
```

EXAMPLE 1 Using scha_check_app_user with su in a Script *(Continued)*

```
/usr/bin/cat $TMPFILE
/usr/bin/rm $TMPFILE

# Application user name is in $APPUSER.
# Execute mycommand with any necessary arguments.
#
# Note that the su command might still fail, for example, if
# this script lacks the necessary privilege to execute as
# the application user.
#
# Other command wrappers such as "su -" or "pfexec" could be used
# here instead of plain "su".

su $APPUSER $COMMANDPATH arg1 arg2
```

Exit Status

The following exit status codes are returned. Error codes are described in scha_calls(3HA).

0 SCHA_ERR_NOERR
: The security checks have passed and the command may be executed as the application user. However, when output is written to stderr, it indicates that an error occurred in fetching or checking the application user. Any such warning message should be passed back to the user.

3 SCHA_ERR_INVAL
: The command is invoked with invalid arguments. In this case, the application user is not written to stdout. An error message that details one of several possible errors is written to stderr.

6 SCHA_ERR_ACCESS
: The file identified by the path argument is not executable; or the -U option specifies root and the effective user ID of the caller is non-root; or Resource_security is SECURE and one of the following conditions applies:

- The executable file is group-writable or world-writable.
- The application user is root and the executable file is owned by a non-root user.

The SCHA_ERR_ACCESS exit code indicates a security violation, and the caller should not execute the command.

14 SCHA_ERR_RSRC
: The *rname* argument does not identify a valid resource name. In this case, the application user is not written to stdout. An error message is written to stderr.

16 SCHA_ERR_CHECKS
: Resource_security is SECURE and the Application_user name does not map to a valid user ID. The SCHA_ERR_CHECKS exit code indicates a security violation, and the caller should not execute the

command.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also su(1M), pfexec(1), cluster(1CL), scha_cmds(1HA), scha_calls(3HA), scha_strerror(3HA), attributes(5), *Oracle Solaris Cluster Data Services Developer's Guide*

Name scha_cluster_get – access cluster information

Synopsis `scha_cluster_get -O` *optag* `[-Z` *zoneclustername*`]` `[`*args*`]`

Description The `scha_cluster_get` command accesses and generates information about a cluster. You can access information about the cluster, nodes, host names, resource groups, resource types, and states.

The command is intended for use in shell script implementations of callback methods for resource types. These callback methods for resource types represent services that are controlled by the cluster's Resource Group Manager (RGM). This command provides the same information as the `scha_resource_get()` function.

This command sends output to the standard output (`stdout`) in formatted strings on separate lines, as described in the `scha_cmds(1HA)` man page. You can store the output in shell variables. You can also parse the output with shell commands such as the `awk` command.

Options The following options are supported:

`-O` *optag*
The *optag* argument indicates the information to be accessed. Depending on the *optag*, an additional argument may be needed to indicate the cluster node for which information is to be retrieved.

Note – *optag* options, such as `NODENAME_LOCAL` and `NODENAME_NODEID`, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify *optag* options.

The following *optag* values are supported:

`ALL_LOADLIMITS`
Generates on successive lines all the `loadlimit` names defined in the global cluster or zone cluster.

`ALL_NODEIDS`
Generates on successive lines the numeric node identifiers of all nodes in the cluster.

`ALL_NODENAMES`
Generates on successive lines the names of all nodes in the cluster.

`ALL_PRIVATELINK_HOSTNAMES`
Generates on successive lines the host names by which all cluster nodes are addressed on the cluster interconnect.

`ALL_PSTRINGS`
Generates on successive lines the names, but not the values, of all private strings in the cluster. For more information about private strings, see the `clpstring(1CL)` man page.

`ALL_RESOURCEGROUPS`
Generates on successive lines the names of all the resource groups that are being managed in the cluster.

`ALL_RESOURCETYPES`
Generates on successive lines the names of all the resource types that are registered in the cluster.

`ALL_ZONES`
Generates on successive lines the `nodename:zonename` string of all zones, including the global zone, on all nodes in the cluster.

Only if the following conditions occur is a non-global zone included in the output of this query:

- The non-global zone booted at least once since the cluster was brought online.
- The non-global zone successfully started the Service Management Facility (SMF) service `/system/cluster/sc_ng_zones`.

Non-global zones that do not execute the SMF service `/system/cluster/sc_ng_zones` cannot master resource groups, and are therefore not included in the output.

`ALL_ZONES_NODEID`
Generates on successive lines the `nodename:zonename` string of all zones, including the global zone, on the cluster node whose numeric node identifier is given as the argument.

Only if the following conditions occur is a non-global zone included in the output of this query:

- The non-global zone booted at least once since the cluster was brought online.
- The non-global zone successfully started the Service Management Facility (SMF) service `/system/cluster/sc_ng_zones`.

Non-global zones that do not execute the SMF service `/system/cluster/sc_ng_zones` cannot master resource groups, and are therefore not included in the output.

`CLUSTERNAME`
Generates the name of the cluster.

`HARD_LOADLIMIT`
Generates on successive lines the hard limit set for a specific `limitname` for all nodes in the global cluster or zone cluster. It requires an additional unflagged `string` argument that is a load limit name string.

Each element of the string array output is of the format `"%s=%d"`, where the left-side string is a *nodename* or *nodename*:*zonename*, and the right-side integer is the hard load limit value for the specified limit name on that node. If no hard limit is specified, the value of `-1` is displayed for the hard limit.

`LOADLIMIT_PROPS`
Generates on successive lines the hard and soft limits (delimited by `/`) for all nodes in the global cluster or zone cluster. It requires an additional unflagged `string` argument that is a load limit name string.

Each element of the string array output is a string of the format "`%s=%d/%d`", where the left-side string is a *nodename* or *nodename*:*zonename*, the first integer is the soft limit, and the second integer is the hard limit. If no hard limit is specified, the value of `-1` is displayed for the hard limit. If no soft limit is specified, the value `0` is displayed for the soft limit.

`LOADLIMITS_NODE`
Generates on successive lines the load limits (delimited by `/`) set for a specific node. It requires an additional unflagged `string` argument that is a load limit name string.

Each element of the string array output is a string of the format "`%s=%d/%d`", where the string is a limitname defined on the specified node, the first, integer is the soft limit value, and the second integer is the hard limit value. If no hard limit is specified, the value of `-1` is displayed for the hard limit. If no soft limit is specified, the value `0` is displayed for the soft limit.

`NODEID_LOCAL`
Generates the numeric node identifier for the node where the command is executed.

`NODEID_NODENAME`
Generates the numeric node identifier of the node indicated by the name. Requires an additional unflagged argument that is the name of a cluster node.

`NODENAME_LOCAL`
Generates the name of the cluster node where the command is executed.

`NODENAME_NODEID`
Generates the name of the cluster node indicated by the numeric identifier. Requires an additional unflagged argument that is a numeric cluster node identifier.

`NODESTATE_LOCAL`
Generates `UP` or `DOWN` depending on the state of the node where the command is executed.

`NODESTATE_NODE`
Generates `UP` or `DOWN` depending on the state of the named node. Requires an additional unflagged argument that is the name of a cluster node.

`PRIVATELINK_HOSTNAME_LOCAL`
Generates the host name by which the node on which the command is run is addressed over the cluster interconnect.

`PRIVATELINK_HOSTNAME_NODE`
Generates the host name by which the named node is addressed on the cluster interconnect. Requires an additional unflagged argument that is the name of a cluster node.

`PSTRING`
Generates the clear text value of a private string. Requires an additional unflagged argument that is the name of a private string. Users other than superuser require

`solaris.cluster.modify` role-based access control (RBAC) authorization to use this query tag. For more information on private strings, see the `clpstring`(1CL) man page.

`RESOURCE_SECURITY`
Generates the current setting of the `resource_security` cluster property.

`SOFT_LOADLIMIT`
Generates on successive lines the soft load limit set for a specific `limitname` for all nodes in the cluster. It requires an additional unflagged `string` argument that is a load limit name string.

Each element of the string array output is of the format `"%s=%d"`, where the left-side string is a *nodename* or *nodename*:*zonename*, and the right-side integer is the soft load limit value for the specified limit name on that node. If no soft limit is specified, the value of `0` is displayed for the soft limit.

`SYSLOG_FACILITY`
Generates the number of the `syslog`(3C) facility that the RGM uses for log messages. The value is `24`, which corresponds to the `daemon` facility. You can use this value as the facility level in the `logger`(1) command to log messages in the cluster log.

`-Z` *zoneclustername*
Specifies the cluster on which you want to operate. This option is applicable when the command is executed in the global zone but needs to operate on a specified zone cluster. It cannot be used within a zone cluster to access a different zone cluster.

zoneclustername	Specifies that the query is to be performed in the zone cluster named *zoneclustername*.

If the `-Z` option is omitted, the query is performed in the cluster in which the command is executed.

To query the value of a per-zone property such as node state in the global cluster, do not use the `-Z` option. Instead, use the per-zone form of the query tag. For example, use `NODESTATE_NODE` instead of `NODESTATE`, and provide an extra command-line argument of the form *nodename:zonename*.

Examples

EXAMPLE 1 Using the `scha_cluster` Command in a Shell Script

The following shell script uses the `scha_cluster` command to print whether each cluster node is up or down:

```
#!/bin/sh
nodenames=`scha_cluster_get -O All_Nodenames`
for node in $nodenames
do
     state=`scha_cluster_get -O NodeState_Node $node`
     printf "State of node: %s\n exit: %d\n value: %s\n" "$node" $? "$state"
done
```

EXAMPLE 2 Using the `scha_cluster` Command to View a Node's Load Limits

The following command displays all load limits that were defined for node `node1`.

```
# scha_cluster_get -O LOADLIMITS_NODE node1
factor1=50/100
factor2=0/4
```

Exit Status

The following exit status codes are returned:

`0` Successful completion.

nonzero An error occurred.

Error codes are described in `scha_calls(3HA)`.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Stable

See Also

`awk(1)`, `logger(1)`, `sh(1)`, `scha_cmds(1HA)`, `syslog(3C)`, `scha_calls(3HA)`, `scha_cluster_get(3HA)`, `attributes(5)`, `rg_properties(5)`

Name scha_cmds – command standard output for scha_cluster_get, scha_control, scha_resource_get, scha_resourcegroup_get, scha_resourcetype_get, scha_resource_setstatus

Synopsis *scha-command* -O *optag*...

Description The Oracle Solaris Cluster scha_cluster_get(1HA), scha_control(1HA), scha_resource_get(1HA), scha_resourcegroup_get(1HA), scha_resourcetype_get(1HA), and scha_resource_setstatus(1HA) commands are command-line implementations of the callback methods for resource types. See rt_callbacks(1HA).

Resource types represent services that are controlled by the cluster's Resource Group Manager (RGM) facility. These commands provide a command-line interface to the functionality of the scha_calls(3HA) C functions.

The get commands access cluster configuration information. All of these commands have the same general interface. These commands all take an -O *optag* operand. This operand indicates the information to be accessed. These commands all send the results to the standard output (stdout) as formatted strings. Additional arguments might be needed depending on the command and the value of *optag*. For information about the format of different *optag* results, see the “Results Format” section.

Note – *optag* options, for all scha commands, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify *optag* options.

The scha_control(1HA) command also takes an -O *optag* option that indicates a control operation, but does not produce output to standard output.

The scha_resource_setstatus(1HA) command sets the STATUS and STATUS_MSG properties of a resource that is managed by the RGM.

Result Formats The format of strings that are output to the standard output by the commands depends on the type of the result that is indicated by the *optag* that you include with the -O option. Formats for each type are specified in the following table. Format notation is described in formats(5).

Result Type	Format on Standard Output
boolean	TRUE\n or FALSE\n
enum	%s\n, the string name of an enum value.

Result Type	Format on Standard Output
`extension`	`%s\n`, the type attribute of the extension property, which is one of the following values: `STRING`, `INT`, `BOOLEAN`, `ENUM`, or `STRINGARRAY`. Following the type information, the property value is output according to the formats for each type as follows: `STRING` as `string`, `INT` as `int`, `BOOLEAN` as `boolean`, `ENUM` as `enum`, `STRINGARRAY` as `string_array`.
`int`	`%d\n`
`status`	`%s\n%s\n`, the first string is the status, which is one of the following `enum` values: `DEGRADED`, `FAULTED`, `OFFLINE`, `ONLINE`, or `UNKNOWN`. The second string is the status message.
`string`	`%s\n`
`string_array`	Each element in the array is output in the format `%s\n`. An asterisk, indicating all nodes or resources, can be returned for the `GLOBAL_RESOURCES_USED` and `INSTALLED_NODES` properties.
`unsigned_int`	`%u\n`
`unsigned_int_array`	Each element in the array is output in the format `%u\n`

optag Result Types

The following table specifies the valid *optag* values for different commands as well as the type of the result that is output according to the formats specified in the previous table.

optag Values for `scha_cluster_get`(1HA)	Result Type
`ALL_NODEIDS`	`unsigned_int_array`
`ALL_NODENAMES`	`string_array`
`ALL_PRIVATELINK_HOSTNAMES`	`string_array`
`ALL_RESOURCEGROUPS`	`string_array`
`ALL_RESOURCETYPES`	`string_array`
`CLUSTERNAME`	`string`
`NODEID_LOCAL`	`unsigned_int`
`NODEID_NODENAME`	`unsigned_int`
`NODENAME_LOCAL`	`string`
`NODENAME_NODEID`	`string`

optag **Values for** `scha_cluster_get`**(1HA)**	**Result Type**
NODESTATE_LOCAL	enum (UP, DOWN)
NODESTATE_NODE	enum (UP, DOWN)
PRIVATELINK_HOSTNAME_LOCAL	string
PRIVATELINK_HOSTNAME_NODE	string
SYSLOG_FACILITY	int

optag **Values for** `scha_control`**(1HA)**
CHANGE_STATE_OFFLINE
CHANGE_STATE_ONLINE
CHECK_GIVEOVER
CHECK_RESTART
GIVEOVER
IGNORE_FAILED_START
RESOURCE_DISABLE
RESOURCE_IS_RESTARTED
RESOURCE_RESTART
RESTART

optag **Values for** `scha_resource_get`**(1HA)**	**Result Type**
AFFINITY_TIMEOUT	int
ALL_EXTENSIONS	string_array
BOOT_TIMEOUT	int
CHEAP_PROBE_INTERVAL	int
CHEAP_PROBE_INTERVAL	int
EXTENSION	extension
EXTENSION_NODE	extension
FAILOVER_MODE	enum (NONE, HARD, SOFT, RESTART_ONLY, LOG_ONLY)
FINI_TIMEOUT	int

optag Values for `scha_resource_get`(1HA)	Result Type
GROUP	string
INIT_TIMEOUT	int
LOAD_BALANCING_POLICY	string
LOAD_BALANCING_WEIGHTS	string_array
MONITORED_SWITCH	enum (DISABLED, ENABLED)
MONITORED_SWITCH_NODE	enum (DISABLED, ENABLED)
MONITOR_CHECK_TIMEOUT	int
MONITOR_START_TIMEOUT	int
MONITOR_STOP_TIMEOUT	int
NETWORK_RESOURCES_USED	string_array
NUM_RESOURCE_RESTARTS	int
NUM_RG_RESTARTS	int
ON_OFF_SWITCH	enum (DISABLED, ENABLED)
ON_OFF_SWITCH_NODE	enum (DISABLED, ENABLED)
PORT_LIST	string_array
POSTNET_STOP_TIMEOUT	int
PRENET_START_TIMEOUT	int
R_DESCRIPTION	string
RESOURCE_DEPENDENCIES	string_array
RESOURCE_DEPENDENCIES_OFFLINE_RESTART	string_array
RESOURCE_DEPENDENCIES_RESTART	string_array
RESOURCE_DEPENDENCIES_WEAK	string_array
RESOURCE_PROJECT_NAME	string
RESOURCE_STATE	enum (ONLINE, OFFLINE, START_FAILED, STOP_FAILED, MONITOR_FAILED, ONLINE_NOT_MONITORED, STARTING, STOPPING)
RESOURCE_STATE_NODE	enum (see RESOURCE_STATE for values)
RETRY_COUNT	int
RETRY_INTERVAL	int

optag Values for scha_resource_get(1HA)	Result Type
SCALABLE	boolean
START_TIMEOUT	int
STATUS	status
STATUS_NODE	status
STOP_TIMEOUT	int
THOROUGH_PROBE_INTERVAL	int
TYPE	string
TYPE_VERSION	string
UDP_AFFINITY	boolean
UPDATE_TIMEOUT	int
VALIDATE_TIMEOUT	int
WEAK_AFFINITY	boolean

optag Values for scha_resource_get(1HA) and scha_resourcetype_get(1HA)	Result Type
API_VERSION	int
BOOT	string
FAILOVER	boolean
FINI	string
GLOBAL_ZONE	boolean
INIT	string
INIT_NODES	enum (RG_PRIMARIES, RT_INSTALLED_NODES)
INSTALLED_NODES	string_array. An asterisk (*) is returned to indicate all nodes.
IS_LOGICAL_HOSTNAME	boolean
IS_SHARED_ADDRESS	boolean
MONITOR_CHECK	string
MONITOR_START	string
MONITOR_STOP	string
PER_NODE	boolean

optag **Values for `scha_resource_get`(1HA) and `scha_resourcetype_get`(1HA)**	**Result Type**
PKGLIST	string_array
POSTNET_STOP	string
PRENET_START	string
PROXY	boolean
RT_BASEDIR	string
RT_DESCRIPTION	string
RT_SYSTEM	boolean
RT_VERSION	string
SINGLE_INSTANCE	boolean
START	string
STOP	string
UPDATE	string
VALIDATE	string

optag **Values for `scha_resourcegroup_get`(1HA)**	**Result Type**
AUTO_START_ON_NEW_CLUSTER	boolean
DESIRED_PRIMARIES	int
FAILBACK	boolean
GLOBAL_RESOURCES_USED	string_array (an asterisk (*) is returned to indicate all resources)
IMPLICIT_NETWORK_DEPENDENCIES	boolean
MAXIMUM_PRIMARIES	int
NODELIST	string_array
PATHPREFIX	string
PINGPONG_INTERVAL	int
RESOURCE_LIST	string_array
RG_AFFINITIES	string_array
RG_DEPENDENCIES	string_array

optag Values for `scha_resourcegroup_get(1HA)`	Result Type
RG_DESCRIPTION	string
RG_IS_FROZEN	boolean
RG_MODE	enum (FAILOVER, SCALABLE)
RG_PROJECT_NAME	string
RG_SLM_CPU	decimal
RG_SLM_CPU_MIN	decimal
RG_SLM_PSET_TYPE	enum (DEFAULT, DEDICATED_STRONG, DEDICATED_WEAK)
RG_SLM_TYPE	enum (AUTOMATED, MANUAL)
RG_STATE	enum (UNMANAGED, ONLINE, OFFLINE, PENDING_ONLINE, PENDING_OFFLINE, ERROR_STOP_FAILED, ONLINE_FAULTED, PENDING_ONLINE_BLOCKED)
RG_STATE_NODE	enum (see RG_STATE for values)
RG_SYSTEM	boolean
SUSPEND_AUTOMATIC_RECOVERY	boolean

Exit Status

One set of exit status codes is used for all `scha` commands.

The exit status codes are the numeric values of the `scha_err_t` return codes of the corresponding C functions as described in `scha_calls(3HA)`.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Stable

See Also

`awk(1)`, `rt_callbacks(1HA)`, `scha_cluster_get(1HA)`, `scha_control(1HA)`, `scha_resource_get(1HA)`, `scha_resourcegroup_get(1HA)`, `scha_resourcetype_get(1HA)`, `scha_resource_setstatus(1HA)`, `scha_calls(3HA)`, `attributes(5)`, `formats(5)`, `r_properties(5)`, `rg_properties(5)`, `rt_properties(5)`

Name scha_control – request resource and resource group control

Synopsis `scha_control -O` *optag* `-G` *group* `-R` *resource* `[-Z` *zonename*`]`

Description The `scha_control` command requests the restart or relocation of a resource or resource group that is under the control of the Resource Group Manager (RGM). Use this command in shell script implementations of resource monitors. This command provides the same functionality as the `scha_control(3HA)` function.

The exit code of this command indicates whether the requested action was rejected. If the request is accepted, this command does not return until the resource group or resource has completed going offline and has come back online. The fault monitor that called `scha_control(1HA)` might be stopped as a result of the resource or resource group's going offline. As a result, the fault monitor might never receive the return status of a successful request.

You need `solaris.cluster.resource.admin` role-based access control (RBAC) authorization to use this command. See `rbac(5)`.

You must also be able to assume a role to which the Oracle Solaris Cluster Commands rights profile has been assigned to use this command. Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the `pfsh(1)`, `pfcsh(1)`, or `pfksh(1)` profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run `su(1M)` to assume a role. You can also use `pfexec(1)` to issue privileged Oracle Solaris Cluster commands.

Options The following options are supported:

`-G` *group*
The name of the resource group that is to be restarted or relocated or that contains the resource that is to be restarted or relocated. If the resource group is not online on the node where the request is made, the request is rejected.

`-O` *optag*
Requests *optag* options.

Note – *optag* options, such as `CHECK_GIVEOVER` and `CHECK_RESTART`, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify *optag* options.

The following *optag* values are supported:

`CHANGE_STATE_OFFLINE`
Requests that the proxy resource that is named by the `-R` option be brought offline on the local node. A *proxy resource* is an Oracle Solaris Cluster resource that imports the state of a resource from another cluster such as Oracle Clusterware. This change in state reflects, in the context of the Oracle Solaris Cluster software, the change in state of the external resource.

When you change the state of a proxy resource with this *optag* value, methods of the proxy resource are not executed.

If a fault occurs on a "depended-on" resource on a node, and the resource cannot recover, the monitor brings that resource on that node offline. The monitor brings the resource offline by calling the `scha_control` command with the `CHANGE_STATE_OFFLINE` *optag* value. The monitor also brings all of the depended-on resource's offline-restart dependents offline by triggering a restart on them. When the cluster administrator resolves the fault and reenables the depended-on resource, the monitor brings the depended-on resource's offline-restart dependents back online as well.

`CHANGE_STATE_ONLINE`
Requests that the proxy resource that is named by the `-R` option be brought online on the local node. A *proxy resource* is an Oracle Solaris Cluster resource that imports the state of a resource from another cluster such as Oracle Clusterware. This change in state reflects, in the context of the Oracle Solaris Cluster software, the change in state of the external resource.

When you change the state of a proxy resource with this *optag* value, methods of the proxy resource are not executed.

`CHECK_GIVEOVER`
Performs all the same validity checks that would be done for a `GIVEOVER` of the resource group that is named by the `-G` option, but does not actually relocate the resource group.

`CHECK_RESTART`
Performs all the same validity checks that would be done for a `RESTART` of the resource group that is named by the `-G` option, but does not actually restart the resource group.

`GIVEOVER`
Requests that the resource group that is named by the `-G` option be brought offline on the local node, and online again on a different node of the RGM's choosing. Note that if the resource group is currently online on two or more nodes and there are no additional available nodes on which to bring the resource group online, it can be taken offline on the local node without being brought online elsewhere. The request might be rejected depending on the result of various checks. For example, a node might be rejected as a host because the group was brought offline due to a `GIVEOVER` request on that node within the interval specified by the `PINGPONG_INTERVAL` property.

If the cluster administrator configures the `RG_Affinities` properties of one or more resource groups, and you issue a **`scha_control GIVEOVER`** request on one resource group, more than one resource group might be relocated as a result. The `RG_Affinities` property is described in `rg_properties(5)`.

The `MONITOR_CHECK` method is called before the resource group that contains the resource is relocated to a new node as the result of a `scha_control` command or `scha_control()` function call from a fault monitor.

You can call the MONITOR_CHECK method on any node that is a potential new master for the resource group. The MONITOR_CHECK method is intended to assess whether a node is healthy enough to run a resource. The MONITOR_CHECK method must be implemented in such a way that it does not conflict with the running of another method concurrently.

MONITOR_CHECK failure vetoes the relocation of the resource group to the node where the callback was invoked.

IGNORE_FAILED_START
Requests that if the currently executing Prenet_start or Start method fails, the resource group is not to fail over, regardless of the setting of the Failover_mode property.

In other words, this *optag* value overrides the recovery action that is normally taken for a resource for which the Failover_Mode property is set to SOFT or HARD when that resource fails to start. Normally, the resource group fails over to a different node. Instead, the resource behaves as if Failover_Mode is set to NONE. The resource enters the START_FAILED state, and the resource group ends up in the ONLINE_FAULTED state, if no other errors occur.

This optag value is meaningful only when it is called from a Start or Prenet_start method that subsequently exits with a nonzero status or times out. This optag value is valid only for the current invocation of the Start or Prenet_start method. The scha_control command should be called with this optag value in a situation in which the Start method has determined that the resource cannot start successfully on another node. If this optag value is called by any other method, the error SCHA_ERR_INVAL is returned. This optag value prevents the “ping pong” failover of the resource group that would otherwise occur.

RESOURCE_DISABLE
Disables the resource that is named by the -R option on the node on which the scha_control command is called.

If a fault occurs on a “depended-on” resource on a node, and the resource cannot recover, the monitor brings that resource on that node offline. The monitor brings the resource offline by calling the scha_control command with the RESOURCE_DISABLE *optag* value. The monitor also brings all of the depended-on resource's offline-restart dependents offline by triggering a restart on them. When the cluster administrator resolves the fault and reenables the depended-on resource, the monitor brings the depended-on resource's offline-restart dependents back online as well.

RESOURCE_IS_RESTARTED
Requests that the resource restart counter for the resource that is named by the -R option be incremented on the local node, without actually restarting the resource.

A resource monitor that restarts a resource directly without calling the RESOURCE_RESTART option of scha_control (for example, using pmfadm(1M)) can use this option to notify the RGM that the resource has been restarted. This incrementing is reflected in subsequent NUM_RESOURCE_RESTARTS queries of scha_resource_get(1HA).

If the resource's type fails to declare the RETRY_INTERVAL standard property, the RESOURCE_IS_RESTARTED option of the scha_control command is not permitted. Consequently, the scha_control command fails and generates exit status code 13 (SCHA_ERR_RT).

RESOURCE_RESTART

Requests that the resource that is named by the -R option be brought offline and online again on the local node without stopping any other resources in the resource group. The resource is stopped and started by applying the following sequence of methods to it on the local node:

```
MONITOR_STOP
STOP
START
MONITOR_START
```

If the resource type does not declare a STOP and START method, the resource is restarted using POSTNET_STOP and PRENET_START instead:

```
MONITOR_STOP
POSTNET_STOP
PRENET_START
MONITOR_START
```

If the resource's type does not declare a MONITOR_STOP and MONITOR_START method, only the STOP and START methods or the POSTNET_STOP and PRENET_START methods are invoked to perform the restart.

If a method invocation fails while restarting the resource, the RGM might set an error state, relocate the resource group, or reboot the node, depending on the setting of the FAILOVER_MODE property of the resource. For additional information, see the FAILOVER_MODE property in r_properties(5).

A resource monitor using this option to restart a resource can use the NUM_RESOURCE_RESTARTS query of scha_resource_get(1HA) to keep count of recent restart attempts.

The RESOURCE_RESTART function should be used with care by resource types that have PRENET_START, POSTNET_STOP, or both methods. Only the MONITOR_STOP, STOP, START, and MONITOR_START methods are applied to the resource. Network address resources on which this resource depends are not restarted and remain online.

If a fault occurs on a "depended-on" resource on a node, and the resource cannot recover, the monitor brings that resource on that node offline. The monitor brings the resource offline by calling the scha_control command with the RESOURCE_RESTART *optag* value. The monitor also brings all of the depended-on resource's offline-restart dependents offline by triggering a restart on them. When the cluster administrator resolves the fault and reenables the depended-on resource, the monitor brings the depended-on resource's offline-restart dependents back online as well.

RESTART
Requests that the resource group that is named by the -G option be brought offline, then online again, without forcing relocation to a different node. The request might ultimately result in relocating the resource group if a resource in the group fails to restart. A resource monitor using this option to restart a resource group can use the NUM_RG_RESTARTS query of scha_resource_get(1HA) to keep count of recent restart attempts.

The CHECK_GIVEOVER and CHECK_RESTART *optag* values are intended to be used by resource monitors that take direct action upon resources (for example, killing and restarting processes, or rebooting nodes) rather than invoking the scha_control command to perform a giveover or restart. If the check fails, the monitor should sleep for awhile and restart its probes rather than invoke its restart or failover actions. For more information, see scha_control(3HA).

-R *resource*
The name of a resource in the resource group, presumably the resource whose monitor is making the scha_control(1HA) request. If the named resource is not in the resource group, the request is rejected.

The setting of the Failover_mode property of the indicated resource might suppress the requested scha_control action. If Failover_mode is RESTART_ONLY, all requests except scha_control GIVEOVER and scha_control CHECK_GIVEOVER are permitted. The GIVEOVER and CHECK_GIVEOVER requests return the SCHA_ERR_CHECKS exit code and the requested giveover action is not executed, producing only a syslog message.

If the Retry_count and Retry_interval properties are set on the resource, the number of resource restarts is limited to Retry_count attempts within the Retry_interval. If Failover_mode is LOG_ONLY, any scha_control giveover, restart, or disable request returns the SCHA_ERR_CHECKS exit code and the requested giveover or restart action is not executed, producing only a syslog message.

-Z *zonename*
The name of the zone in which a resource group is configured to run.

If the Global_zone property is set to TRUE, methods execute in the global zone even if the resource group that contains the resource runs in a non-global zone. This option provides the name of the non-global zone in which the resource group is configured to run.

Use the -Z option only for resource types whose Global_zone property is set to TRUE. This option is not needed if the Global_zone property is set to FALSE. For more information about the Global_zone property, see the rt_properties(5) man page.

Exit Status The following exit status codes are returned:

`0`	The command completed successfully.
nonzero	An error occurred.

Failure error codes are described in `scha_calls(3HA)`.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Stable

See Also `pmfadm(1M)`, `rt_callbacks(1HA)`, `scha_cmds(1HA)`, `scha_resource_get(1HA)`, `scha_calls(3HA)`, `scha_control(3HA)`, `scha_control_zone(3HA)`, `attributes(5)`, `r_properties(5)`, `rbac(5)`, `rg_properties(5)`, `rt_properties(5)`

Name scha_resource_get – access resource information

Synopsis `scha_resource_get [-Q] -O` *optag* `-R` *resource* `[-G` *group*`]`
`[-Z` *zoneclustername*`] [`*args*`]`

Description The `scha_resource_get` command accesses information about a resource that is under the control of the Resource Group Manager (RGM). You can use this command to query the properties of the resource's type, as described in `rt_properties(5)`, as well as the properties of the resource, as described in `r_properties(5)`.

Use the `scha_resource_get` command in shell script implementations of the callback methods for resource types that represent services that are controlled by the cluster's RGM. This command provides the same information as the `scha_resource_get(3HA)` C function.

Information is generated by the command to `stdout` in formatted strings on separate lines, as described in `scha_cmds(1HA)`. The output can be stored in shell variables and parsed by using shell facilities or `awk(1)` for further use by the script.

You need `solaris.cluster.resource.read` role-based access control (RBAC) authorization to use this command. See `rbac(5)`.

You must also be able to assume a role to which the Oracle Solaris Cluster Commands rights profile has been assigned to use this command. Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the `pfsh(1)`, `pfcsh(1)`, or `pfksh(1)` profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run `su(1M)` to assume a role. You can also use `pfexec(1)` to issue privileged Oracle Solaris Cluster commands.

Options The following options are supported:

`-G` *group*
The name of the resource group in which the resource has been configured. Although this argument is optional, the command will run more efficiently if you include it.

`-O` *optag*
Indicates the information to be accessed. Depending on the *optag* value that you specify, you might need to include an additional value to indicate the cluster node for which information is to be retrieved.

Note – *optag* values, such as `AFFINITY_TIMEOUT` and `BOOT_TIMEOUT`, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify *optag* values.

The following *optag* values retrieve the corresponding resource properties. The value of the named property of the resource is generated. The `NUM_RG_RESTARTS`, `NUM_RESOURCE_RESTARTS`, `MONITORED_SWITCH`, `ON_OFF_SWITCH`, `RESOURCE_STATE`, and `STATUS` properties refer to the value on the node where the command is executed. See the r_properties(5) man page for descriptions of the resource properties that correspond to the following *optag* values. Note that some *optag* values in the following list are described after the list rather than in the r_properties(5) man page.

AFFINITY_TIMEOUT
ALL_EXTENSIONS
APPLICATION_USER
BOOT_TIMEOUT
CHEAP_PROBE_INTERVAL
EXTENSION
EXTENSION_NODE
FAILOVER_MODE
FINI_TIMEOUT
GLOBAL_ZONE_OVERRIDE
GROUP
INIT_TIMEOUT
LOAD_BALANCING_POLICY
LOAD_BALANCING_WEIGHT
SMONITORED_SWITCH
MONITORED_SWITCH_NODE
MONITOR_CHECK_TIMEOUT
MONITOR_START_TIMEOUT
MONITOR_STOP_TIMEOUT
NETWORK_RESOURCES_USED
NUM_RESOURCE_RESTARTS
NUM_RESOURCE_RESTARTS_ZONE
NUM_RG_RESTARTS
NUM_RG_RESTARTS_ZONE
ON_OFF_SWITCH
ON_OFF_SWITCH_NODE
PORT_LIST
POSTNET_STOP_TIMEOUT
PRENET_START_TIMEOUT
RESOURCE_DEPENDENCIES
RESOURCE_DEPENDENCIES_OFFLINE_RESTART
RESOURCE_DEPENDENCIES_RESTART
RESOURCE_DEPENDENCIES_WEAK
RESOURCE_PROJECT_NAME
RESOURCE_STATE
RESOURCE_STATE_NODE
RETRY_COUNT
RETRY_INTERVAL
R_DESCRIPTION
SCALABLE
START_TIMEOUT
STATUS
STATUS_NODE
STOP_TIMEOUT
THOROUGH_PROBE_INTERVAL

TYPE
TYPE_VERSION
UDP_AFFINITY
UPDATE_TIMEOUT
VALIDATE_TIMEOUT
WEAK_AFFINITY

The following *optag* values are not described in the r_properties(5) man page.

ALL_EXTENSIONS
Generates, on successive lines, the names of all extension properties of the resource.

EXTENSION
Generates the type of property followed by its value, on successive lines. If the property is a per-node extension property, the value that is returned is the value of the property on the node on which scha_resource_get is executed. Requires an unflagged argument that names an extension property of the resource. Shell scripts might need to discard the type to obtain the value, as shown in EXAMPLES.

When a user requests the value of this property on a node for which an explicit value has not been assigned, the default value that is declared in the Resource Type Registration (RTR) file is returned. See the rt_reg(4) man page.

EXTENSION_NODE
Generates the type of property followed by its value, on successive lines, for the named node. This value requires two unflagged arguments, in the following order, that name an extension of the resource on a particular node:

- Extension property name
- Node name

Shell scripts might need to discard the type to obtain the value.

When a user requests the value of this property on a node for which an explicit value has not been assigned, the default value that is declared in the RTR file is returned. See the rt_reg(4) man page.

GROUP
Generates the name of the resource group in which the resource is configured.

RESOURCE_DEPENDENCIES_NODE
Generates the value of the resource's RESOURCE_DEPENDENCIES property for the named node. Requires an unflagged argument that names a node.

RESOURCE_DEPENDENCIES_OFFLINE_RESTART_NODE
Generates the value of the resource's RESOURCE_DEPENDENCIES_OFFLINE_RESTART property for the named node. Requires an unflagged argument that names a node.

RESOURCE_DEPENDENCIES_RESTART_NODE
Generates the value of the resource's RESOURCE_DEPENDENCIES_RESTART property for the named node. Requires an unflagged argument that names a node.

RESOURCE_DEPENDENCIES_WEAK_NODE
Generates the value of the resource's RESOURCE_DEPENDENCIES_WEAK property for the named node. Requires an unflagged argument that names a node.

RESOURCE_STATE_NODE
Generates the value of the resource's RESOURCE_STATE property for the named node. Requires an unflagged argument that names a node.

STATUS_NODE
Generates the value of the resource's STATUS property for the named node. Requires an unflagged argument that names a node.

The following *optag* values retrieve the corresponding resource type properties. The value of the named property of the resource's type is generated.

Note – *optag* values, such as API_VERSION and BOOT, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify *optag* values.

For descriptions of resource type properties, see rt_properties(5).

API_VERSION
BOOT
FAILOVER
FINI
GLOBAL_ZONE
INIT
INIT_NODES
INSTALLED_NODES
IS_LOGICAL_HOSTNAME
IS_SHARED_ADDRESS
MONITOR_CHECK
MONITOR_START
MONITOR_STOP
PKGLIST
POSTNET_STOP
PRENET_START
PROXY
RT_BASEDIR
RT_DESCRIPTION
RT_SYSTEM
RT_VERSION
SINGLE_INSTANCE
START
STOP
UPDATE
VALIDATE

If this resource's type declares the GLOBAL_ZONE_OVERRIDE resource property, the value that is retrieved by the GLOBAL_ZONE *optag* is the current value of the GLOBAL_ZONE_OVERRIDE property, rather than the value of the GLOBAL_ZONE property. For more information, see the description of the Global_zone property in the rt_properties(5) man page and the Global_zone_override property in the r_properties(5) man page.

-Q
Include any specified qualifiers in resource dependency lists. The {LOCAL_NODE}, {ANY_NODE}, @nodename, and {FROM_RG_AFFINITIES} qualifiers are described in the r_properties(5) man page. If you omit the -Q option, the returned value of a resource dependency list contains only the resource names for dependencies that are applicable on the local node, without any declared qualifiers.

-R *resource*
The name of a resource that is being managed by the RGM cluster facility.

-Z *zoneclustername*
Specifies the cluster in which the resource group exists and on which you want to operate. This option is applicable when the command is executed in the global zone but needs to operate on a specified zone cluster. It cannot be used within a zone cluster to access a different zone cluster.

zoneclustername	Specifies that the query is to be performed in the zone cluster named *zoneclustername*.

If the -Z option is omitted, the query is performed in the cluster in which the command is executed.

Examples

EXAMPLE 1 Sample Script That Uses the scha_resource_get Command

The following script is passed -R and -G arguments, which provide the required resource name and resource group name. Next, the scha_resource_get command accesses the Retry_count property of the resource and the enum-type LogLevel extension property of the resource.

```
#!/bin/sh

while getopts R:G: opt
do
     case $opt in
           R)      resource="$OPTARG";;
           G)      group="$OPTARG";;
     esac
done

retry_count=‘scha_resource_get -O Retry_count -R $resource \\
-G $group‘
printf "retry count for resource %s is %d\n" $resource \\
$retry_count

LogLevel_info=‘scha_resource_get -O Extension -R $resource \\
```

EXAMPLE 1 Sample Script That Uses the `scha_resource_get` Command *(Continued)*

```
-G $group LogLevel‘

# Get the enum value that follows the type information
# of the extension property.  Note that the preceding
# assignment has already changed the newlines separating
# the type and the value to spaces for parsing by awk.

loglevel=‘echo $LogLevel_info | awk ’{print $2}’‘
```

EXAMPLE 2 Using the `scha_resource_get` Command With and Without the `-Q` Option to Query Resource Dependencies

This example shows how to use the `clresource` command to create a resource named `myres`, with several resource dependencies that have a `{LOCAL_NODE}` scope qualifier, a `{ANY_NODE}` scope qualifier, or no scope qualifier. This example then shows how to use the `scha_resource_get` command to query the `Resource_dependencies` property. Without the `-Q` option, only resource names are returned. With the `-Q` option, the declared scope qualifiers are returned as well.

```
# clresource create -g mygrp -t myrestype \
-p Resource_dependencies=myres2{LOCAL_NODE},myres3{ANY_NODE},myres4 \
myres
# scha_resource_get -O Resource_dependencies -R myres -G mygrp
myres2
myres3
myres4
# scha_resource_get -Q -O Resource_dependencies -R myres -G mygrp
myres2{LOCAL_NODE}
myres3{ANY_NODE}
myres4
#
```

EXAMPLE 3 Viewing Resource Dependency Properties

The following example shows how to use the `scha_resource_get` command to retrieve a per-node resource dependency that is dependent on two different logical hostname resources. To set a per-node resource dependency, you must use the `clresource set` command. The example uses a scalable resource called `gds-rs` and sets the dependency of `gds-rs` on `trancos-3-rs` on `ptrancos1` and `trancos-4-rs` on `ptrancos2`.

From the `ptrancos1` node:

```
ptrancos1(/root)$ scha_resource_get -O RESOURCE_DEPENDENCIES -R gds-rs
trancos-3-rs
ptrancos1(/root)$ scha_resource_get -O RESOURCE_DEPENDENCIES_NODE -R gds-rs ptrancos1
trancos-3-rs
```

EXAMPLE 3 Viewing Resource Dependency Properties *(Continued)*

```
ptrancos1(/root)$ scha_resource_get -O RESOURCE_DEPENDENCIES_NODE -R gds-rs ptrancos2
trancos-4-rs
ptrancos1(/root)$ scha_resource_get -Q -O RESOURCE_DEPENDENCIES -R gds-rs
trancos-3-rs@ptrancos1
trancos-4-rs@ptrancos2
ptrancos1(/root)$ scha_resource_get -O NETWORK_RESOURCES_USED -R gds-rs
trancos-3-rs
```

From the `ptrancos2` node:

```
ptrancos2(/root)$ scha_resource_get -O RESOURCE_DEPENDENCIES -R gds-rs
trancos-4-rs
ptrancos2(/root)$ scha_resource_get -O RESOURCE_DEPENDENCIES_NODE -R gds-rs ptrancos1
trancos-3-rs
ptrancos2(/root)$ scha_resource_get -O RESOURCE_DEPENDENCIES_NODE -R gds-rs ptrancos2
trancos-4-rs
ptrancos2(/root)$ scha_resource_get -Q -O RESOURCE_DEPENDENCIES -R gds-rs
trancos-3-rs@ptrancos1
trancos-4-rs@ptrancos2
ptrancos2(/root)$ scha_resource_get -O NETWORK_RESOURCES_USED -R gds-rs
trancos-4-rs
```

Exit Status

The following exit status codes are returned:

`0` The command completed successfully.

nonzero An error occurred.

Failure error codes are described in `scha_calls(3HA)`.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Evolving

See Also

`awk(1)`, `scha_cmds(1HA)`, `scha_calls(3HA)`, `scha_resource_get(3HA)`, `rt_reg(4)`, `attributes(5)`, `property_attributes(5)`, `r_properties(5)`, `rt_properties(5)`

Name scha_resourcegroup_get – access resource group information

Synopsis `scha_resourcegroup_get -O` *optag* `-G` *group* `[-Z` *zonecluster*`]` `[`*args*`]`

Description The `scha_resourcegroup_get` command accesses information about a resource group that is under the control of the Resource Group Manager (RGM) cluster facility.

This command is intended to be used in shell script implementations of the callback methods for resource types. These resource types represent services that are controlled by the cluster's RGM. This command provides the same information as the `scha_resourcegroup_get(3HA)` C function.

Information is generated by the command to standard output (`stdout`) in formatted strings as described in `scha_cmds(1HA)`. The output is a string or several strings on separate lines. The output can be stored in shell variables and parsed using shell facilities or `awk(1)` for further use by the script.

You need `solaris.cluster.resource.read` role-based access control (RBAC) authorization to use this command. See `rbac(5)`.

You must also be able to assume a role to which the Oracle Solaris Cluster Commands rights profile has been assigned to use this command. Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the `pfsh(1)`, `pfcsh(1)`, or `pfksh(1)` profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run `su(1M)` to assume a role. You can also use `pfexec(1)` to issue privileged Oracle Solaris Cluster commands.

Options The following options are supported:

`-G` *group*
Name of the resource group.

`-O` *optag*
Specifies the information that is to be accessed. Depending on the *optag* that you specify, you might need to include an additional operand to indicate the node or zone for which information is to be retrieved.

Note – *optag* values, such as `DESIRED_PRIMARIES` and `FAILBACK`, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify *optag* options.

The following *optag* values retrieve the corresponding resource group properties. The value of the named property of the resource group is generated. The `RG_STATE` property refers to the value on the particular node where the command is executed.

```
ALL_LOAD_FACTORS
ALL_LOAD_FACTOR_NAMES
AUTO_START_ON_NEW_CLUSTER
```

```
DESIRED_PRIMARIES
FAILBACK
GLOBAL_RESOURCES_USED
IMPLICIT_NETWORK_DEPENDENCIES
LOAD_FACTOR
MAXIMUM_PRIMARIES
NODELIST
PATHPREFIX
PINGPONG_INTERVAL
PREEMPTION_MODE
PRIORITY
RESOURCE_LIST
RG_AFFINITIES
RG_DEPENDENCIES
RG_DESCRIPTION
RG_IS_FROZEN
RG_MODE
RG_PROJECT_NAME
RG_SLM_TYPE
RG_SLM_PSET_TYPE
RG_SLM_CPU
RG_SLM_CPU_MIN
RG_STATE
RG_STATE_NODE
RG_SYSTEM
SUSPEND_AUTOMATIC_RECOVERY
```

`-Z` *zoneclustername*

Specifies the cluster in which the resource group exists and on which you want to operate. This option is applicable when the command is executed in the global zone but needs to operate on a specified zone cluster. It cannot be used within a zone cluster to access a different zone cluster.

zoneclustername — Specifies that the query is to be performed in the zone cluster named *zoneclustername*.

If the `-Z` option is omitted, the query is performed in the cluster in which the command is executed.

To query the value of a per-zone property such as resource group state in the global cluster, do not use the `-Z` option. Instead, use the per-zone form of the query tag. For example, use `RG_STATE_NODE` instead of `RG_STATE`, and provide an extra command-line argument of the form *nodename:zonename*.

Note – `RG_STATE_NODE` requires an unflagged argument that specifies a node. This *optag* value generates the value of the resource group's `RG_STATE` property for the specified node. If the unflagged argument specifies a non-global zone, the format is *nodename*:*zonename*.

Examples

EXAMPLE 1 A Sample Script Using scha_resourcegroup_get

The following script is passed a `-G` argument, which provides the required resource group name. Next, the `scha_resourcegroup_get` command is used to get the list of resources in the resource group.

```
#!/bin/sh

while getopts G: opt
do
     case $opt in
          G)      group="$OPTARG";;
     esac
done

resource_list=‘scha_resourcegroup_get -O Resource_list -G $group‘

for resource in $resource_list
do
     printf "Group: %s contains resource: %s\n" "$group" "$resource"
done
```

EXAMPLE 2 Using the scha_resourcegroup_get Command to Query All Load Factors on a Resource Group

Use the following command to view all load factors on a resource group called rg1.

```
# scha_resourcegroup_get -O ALL_LOAD_FACTORS -G rg1
factor1=50
factor2=1
factor3=0
```

EXAMPLE 3 Using the scha_resourcegroup_get Command to List All Defined Load Factor Names for a Resource Group

Use the following command to retrieve a list of all defined load factors on a resource group called rg1.

```
# scha_resourcegroup_get -O ALL_LOAD_FACTOR_NAMES -G rg1
factor1
factor2
factor3
```

EXAMPLE 4 Using the scha_resourcegroup_get Command to Query a Specific Load Factor for a Resource Group

Use the following command to view a specific defined load factor on a resource group called rg1.

```
# scha_resourcegroup_get -O LOAD_FACTOR -G rg1 factor1
50
```

EXAMPLE 5 Using the scha_resourcegroup_get Command to Query the Priority of a Resource Group

Use the following command to view the priority set for a resource group called rg1.

```
# scha_resourcegroup_get -O PRIORITY -G rg1
501
```

EXAMPLE 6 Using the scha_resourcegroup_get Command to Query the Preemption Mode for a Resource Group

Use the following command to view the preemption mode set for a resource group called rg1.

```
# scha_resourcegroup_get -O PREEMPTION_MODE rg1
Has_cost
```

Exit Status

The following exit status codes are returned:

`0` The command completed successfully.

nonzero An error occurred.

Failure error codes are described `scha_calls`(3HA).

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Stable

See Also

`awk`(1), `clnode`(1CL), `scha_cmds`(1HA), `scha_calls`(3HA), `scha_resourcegroup_get`(3HA), `attributes`(5), `rg_properties`(5), `rbac`(5)

Name scha_resource_setstatus – set resource status

Synopsis

```
scha_resource_setstatus  -R resource -G group -s status
 [-m msg] [-Z zonename]
```

Description The `scha_resource_setstatus` command sets the `Status` and `Status_msg` properties of a resource that is managed by the Resource Group Manager (RGM). This command is intended to be used by the resource's monitor to indicate the resource's state as perceived by the monitor. It provides the same functionality as the `scha_resource_setstatus(3HA)` C function.

When you execute the `scha_resource_setstatus(1HA)` command, the `Status` and `Status_msg` properties of the resource are updated with the values that you specify. Oracle Solaris Cluster logs the change to the resource status in the cluster system log, which you can view with cluster administration tools.

You need `solaris.cluster.resource.admin` RBAC authorization to use this command. See `rbac(5)`.

You must also be able to assume a role to which the Oracle Solaris Cluster Commands rights profile has been assigned to use this command. Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the `pfsh(1)`, `pfcsh(1)`, or `pfksh(1)` profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run `su(1M)` to assume a role. You can also use `pfexec(1)` to issue privileged Oracle Solaris Cluster commands.

Options The following options are supported:

`-G` *group*
Specifies the resource group that contains the resource.

`-m` *msg*
Specifies the text string that you want to assign to the `Status_msg` property of the resource. If you do not specify this option, the value of the resource's `Status_msg` is set to `NULL`.

`-R` *resource*
Specifies the resource whose status is to be set.

`-s` *status*
Specifies the value of *status*: `OK`, `DEGRADED`, `FAULTED`, `UNKNOWN`, or `OFFLINE`.

`-Z` *zonename*
Specifies the name of the zone cluster in which a resource group is configured to run.

If the `Global_zone` property is set to `TRUE`, methods execute in the global zone even if the resource group that contains the resource is configured in a zone cluster. The `-Z` option sets the status for the non-global zone where the resource group runs rather than for the global zone where the method runs.

Use the -Z option only for resource types whose Global_zone property is set to TRUE. This option is not needed if the Global_zone property is set to FALSE. For more information about the Global_zone property, see the rt_properties(5) man page.

Examples

EXAMPLE 1 Setting the Status of Resource R1 With a Status_msg

The following command sets the status of resource R1 in resource group RG2 to OK and sets the Status_msg to Resource R1 is OK:

```
scha_resource_setstatus -R R1 -G RG2 -s OK -m "Resource R1 is OK"
```

EXAMPLE 2 Setting the Status of Resource R1 Without a Status_msg

The following command sets the status of R1 in resource group RG2 to DEGRADED and sets the Status_msg to NULL:

```
scha_resource_setstatus -R R1 -G RG2 -s DEGRADED
```

EXAMPLE 3 Setting the Status of Resource R1 in Zone Zone1 With a Status_msg

The following example shows a resource type method or monitor that is implemented as a shell script. This shell script shows how to set the status of resource $resource in resource group $rg in zone $localzone to OK. This shell script also sets the Status_msg to “Resource R1 is OK”. In this case, the -Z option must be specified because the resource type property Global_zone is assumed to be set to TRUE.

```
resource=
rg=""
localzone=""
zflag=""
while getopts R:G:Z:
do
      case $c in
      R)   resource=$OPTARG;;
      G)   rg=$OPTARG;;
      Z)   zflag="-Z"
           localzone=$OPTARG;;
      esac
done
...
scha_resource_setstatus -R $resource -G $rg $zflag $localzone -s OK -m
    "Resource R1 is OK"
```

Exit Status

The following exit status codes are returned:

0 The command completed successfully.

nonzero An error occurred.

Failure error codes are described in scha_calls(3HA).

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Stable

See Also scha_cmds(1HA), scha_calls(3HA), scha_resource_setstatus(3HA), attributes(5), rbac(5), rt_properties(5)

Name scha_resourcetype_get – access resource type information

Synopsis `scha_resourcetype_get -O` *optag* `-T` *type* `[-Z` *zoneclustername*`]`

Description The `scha_resourcetype_get` command accesses information about a resource type that is registered with the Resource Group Manager (RGM).

Use this command in shell script implementations of the callback methods for resource types that represent services that are controlled by the RGM. This command provides the same information as the `scha_resourcetype_get(3HA)` C function.

Information is output by this command to the standard output (`stdout`) in formatted strings, as described in the `scha_cmds(1HA)` man page. Output is a string or several strings that are output on separate lines. You can store the output in shell variables. You can also parse the output by using the `awk(1)` command or other shell commands for further use by the script.

You need `solaris.cluster.resource.read` RBAC authorization to use this command. See the `rbac(5)` man page.

Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the `pfsh(1)`, `pfcsh(1)`, or `pfksh(1)` profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run `su(1M)` to assume a role. You can also use `pfexec(1)` to issue privileged Oracle Solaris Cluster commands.

Options The following options are supported:

`-O` *optag*
Indicates the information to be accessed.

Note – *optag* options, such as `API_VERSION` and `BOOT`, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify *optag* options.

The following *optag* values retrieve the corresponding resource type properties. The value of the named property of the resource's type is output.

```
API_VERSION
BOOT
FAILOVER
FINI
GLOBAL_ZONE
INIT
INIT_NODES
INSTALLED_NODES
IS_LOGICAL_HOSTNAME
IS_SHARED_ADDRESS
MONITOR_CHECK
MONITOR_START
```

```
MONITOR_STOP
PKGLIST
POSTNET_STOP
PRENET_START
PROXY
RESOURCE_LIST
RT_BASEDIR
RT_DESCRIPTION
RT_SYSTEM
RT_VERSION
SINGLE_INSTANCE
START
STOP
UPDATE
VALIDATE
```

`-T` *type*
Is the name of a resource type that is registered for use by the RGM cluster facility.

`-Z` *zoneclustername*
Specifies the cluster on which you want to operate. This option is applicable when the command is executed in the global zone but needs to operate on a specified zone cluster. It cannot be used within a zone cluster to access a different zone cluster.

zoneclustername Specifies that the query is to be performed in the zone cluster named *zoneclustername*.

If the `-Z` option is omitted, the query is performed in the cluster in which the command is executed.

Exit Status The following exit values are returned:

`0` The command completed successfully.

nonzero An error occurred.

Failure error codes are described `scha_calls(3HA)`.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Stable

See Also `awk(1)`, `scha_cmds(1HA)`, `scha_calls(3HA)`, `scha_resourcetype_get(3HA)`, `attributes(5)`, `rt_properties(5)`

REFERENCE

OSC4 1m

Name ccradm – CCR table files administration command

Synopsis `/usr/cluster/lib/sc/ccradm` *subcommand* `[-?]`

`/usr/cluster/lib/sc/ccradm addkey [-Z` *zoneclustername*`] -v` *value* `-k` *key* *ccrtablefile*

`/usr/cluster/lib/sc/ccradm addtab [-Z` *zoneclustername*`]` *ccrtablefile*

`/usr/cluster/lib/sc/ccradm changekey [-Z` *zoneclustername*`] -v` *value* `-k` *key* *ccrtablefile*

`/usr/cluster/lib/sc/ccradm delkey [-Z` *zoneclustername*`] -k` *key* *ccrtablefile*

`/usr/cluster/lib/sc/ccradm recover [-Z` *zoneclustername*`] -f -o` *ccrtablefile*

`/usr/cluster/lib/sc/ccradm remtab [-Z` *zoneclustername*`]` *ccrtablefile*

`/usr/cluster/lib/sc/ccradm replace [-Z` *zoneclustername*`] -i` *newdatafile* *ccrtablefile*

`/usr/cluster/lib/sc/ccradm showkey [-Z` *zoneclustername*`] -k` *key* *ccrtablefile*

Description The `ccradm` command supports administration of Cluster Configuration Repository (CCR) information.

The CCR information resides under the `/etc/cluster/ccr` directory. CCR information about the global cluster resides in the `/etc/cluster/ccr/global` directory. CCR information about a zone cluster *zoneclustername* resides in the `/etc/cluster/ccr/zoneclustername` directory. CCR information should only be accessed through the supported programming interfaces. The file permissions are intentionally set to prevent direct access to CCR information.

CCR information is stored in the form of a table, with one table stored in its own file. Each line of the CCR table file consists of two ASCII strings, where one is the key and the other is the value. Each CCR file starts with a generation number, `ccr_gennum` and a checksum, `ccr_checksum`.

The `ccr_gennum` indicates the current generation number of the CCR table file. The system manages the `ccr_gennum`. The highest number is the latest version of the file.

The `ccr_checksum` indicates the checksum of the CCR table contents, and provides a consistency check of the data in the table. The system will not use a CCR table file with an invalid checksum.

The *ccrtablefile* file is the name of the file representing the CCR table on the local node. When the `-Z` option is specified, the *ccrtablefile* belongs to the specified zone cluster. When `-Z` option is not specified, the *ccrtablefile* belongs to the global cluster. Note that the global cluster and the zone clusters can each have a *ccrtablefile* of the same name with different information.

You can use this command only in the global zone.

Sub-commands This command has the following subcommands:

`addkey`
: Adds a key-value pair to the CCR table file for the specified cluster. When used with the `-s` option, the data is a string value. When used with the `-f` option, the value is the first string in the file and the file contains exactly one string. The command returns an error if the file is not in this format.

  This subcommand can be used only in cluster mode.

`addtab`
: Creates a table in the CCR for the specified cluster. The table initially contains just the `ccr_gennum` and `ccr_checksum`.

  This subcommand can be used only in cluster mode.

`changekey`
: Modifies the value of a key in CCR table file based upon the specified key and new value. If the key is not found in CCR table file, the command returns `ESPIPE`. When used with the `-s` option, the data is a string value. When used with the `f` option, the value is the first string in the file and the file contains exactly one string. The command returns an error if the file is not in this format.

  This subcommand can be used only in cluster mode.

`delkey`
: Deletes a key-value pair from CCR table file based upon the specified key. If the key is not found in the CCR table file, the command returns `ESPIPE`.

  This subcommand can be used only in cluster mode.

`recover`

: **Caution –** This subcommand is only for use by engineers who are experts on the internal operations of the CCR. This subcommand supports manual recovery operations. Normal users should not use this subcommand.

  The `recover` subcommand always sets the value of the `ccr_gennum` and recomputes the checksum and sets the value of `ccr_checksum` in the CCR table file.

  When you use the `recover` subcommand without the `-o` option, the `recover` subcommand sets the generation number to `INIT_VERSION`, which is `-1`. A generation number of `INIT_VERSION` means that the CCR table file is valid only until the local node rejoins the cluster, at which time the cluster will replace the contents of CCR table file with the contents of CCR table file from another node in the cluster. A prerequisite is that either one of the other nodes in the cluster must have the override version set for the CCR table file, or at least one of the other nodes must have a valid copy of the CCR table file. A CCR table file is valid if it has a valid checksum and its generation number is greater than or equal to zero.

If the CCR table file has a generation number of `INIT_VERSION` on all nodes, then the CCR table will remain invalid after recovery has completed. Therefore, do not use the init subcommand without the `-o` option on a CCR table file on all nodes in the cluster.

When you use the recover subcommand with the `-o` option, the `recover` subcommand sets the generation number to `OVRD_VERSION`, which is `-2`. A generation number of `OVRD_VERSION` means that the system will propagate the contents of CCR table file on the local node to all other cluster nodes. After propagating the contents to other nodes, the system will change the generation number to 0. Only one node should have a CCR table file with a value of `OVRD_VERSION`. If `OVRD_VERSION` is set on the same CCR table file on multiple nodes, the system will arbitrarily use one CCR table file contents.

This subcommand can be used only in noncluster mode.

`remtab`
Removes a table from the CCR.

This subcommand can be used only in cluster mode.

`replace`

Caution – This subcommand is only for use by engineers who are experts on the internal operations of the CCR. This subcommand supports manual recovery operations. Normal users should not use this subcommand.

Replaces the contents of *ccrdatafile* with the contents of *newdatafile*. The checksum is recomputed and the generation number is reset to 0.

This subcommand can be used only in cluster mode.

`showkey`
Displays the value for the specified key in CCR table file. If the key is not found in CCR table file, the command returns `ESPIPE`. The `showkey` command writes to standard output just the value string followed by an end of line for the specified key. When an error occurs, the command writes nothing.

This subcommand can be used only in cluster mode.

Options This command has the following options:

`-?`
`--help`
Displays help information.

You can specify this option with or without a subcommand.

If you do not specify a subcommand, the list of all available subcommands is displayed.

If you specify a subcommand, the usage for that subcommand is displayed.

If you specify this option and other options, the other options are ignored.

`-f`
`--force`
Specifies that you want to force the `recover` subcommand when the node is booted as a cluster member.

`-i` *newdatafile*
`--input=`*newdatafile*
`--input` *newdatafile*
Specifies the CCR table file you want to use for the recovery operation.

`-k`
`--key`
Specifies the name of the key to be added, removed, or modified.

`-o`
`--override`
The override option is used with the `recover` subcommand. It sets the generation number to `OVRD_VERSION`.

This option is used to designate one CCR table file to be the master copy. This master version of the CCR table file overrides other versions of the file that are on the remaining nodes during recovery. If a CCR table file has a generation number of `OVRD_VERSION` on more than one node, then only one of the files is selected and a warning message is printed on the console of one of the nodes. After recovery, the table's generation number is reset to 0.

This option can be used only in noncluster mode.

`-v` *value*
`--value=`*value*
`--value` *value*
Specifies the value for the key of a CCR table. There can be no white space characters in the value string. This means that there can be no spaces, tabs, carriage returns, or line feeds.

`-Z {`*zoneclustername* `| global}`
`--zoneclustername={`*zoneclustername* `| global}`
`--zoneclustername {`*zoneclustername* `| global}`
Specifies the cluster in which the CCR transactions has to be carried out. This option is supported by all subcommands. If you specify this option, you must also specify one argument from the following list:

zoneclustername
Specifies that the command with which you use this option is to operate on all specified resource groups in only the zone cluster named *zoneclustername*.

`global`
Specifies that the command with which you use this option is to operate on all specified resource groups in the global cluster only.

The `-Z` option can be used only in cluster mode.

Operands Only the following operand is supported:

ccrtablefile
Specifies the CCR table file that is to be managed. Only one *ccrtablefile* can be specified.

Usage The `ccradm` command can be used for administrative actions on CCR table files.

Examples **EXAMPLE 1** Repairing a Corrupted CCR Table and Recomputing the checksum

Perform these steps to repair a corrupted CCR table only when directed by authorized Oracle personnel as part of an emergency repair procedure.

This example repairs the CCR table `ccr-file`.

1. Reboot all nodes in noncluster mode.
2. Edit the file on all nodes to contain the correct data. The file must be identical on all nodes. Because the file is identical on all nodes, it also can be designated as the override version on all nodes.
3. Recompute the checksum and designate this CCR table file to be the override version by running the following command on all nodes, where `ccr-file` is the name of the CCR table.

   ```
   # ccradm recover -o ccr-file
   ```
4. Reboot all nodes into cluster mode.

EXAMPLE 2 Restoring a Corrupted CCR Table From a Backup Version

This example replaces the CCR table `yyy` with the contents of its backup version, the file `yyy.bak`. The command is run from one node in cluster mode.

```
# ccradm replace -Z global -i /etc/cluster/ccr/global/yyy.bak /etc/cluster/ccr/global/yyy
```

EXAMPLE 3 Creating a CCR Table

This example creates a temporary CCR table `foo` in the zone cluster `zc1`. The command is run from one node in cluster mode.

```
# ccradm addtab -Z zc1 foo
```

EXAMPLE 4 Removing a CCR Table

This example shows the removal of the CCR table `foo` from the global cluster. The command is run from one node in cluster mode.

```
# ccradm remtab foo
```

EXAMPLE 5 Modifying a CCR Table

This example changes to `5400` the value of the `Pingpong_interval` property in the global cluster CCR table `rgm_rg_nfs-rg`. The command is run from one node in cluster mode.

```
# ccradm changekey -s 5400 -k Pingpong_interval rgm_rg_nfs-rg
```

EXAMPLE 6 Displaying a Key Value From the CCR Table

This example displays the value of the `Pingpong_interval` property from the CCR table `rgm_rg_nfs-rg`.

```
# ccradm showkey -k Pingpong_interval rgm_rg_nfs-rg
5400
```

Exit Status

The following exit values are returned:

0
: No errors occurred.

>0
: Errors occurred.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

Name cl_eventd – Cluster event daemon

Synopsis `/usr/cluster/lib/sc/cl_eventd [-v]`

Description The `cl_eventd` daemon is started at boot time to monitor system events that are generated by other cluster components. This daemon also forwards these events to other cluster nodes. Only the events of class `EC_Cluster` are forwarded to other cluster nodes.

Options The following option is supported:

`-v` Send additional troubleshooting and debugging information to `syslogd`(1M).

Files `/usr/cluster/lib/sc/cl_eventd` Cluster event daemon

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core

See Also `syseventd`(1M), `syslog`(3C)

Notes The `cl_eventd` daemon does not provide a publicly accessible interface.

Name cl_pnmd – Public Network Management (PNM) service daemon

Synopsis `/usr/cluster/bin/cl_pnmd [-d [-t [`*tracefile*`]]]`

Description `cl_pnmd` is a server daemon for the Public Network Management (PNM) module. It is usually started up at system boot time. When it is started, it starts the PNM service.

The `in.mpathd(1M)` daemon does adapter testing and intra-node failover for all IP Network Multipathing (IPMP) groups in the local host.

`cl_pnmd` keeps track of the local host's IPMP state and facilitates inter-node failover for all IPMP groups.

Options The following options are supported:

`-d` Displays debug messages on `stderr`.

`-t` *tracefile* When used with the `-d` option, it causes all debug messages to be redirected to *tracefile*. If *tracefile*. is omitted, `/var/cluster/run/cl_pnmd.log` is used.

Diagnostics `cl_pnmd` is a daemon and has no direct `stdin`, `stdout`, or `stderr` connection to the outside. All diagnostic messages are logged through `syslog(3C)`.

Notes `cl_pnmd` must be run in superuser mode.

Due to the volume of debug messages generated, do not use the `-t` option for an extended period of time.

`cl_pnmd` is started by the `pnm` startup script. The Service Management Facility starts and stops the daemon.

The `SIGTERM` signal can be used to kill `cl_pnmd` gracefully. Other signals should not be used to kill the daemon.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also `ifconfig(1M)`, `in.mpathd(1M)`, `syslog(3C)`, `attributes(5)`

Name dcs_config – query DCS

Synopsis

```
/usr/cluster/lib/sc/dcs_config -c info [ -s service-name | -C service-class | -d device-path ]
```

```
/usr/cluster/dtk/bin/dcs_config -c status [ -s service-name ]
```

```
/usr/cluster/lib/sc/dcs_config -c remove -s service-name
```

Description The `dcs_config` command is an emergency command line interface designed to update the Device Configuration System (DCS) directly. The update options to `dcs_config` should only be used when directed by authorized Oracle support personnel. Perform all normal changes to the DCS by using the `cldevicegroup` command.

To query device services, use the `info` or `status` forms of the command. The `info` form gives general configuration information about the service. The `status` form gives information about the service's current state. `info` and `status` commands without additional qualifying options shows all service classes and services in use.

You can use this command only in the global zone.

Options The following options are supported:

`-c` *command*
Specifies the *command* to run:

`info`
displays information about the specified service name or all services if one is not specified. Output varies depending on the type of service and can include service class, secondaries, switchback, replicas, incarnations, or devices.

`status`
Displays the service state for the specified service or all states if no service name is specified

`remove`
Removes the specified service name from DCS. This only removes the service name from the cluster. It does not remove it from Oracle Solaris. For instance, if you use `dcs_config` to remove a metaset, Solaris Volume Manager does not remove the disk set.

`-C` *service-class*
Specifies the service class. Valid service classes are `SUNWmd`, `DISK`, `TAPE`, and `SUNWlocal`.

`-d` *device-path*
Specifies the device path.

`-s` *service-name*
Specifies the service name. Valid service names include metasets and disks.

Examples

EXAMPLE 1 Displaying Information About a Disk

This example displays information about the disk `dsk/d5`:

```
# dcs_config -c info -s dsk/d5
Service name: dsk/d5
Service class: DISK
Switchback Enabled: False
Number of secondaries: All
Replicas: (Node id --> 1, Preference --> 0)(Node id --> 2, Preference --> 0)
Devices: (239, 160-167)
Properties:
   gdev --> d5
   autogenerated --> 1
```

EXAMPLE 2 Removing an Unrecognized Solaris Volume Manager metaset

In this example, the cluster software recognizes the metaset `nfs-set` but Solaris Volume Manager does not. The `cldevicegroup status` command shows the metaset:

```
=== Cluster Device Groups ===

--- Device Group Status ---
Device Group Name     Primary     Secondary     Status
-----------------     -------     ---------     ------
nfs-set                -            -             Offline
```

The `metaset` command does not know about the set:

```
# metaset -s nfs-set
metaset: setname "nfs-set": no such set
```

Run from one node, the following `dcs_config` command removes `nfs-set` from the cluster:

```
# dcs_config -c remove -s nfs-set
```

EXAMPLE 3 Displaying the Status of a metaset

This example displays the status of the `nfs-set` metaset.

```
# dcs_config -c status -s nfs-set
Service Name: nfs-set
Active replicas: (1. State - Primary)(2. State - Secondary)
Service state: SC_STATE_ONLINE
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also cldevicegroup(1CL), metaset(1M)

Name halockrun – run a child program while holding a file lock

Synopsis `/usr/cluster/bin/halockrun [-nsv] [-e` *exitcode*`]` *lockfilename*
prog `[`*args*`]`

Description The `halockrun` utility provides a convenient means to claim a file lock on a file and run a program while holding that lock. As this utility supports script locking, this utility is useful when programming in scripting languages such as the Bourne shell. See `sh(1)`.

`halockrun` opens the file *lockfilename* and claims an exclusive mode file lock on the entire file. See `fcntl(2)`. Then it runs the program *prog* with arguments *args* as a child process and waits for the child process to exit. When the child exits, `halockrun` releases the lock, and exits with the same exit code with which the child exited.

The overall effect is that the child *prog* is run as a critical section, and that this critical section is well-formed, in that no matter how the child terminates, the lock is released.

If the file *lockfilename* cannot be opened or created, then `halockrun` prints an error message on stderr and exits with exit code `99`.

You can run this command in the global zone. The command affects only the global zone in which you issue the command.

Options The following options are supported:

`-e` *exitcode* — Normally, errors detected by `halockrun` exit with exit code `99`. The `-e` option provides a means to change this special exit code to a different value.

`-n` — The lock should be requested in non-blocking mode: if the lock cannot be granted immediately, `halockrun` exits immediately, with exit code `1`, without running *prog*. This behavior is not affected by the `-e` option.

Without the `-n` option, the lock is requested in blocking mode, thus, the `halockrun` utility blocks waiting for the lock to become available.

`-s` — Claim the file lock in shared mode, rather than in exclusive mode.

`-v` — Verbose output, on `stderr`.

Exit Status Errors detected by `halockrun` itself, such that the child process was never started, cause `halockrun` to exit with exit code `99`. (This exit code value can be changed to a different value using the `-e` option. See `OPTIONS`.

Otherwise, `halockrun` exits with the same exit code with which the child exited.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also fcntl(2), attributes(5)

Name hatimerun – run child program under a timeout

Synopsis `/usr/cluster/bin/hatimerun -t` *timeOutSecs* `[-av] [-e` *exitcode*`]` *prog args*

`/usr/cluster/bin/hatimerun -t` *timeOutSecs* `[-v] [-e` *exitcode*`]` `[-k` *signalname*`]` *prog args*

Description The `hatimerun` utility provides a convenient facility for timing out the execution of another child, program. It is useful when programming in scripting languages, such as the Bourne shell. See `sh(1)`.

The `hatimerun` utility runs the program *prog* with arguments *args* as a child subprocess under a timeout, and as its own process group. The timeout is specified in seconds, by the `-t` *timeOutSecs* option. If the timeout expires, then `hatimerun` kills the child subprocess's process group with a SIGKILL signal, and then exits with exit code 99.

You can run this command in the global zone. The command affects only the global zone in which you issue the command.

Options The following options are supported:

`-a` Changes the meaning of `hatimerun` radically: instead of killing the child when the timeout expires, the `hatimerun` utility simply exits, with exit code 99, leaving the child to run asynchronously.

It is illegal to supply both the `-a` option and the `-k` option.

`-e` Changes the exit code for the timeout case to some other value than 99.

`-k` Specifies what signal is used to kill the child process group. The possible signal names are the same as those recognized by the `kill(1)` command. In particular, the signal name should be one of the symbolic names defined in the `<signal.h>` description. The signal name is recognized in a case-independent fashion, without the `SIG` prefix. It is also legal to supply a numeric argument to the `-k` option, in which case that signal number is used.

It is illegal to supply both the `-a` option and the `-k` option.

`-t` Specifies the timeout period, in seconds.

`-v` Verbose output, on stderr.

Exit Status If the timeout occurs, then `hatimerun` exits with exit code 99 (which can be overridden to some other value using the `-e` option).

If the timeout does not occur but some other error is detected by the `hatimerun` utility (as opposed to the error being detected by the child program), then `hatimerunhatimerun` exits with exit code 98.

Otherwise, `hatimerun` exits with the child's exit status.

The `hatimerun` utility catches the signal SIGTERM. It responds to the signal by killing the child as if a timeout had occurred, and then exiting with exit code 98.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also `kill(1)`, `sh(1)`, `attributes(5)`

Name pmfadm – process monitor facility administration

Synopsis

```
/usr/cluster/bin/pmfadm -c nametag [-a action] [
 [-e ENV_VAR=env.var...] | -E] [-n retries] [-t period]
 [-C level#] command [args-to-command...]

/usr/cluster/bin/pmfadm -k nametag [-w timeout] [signal]

/usr/cluster/bin/pmfadm -L [-h host]

/usr/cluster/bin/pmfadm -l nametag [-h host]

/usr/cluster/bin/pmfadm -m nametag [-n retries] [-t period]

/usr/cluster/bin/pmfadm -q nametag [-h host]

/usr/cluster/bin/pmfadm -s nametag [-w timeout] [signal]
```

Description The `pmfadm` utility provides the administrative, command-line interface to the process monitor facility.

The process monitor facility provides a means of monitoring processes, and their descendents, and restarting them if they fail to remain alive. The total number of failures allowed can be specified, and limited to a specific time period. After the maximum number of failures has occurred within the specified time period, a message is logged to the console, and the process is no longer restarted.

If an *action* program has been specified, it is called when the number of failures allowed has been reached. If the *action* program exits with non-zero status, the process nametag is removed from the process monitor facility. Otherwise, the process is restarted with the original parameters passed into `pmfadm`.

Processes that are started under control of the process monitor are run as the effective user ID (`euid`) and effective group ID (`egid`) of the user that initiated the request. Only the original user, or root, can manipulate the nametag associated with those processes. Status information, however, is available to any caller, local or remote.

All spawned processes, and their descendent spawned processes, of the process that initially started are monitored. Only when the last process or subprocess exits does the process monitor attempt to restart the process.

You can run this command in the global zone. The command affects only the global zone in which you issue the command.

Options The following options are supported:

`-a` *action*
The action program to be called when the process fails to stay alive. This program must be specified in a single argument to the `-a` option, but can be a quoted string that contains multiple components. In either case, the string is executed as specified, with two additional arguments, the event that occurred (currently only `failed`), and the nametag associated

with the process. The current directory, and PATH environment variable, are re-instantiated before the command is executed. No other environment variables are, or should be assumed to be, preserved.

If the action program exits with status 0, the process is started over again with the original arguments that were given to pmfadm. Any other exit status causes the nametag to cease to exist within the scope of the process monitor.

If no -a option is specified, the result is the same as if there were an action script specified which always exits non-zero.

-C *level#*
When starting a process, monitor it and its children up to and including level *level#*. The value of *level#* must be an integer greater than or equal to zero. The original process executed is at level 0, its children are executed at level 1, their children are executed at level 2, and so on. Any new fork operation produces a new level of children.

This option provides more control over which processes get monitored. It is useful for monitoring servers that fork new processes.

When this option is not specified, all children are monitored, and the original process is not restarted until it and all its children have died.

If a server forks new processes to handle client requests, it might be desirable to monitor only the server. The server needs to be restarted if it dies even if some client processes are still running. The appropriate monitoring level is -C 0.

If, after forking a child, the parent exits, then it is the child that needs monitoring. The level to use to monitor the child is -C 1. When both processes die, the server is restarted.

-c *nametag*
Start a process, with *nametag* as an identifier. All arguments that follow the command-line flags are executed as the process of interest. The current directory, and PATH environment variable, are re-instantiated by the process monitor facility before the command is executed. No other environment variables are, or should be assumed to be, preserved.

If *nametag* already exists, pmfadm exits with exit status 1, with no side effects.

I/O redirection is not supported in the command-line arguments. If this is necessary, a script should be created that performs this redirection, and used as the command that pmfadm executes.

-E
Pass the whole pmfadm environment to the new process. The default is not to use this option, in which case the rpc.pmfd environment plus the path of the pmfadm environment are passed.

The -e and -E options are mutually exclusive, that is, both cannot be used in the same command.

`-e` `ENV_VAR=`*env.value*
An environment variable in the form `ENV_VAR=`*env.value* which is passed to the execution environment of the new process. This option can be repeated, so multiple environment variables can be passed. The default is not to use this option, in which case the `rpc.pmfd` environment plus the path of the `pmfadm` environment are passed.

`-h` *host*
The name of the host to contact. Defaults to localhost.

`-k` *nametag*
Send the specified signal to the processes associated with *nametag*, including any processes associated with the action program if it is currently running. The default signal, `SIGKILL`, is sent if none is specified. If the process and its descendants exit, and there are remaining retries available, the process monitor restarts the process. The signal specified is the same set of names recognized by the `kill` command.

`-L`
Return a list of all tags running that belong to the user that issued the command, or if the user is root, all tags running on the server are shown.

`-l` *nametag*
Print out status information about *nametag*. The output from this command is useful mainly for diagnostics and might be subject to change.

`-m` *nametag*
Modify the number of retries, or time period over which to observe retries, for *nametag*. Once these parameters have been changed, the history of earlier failures is cleared.

`-n` *retries*
Number of retries allowed within the specified time period. The default value for this field is `0`, which means that the process is not restarted once it exits. The maximum value allowed is 100. A value of `-1` indicates that the number of retries is infinite.

`-q` *nametag*
Indicate whether *nametag* is registered and running under the process monitor. Returns `0` if it is, `1` if it is not. Other return values indicate an error.

`-s` *nametag*
Stop restarting the command associated with *nametag*. The signal, if specified, is sent to all processes, including the action script and its processes if they are currently executing. If a signal is not specified, none is sent. Stopping the monitoring of processes does not imply that they no longer exist. The processes remain running until they, and all of their descendents, have exited. The signal specified is the same set of names recognized by the `kill` command.

`-t` *period*
Minutes over which to count failures. The default value for this flag is `-1`, which equates to infinity. If this parameter is specified, process failures that have occurred outside of the specified period are not counted.

`-w` *timeout*

When used in conjunction with the `-s` *nametag* or `-k` *nametag* flags, wait up to the specified number of seconds for the processes associated with *nametag* to exit. If the timeout expires, `pmfadm` exits with exit status `2`. The default value for this flag is `0`, meaning that the command returns immediately without waiting for any process to exit.

If a value of `-1` is given, `pmfadm` waits indefinitely for the processes associated with the tag to exit. The `pmfadm` process does not release the RPC server thread that it uses until the RPC timeout period is reached. Therefore, avoid setting the `-w` *timeout* value to `-1` unnecessarily.

Examples

EXAMPLE 1 Starting a Sleep Process That Will Not be Restarted

The following example starts a sleep process named `sleep.once` that will not be restarted once it exits:

```
example% pmfadm -c sleep.once /bin/sleep 5
```

EXAMPLE 2 Starting a Sleep Process and Restarting It

The following example starts a sleep process and restarts it, at most, one time:

```
example% pmfadm -c sleep.twice –n 1 /bin/sleep 5
```

EXAMPLE 3 Starting a Sleep Process and Restarting It

The following examples start a sleep process and restarts it, at most, twice per minute. It calls `/bin/true` when it fails to remain running beyond the acceptable number of failures:

```
example% pmfadm -c sleep.forever –n 2 –t 1 –a /bin/true /bin/sleep 60
```

EXAMPLE 4 Listing the Current Status of the sleep.forever Nametag

The following command lists the current status of the `sleep.forever` nametag:

```
example% pmfadm -l sleep.forever
```

EXAMPLE 5 Sending a SIGHUP to All Processes

The following command sends a `SIGHUP` to all processes associated with `sleep.forever`, waiting up to five seconds for all processes to exit.

```
example% pmfadm -w 5 -k sleep.forever HUP
```

EXAMPLE 6 Stopping the Monitoring of Processes and Sending a SIGHUP

The following command stops monitoring (restarting) processes associated with `sleep.forever`, and sends a `SIGHUP` to any processes related to it. This command returns as soon as the signals have been delivered, but possibly before all processes have exited.

```
example% pmfadm -s sleep.forever HUP
```

EXAMPLE 7 Listing All Tags Running That Belong to the User

If a user issues the following commands:

```
example% pmfadm -c sleep.once /bin/sleep 30
example% pmfadm -c sleep.twice /bin/sleep 60
example% pmfadm -c sleep.forever /bin/sleep 90
```

the output of the following command:

```
example% pmfadm -L
```

is

```
sleep.once sleep.twice sleep.forever
```

Exit Status

The following exit values are returned:

`0`	Successful completion.
`1`	*nametag* doesn't exist, or there was an attempt to create a nametag that already exists.
`2`	The command timed out.
other nonzero	An error occurred.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

`kill(1)`, `rpc.pmfd(1M)`, `attributes(5)`

Name rpc.pmfd, pmfd – RPC-based process monitor server

Synopsis `/usr/cluster/lib/sc/rpc.pmfd`

Description The `rpc.pmfd` daemon is the Oracle's ONC RPC server for serving the process monitor facility that is used by Oracle Solaris Cluster software. This daemon initially starts when the system comes up.

The `rpc.pmfd` daemon must be started as superuser so commands that are queued to be monitored can be run as the user that submitted them.

You can run this command in the global zone. The command affects only the global zone in which you issue the command.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also `truss(1)attributes(5)`

Diagnostics Diagnostic messages are normally logged to the console.

Notes To avoid collisions with other controlling processes, the `truss` command does not allow tracing a process that it detects as being controlled by another process by way of the `/proc` interface.

Name scconf – update the Oracle Solaris Cluster software configuration

Synopsis

scconf -a [-Hv] [-h *node_options*] [-A *adapter_options*]
[-B *switch_options*] [-m *cable_options*] [-P *privatehostname_options*]
[-q *quorum_options*] [-D *devicegroup_options*] [-T *authentication_options*]

scconf -c [-Hv] [-C *cluster_options*] [-A *adapter_options*]
[-B *switch_options*] [-m *cable_options*] [-P *privatehostname_options*]
[-q *quorum_options*] [-D *devicegroup_options*] [-S *slm_options*]
[-T *authentication_options*] [-w *heartbeat_options*]

scconf -r [-Hv] [-h *node_options*] [-A *adapter_options*]
[-B *switch_options*] [-m *cable_options*] [-P *privatehostname_options*]
[-q *quorum_options*] [-D *devicegroup_options*] [-T *authentication_options*]

scconf -p [-Hv [v]]

scconf [-H]

Description

Note – Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `scconf` command manages the Oracle Solaris Cluster software configuration. You can use `scconf` to add items to the configuration, to change properties of previously configured items, and to remove items from the configuration. In each of these three forms of the command, options are processed in the order in which they are typed on the command line. All updates associated with each option must complete successfully before the next option is considered.

The `scconf` command can also be used to register SVM metasets and raw disk groups when the disk groups or metasets consist of disks that use controller-based replication for data availability. Before using the `scconf` command to register disk groups and metasets, ensure that all disks in the disk group are either replicated or non-replicated, but not both. Also, you must execute the `scdidadm` command with the `-T` or `-t` options or the `cldevice replicate` command. These commands configure the DID device to use controller-based replication. For more information, see the `scdidadm(1M)` man page or the `cldevice(1CL)` man page.

The `scconf` command can only be run from an active cluster node. As long as the node is active in the cluster, it makes no difference which node is used to run the command. The results of running the command are always the same, regardless of the node used.

The `-p` option of `scconf` enables you to print a listing of the current configuration.

All forms of the `scconf` command accept the `-H` option. Specifying `-H` displays help information, and all other options are ignored and not executed. Help information is also printed when `scconf` is invoked without options.

You can use this command only in the global zone.

Options

Basic Options

The following option is common to all forms of the `scconf` command:

`-H`

If this option is specified on the command line at any position, it prints help information. All other options are ignored and are not executed. Help information is also printed if `scconf` is invoked with no options.

You can use this option only in the global zone.

The following options modify the basic form and function of the `scconf` command. None of these options can be combined on the same command line.

`-a`

Specifies the `add` form of the `scconf` command.

You can use this option only in the global zone.

The `-a` option can be used to add or initialize most of the items that are used to define the software configuration of an Oracle Solaris Cluster. Additional options are used with `-a` to specify elements (adapter, switch, or device group options, for example) and their associated properties to be added. Any number of these additional options can be combined on the same command line, as long as they are for use with the `-a` option.

`-c`

Specifies the `change` form of the `scconf` command.

You can use this option only in the global zone.

The `-c` option is used to change properties of items already configured as part of the Oracle Solaris Cluster software configuration. Additional options are used with `-c` to specify new or changed properties. Any number of these additional options can be combined on the same command line, as long as they are for use with the `-c` option.

`-p`

Specifies the `print` form of the `scconf` command.

You can use this option only in the global zone.

The `-p` option prints a listing of the current Oracle Solaris Cluster configuration elements and their associated properties that you can configure with `scconf`. This option can be combined with one or more `-v` options to print more verbose listings.

`-r`

Specifies the `remove` form of the `scconf` command.

You can use this option only in the global zone.

The `-r` option is used to remove items from the Oracle Solaris Cluster software configuration. Additional options are used with `-r` to specify the items to delete from the configuration. Any number of these additional options can be combined on the same command line, as long as they are for use with the `-r` option.

Additional Options

The following additional options can be combined with one or more of the previously described basic options. Refer to the SYNOPSIS section to see the options that can be used with each form of `scconf`.

The additional options are as follows:

`-A` *adapter_options*

Adds, removes, or changes the properties of a cluster transport adapter. The node on which the given adapter is hosted need not be active in the cluster for these operations to succeed. The `-A` *adapter_options* for each of the three forms of the command that accept `-A` are described here.

- Use this syntax to specify `-A` *adapter_options* for the `add` form of the command:

  –A name=*adaptername*,node=*node*[,vlanid=*vlanid*][,state=*state*] \
  [,*other_options*]

- Use this syntax to specify `-A` *adapter_options* for the `change` form of the command:

  –A name=*adaptername*,node=*node*[,state=*state*] \
  [,*other_options*]

- Use this syntax to specify `-A` *adapter_options* for the `remove` form of the command:

  –A name=*name*,node=*node*

The `-A` option supports the following sub-options:

`name=`*adaptername*

Specifies the name of an adapter on a particular node. This sub-option must be included with each occurrence of the `-A` option.

adaptername is constructed from a *device name*, immediately followed by a *physical-unit* number (for example, `hme0`).

`node=`*node*

Specifies the name of an adapter on a particular node. A `node` sub-option is required for each occurrence of the `-A` option.

The *node* can be given either as a node name or node ID.

`state=`*state*

Changes the state of the adapter. You can use this sub-option with the `change` form of the command. The `state` can be set to either `enabled` or `disabled`.

When an adapter is added to the configuration, its state is always set to `disabled`. By default, adding a cable to any of the ports on an adapter changes the state of both the port and the adapter to `enabled`. See `-m` *cable_options*.

Disabling an adapter also has the effect of disabling all ports associated with that adapter. However, enabling an adapter does not result in the enabling of its ports. To enable an adapter port, you must enable the cable to which the port is connected.

`trtype=`*type*
Specifies the transport type. This sub-option must be included when `-A` is used with the `add` form of the command.

An example of a transport *type* is `dlpi`. See `sctransp_dlpi(7p)`.

`[vlanid=`*vlanid*`]`
Specifies the VLAN ID of the tagged-VLAN adapter.

[*other_options*]
If other options are available for a particular adapter type, they can be used with `-A` in the add and change forms of the command. Refer to the cluster transport adapter man pages for information about special options.

You need `solaris.cluster.transport.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-B` *switch_options*
Adds, removes, or changes the properties of a cluster transport switch, also called transport junction.

Examples of such devices can include, but are not limited to, Ethernet hubs, other switches of various types, and rings.

The `-B` *switch_options* for each of the three forms of the command that accept `-B` are described here.

- Use this syntax to specify `-B` *switch_options* for the `add` form of the command:

  `–B type=`*type*`,name=`*name*`[,`*other_options*`]`

- Use this syntax to specify `-B` *switch_options* for the `change` form of the command:

  `–B name=`*name*`[,state=`*state*`][,`*other_options*`]`

- Use this syntax to specify `-B` *switch_options* for the `remove` form of the command:

  `–B name=`*name*

The `-B` option supports the following sub-options:

`name=`*name*
Specifies the name of a cluster transport switch. A `name` sub-option must be included with each occurrence of the `-B` option.

name can be up to 256 characters in length. It is made up of either letters or digits, with the first character being a letter. Each transport switch name must be unique across the namespace of the cluster.

`state=`*state*
Changes the state of a cluster transport switch. This sub-option can be used with a `-B change` command. `state` can be set to either `enabled` or `disabled`.

When a switch is added to the configuration, its state is always set to `disabled`. By default, adding a cable to any of the ports on a switch changes the state of both the port and the switch to `enabled`. See `-m` *cable_options*.

Disabling a switch also has the effect of disabling all ports associated with that switch. However, enabling a switch does not result in the enabling of its ports. To enable a switch port, you must enable the cable to which the port is connected.

`type=`*type*
Specifies a cluster transport switch type. This sub-option must be included when `-B` is used with the `add` form of the command.

Ethernet hubs are examples of cluster transport switches of type `switch`. The `scconf_transp_jct_etherswitch(1M)` man page contains more information.

[*other_options*]
When other options are available for a particular switch type, they can be used with `-B` in the `add` and `change` forms of the command. Refer to the `scconf_transp_jct_etherswitch(1M)` cluster transport switch man page for information about special options.

You need `solaris.cluster.transport.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-C` *cluster_options*
Changes the name of the cluster itself. This option can only be used with the `change` form of the command.

Specify *cluster_options* for the `change` form of the command as follows:

`-C cluster=`*clustername*

This form of the command changes the name of the cluster to *clustername*.

`-D` *devicegroup_options*
Adds device groups to the configuration, changes or resets properties of existing device groups, or removes groups from the Oracle Solaris Cluster device groups configuration. Other device group options (*other_options*) play a crucial role in adding or changing device groups and their options. Pay special attention to the man pages for the type-dependent device group options (for example, `scconf_dg_svm(1M)`, and `scconf_dg_rawdisk(1M)`) when configuring any device group. Not all device group types support all three forms of

the `-D` option. For example, `svm` device groups can normally only be used with the `change` form of the command to change certain attributes, such as the ordering of the node preference list.

The `add` form of the command can be used to either create device groups or to add nodes to existing device groups. For some device group types, the `add` form can also be used to add devices to a group. The `change` form of the command registers updates to change certain attributes associated with a group. The `remove` form of the command is used to either remove an entire device group or one or more of a group's components.

The `-D` *devicegroup_options* for each of the three forms of the `scconf` command that accept `-D` are as follows:

Add:

```
-D type=type,name=name[,nodelist=node[:node]...]
        [,preferenced={true | false}]
        [,numsecondaries=integer]
        [,failback={enabled | disabled}][,other_options]
```

Change:

```
-D name=name[,nodelist=node[:node]...]
        [,preferenced={true | false}]
        [,numsecondaries=integer]
        [,failback={enabled | disabled}][,other_options]
```

Remove:

```
-D name=name,nodelist=node[:node]...
```

The `-D` option supports the following sub-options:

`name=`*name*
: The name of the device group. This name must be supplied with all three forms of the command.

`nodelist=`*node*[:*node*]…
: A list of potential primary nodes that is required for some device group types when adding a group to the cluster. For the `vxvm` device group type, the concept of primary nodes does not apply when the `localonly` property is set to `true`. Refer to the man pages for the type-dependent device group for more information.

  The `nodelist` sub-option is required when you set the `preferenced` sub-option to `true`.

  With the `add` form of the command, the `nodelist` is, by default, an ordered list indicating the preferred order in which nodes should attempt to take over as the primary node for a device group. However, if the `preferenced` sub-option is set to `false` (see the next subsection), the first node to access a device in the group automatically becomes the primary node for that group. The `preferenced` sub-option cannot be used when adding nodes to an existing device group. However, the `preferenced` sub-option can be used when you create the group for the first time, or with the `change` form of the command.

To change the primary node order preference, you must specify the complete list of cluster nodes in the `nodelist` in the order that you prefer. You must also set the `preferenced` sub-option to `true`.

When used with the `remove` form of the command, the `nodelist` sub-option is used to remove the indicated nodes from the device group. Only by not providing a `nodelist` can the entire device group be removed. Simply removing all of the nodes from a device group does not necessarily remove that group.

`type=`*type*

The type of device group. The type must be used with the `add` form of the command to indicate the type of device group to create (for example, `vxvm` or `rawdisk`).

`[failback={enabled | disabled}]`

Enables or disables the `failback` behavior of a device group with either the `add` or the `change` form of the command.

Specifies the behavior of the system should a device group primary node leave the cluster membership and later return.

When the node leaves the cluster membership, the device group fails over to the secondary node. When the failed node rejoins the cluster membership, the device group can either continue to be mastered by the secondary node, or fail back to the original primary node.

If `failback` is `enabled`, the device group becomes mastered by the original primary node. If `failback` is `disabled`, the device group continues to be mastered by the secondary node.

By default, `failback` is `disabled`.

`[numsecondaries=`*integer*`]`

Enables you to dynamically change the desired number of secondary nodes for a device group. A device group is an HA service that requires one node to act as a primary node and one or more nodes to act as secondary nodes. The secondary nodes of a device group are able to take over and act as the primary node if the current primary node fails.

This integer value should be greater than 0 but less than the total number of nodes in the specified group. The default is 1.

A system administrator can use the `numsecondaries` sub-option to change the number of secondary nodes for a device group while maintaining a given level of availability. If a node in a device group is removed from the secondary nodes list, it is not able to take over and act as a primary node until it is converted back to a secondary node. Before making a change to the number of secondary nodes, you need to assess the impact on the secondary global file system.

The `numsecondaries` sub-option only applies to nodes in a device group that are currently in cluster mode and can be used together with the node's `preferenced` sub-option. If a device's `preferenced` sub-option is enabled, the nodes that are least preferred are removed from the secondary nodes list first. If no node in a device group is flagged as preferred, the cluster randomly picks the node to remove.

When a device group's actual number of secondary nodes drops to less that the desired level due to node failures, nodes that were removed from the secondary nodes list are added back to the secondary list of nodes if they are currently in a cluster, belong to the device group, and are not currently a primary or a secondary node. The conversion starts with the node in the device group with the highest preference until the number of desired secondary nodes is matched.

If a node in the device group has a higher preference than an existing secondary node and joins the cluster, the node with the least preference is removed from the secondary nodes list and is replaced by the newly added node. This replacement only occurs when there are more actual secondary nodes than the desired level.

To set the desired number of secondary nodes to the system default (without having to know the default value), issue one of these commands:

```
# scconf -aD type=vxvm,name=foo, \
nodelist=node1:node2,numsecondaries=
```

or

```
# scconf -cD name=foo,numsecondaries=
```

The `numsecondaries` sub-option can only be used with the `-a` option when a device group is created. The `numsecondaries` sub-option cannot be used with the `-a` option to add a host to an existing device group.

[`preferenced`={`true` | `false`}]

Indicates the status of the preferred order of potential primary nodes for a device group. As long as the `preferenced` sub-option is not set to `false`, node lists for newly created device groups indicate a preferred order in which nodes attempt to take over as the primary node for a device group.

If you set the `preferenced` sub-option to `true`, you must also use the `nodelist` sub-option to specify the entire node list.

If the `preferenced` sub-option is not specified with an `add` that is used to create a device group, it is, by default, `false`. However, if the preferenced sub-option is not specified with a `change`, it is, by default, set to `true` when `nodelist` is given.

The `preferenced` sub-option cannot be used with an `add` that is used to add nodes to an established device group. In this case, the established node preference list setting is used.

[*other_options*]
You can use other device group type-dependent options with either the `add` or `change` form of the command. Refer to the appropriate man pages for more information (for example, `scconf_dg_svm`(1M), and `scconf_dg_rawdisk`(1M)).

You need `solaris.cluster.device.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac`(5).

`-h` *node_options*
Adds or removes a node from the cluster configuration database. When used with the `add` form of `scconf`, both the new name and an internally generated node ID are added to the cluster configuration database. In addition, the new node is given a disk reservation key and a quorum vote count of zero. The name that is assigned to access the node over the cluster interconnect is initialized to `clusternode`*nodeid*`-priv`. See the `-p` option to learn more about printing configuration elements and their associated properties.

`scconf` cannot be used by itself to add a new node to the cluster. You can only use `scconf` to update the configuration database itself. `scconf` does not copy the configuration database onto the new node or create the necessary node identifier on the new node. To add a node to a cluster, use `scinstall`(1M).

When used with the `remove` form of `scconf`, all references to the node, including the last transport cable, all resource group references, and all device group references must be removed before `scconf` can be used to completely remove the node from the cluster configuration.

The node to be removed must not be configured for any quorum devices. In addition, you cannot remove a node from a three-node cluster unless there is at least one shared quorum device configured.

The system administration procedures in the Oracle Solaris Cluster documentation describe how to remove a cluster node in more detail.

You must specify the `node=`*node* sub-option with any occurrence of the `-h` option. For the `add` form of the command, the given *node* must be a node name.

Use this syntax to specify the `-h` *node_options* for the `add` form of the command:

`–h node=`*nodename*

For the `remove` form of the command, the *node* can be given either as a node name or node ID. Use this syntax to specify the `-h` *node_options* for the `remove` form of the command:

`–h node=`*node*

You need `solaris.cluster.node.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac`(5).

-m *cable_options*

Helps to establish the cluster interconnect topology. This option helps by configuring the cables that are connecting the various ports that are found on the cluster transport adapters and switches. Each new cable typically maps a connection either between two cluster transport adapters or between an adapter and a port on a transport switch. The -m *cable_options* for each of the forms of the command that accept -m are as follows:

- Use this syntax to specify the -m *cable_options* for the add form of the command:

  ```
  –m endpoint=[node:]name[@port],
      endpoint=[node:]name[@port][,noenable]
  ```

- Use this syntax to specify the -m *cable_options* for the change form of the command:

  ```
  –m endpoint=[node:]name[@port],state=state
  ```

- Use this syntax to specify the -m *cable_options* for the remove form of the command:

  ```
  –m endpoint=[node:]name[@port]
  ```

The -m option supports the following sub-options:

endpoint=[*node*:]*name*[@*port*]

Must be included with each occurrence of the -m option. For the add form of the command, two endpoint options must be specified. The *name* component of the option argument is used to specify the name of either a cluster transport adapter or cluster transport switch at one of the endpoints of a cable. If a *node* component is given, the *name* is the name of a cluster transport adapter. Otherwise, the *name* is the name of a cluster transport switch.

If a *port* component is not given, an attempt is made to assume a default port name. The default port for an adapter is always 0. The default port name for a switch endpoint is equal to the node ID of the node attached to the other end of the cable. Refer to the cluster transport adapter and cluster transport switch man pages for more information about *port* assignments and other requirements (for example, scconf_transp_jct_etherswitch(1M)). Before a cable can be added, the adapters and switches at each of the two endpoints of the cable must already be configured (see -A and -B).

noenable

Can be used when adding a cable to the configuration. By default, when you add a cable, the state of the cable, the two ports to which it is connected, and the adapters or switches on which the ports are found, are set to enable. But, if noenable is specified when you add a cable, the cable and its two endpoints are added in the disabled state. The state of the adapters or switches on which the ports are found remains unchanged.

state=*state*

Changes the state of a cable and the two endpoints to which it is connected. When a cable is enabled, the cable, its two ports, and the adapters or switches that are associated with those two ports are all enabled. However, when a cable is disabled, only the cable and its two ports are disabled. The state of the adapters or switches that are associated with the two ports remains unchanged. By default, the state of a cable and its endpoints is always set to `enabled` at the time that the cable is added to the configuration. But to add a cable in the `disabled` state, use the `noenable` sub-option as part of an add operation.

You need `solaris.cluster.transport.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-P` *privatehostname_options*

For a node, adds or changes the private hostname.

When used with the `add` (`-a`) form of the command, the `-P` option specifies one of the following actions:

- When a node is specified, the command assigns the specified hostname alias to use for IP access of the specified node over the private cluster interconnect, or transport. If not otherwise assigned or if reset, the default private hostname for the node is `clusternode`*nodeid*`-priv`.
- The hostname must not be used by any other node in the enterprise.

  The private IP address range that is configured for the cluster must support the increased number of private IP addresses that are used in the cluster. Ensure that the private IP address range can support the added private IP address before you assign one. See the `scprivipadm(1M)` man page for more information.

When used with the `change` (`-c`) form of the command, the `-P` option changes the hostname alias for the specified node.

Private hostnames should never be stored in the `hosts(4)` database. A special `nsswitch` facility (see `nsswitch.conf(4)`) performs all hostname lookups for private hostnames.

The *privatehostname_options* for each of the forms of the command that accept `-P` are as follows:

Add:

`–P node=`*node*`[,privatehostname=`*hostalias*`]`

Change:

`–P node=`*node*`[,privatehostname=`*hostalias*`]`

Remove:

`-P node=`*node*

The `-P` option supports the following sub-options:

`node=`*node*

Provides the name or ID of the node to be assigned the specified private hostname, or host alias, that is supplied with the `privatehostname` sub-option.

`privatehostname=`*hostalias*
Supplies the host alias to be used for accessing the node over the private cluster interconnect, or transport. If no `privatehostname` sub-option is specified, the private hostname for the specified `node` is reset to the default.

You need `solaris.cluster.transport.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-q` *quorum_options*
Manages shared cluster quorum devices and various cluster quorum properties. Pay special attention to the man pages for type-dependent quorum device options (for example, `scconf_quorum_dev_scsi(1M)`).

Caution – Devices that use controller-based replication cannot be used as quorum devices in the Oracle Solaris Cluster environment. If you specify a device that uses controller-based replication using the `-q` option, the `scconf` command returns an error.

The `add` and `remove` forms of the command add and remove shared quorum devices to or from the configuration. The `change` form of the command changes various cluster quorum configuration properties or states. The `-q` *quorum_options* available for each of the three forms of the command can be used to change the cluster quorum configuration as follows:

Add:

`–q name=`*devicename*`,type={scsi}`

For SCSI quorum devices only:
`-q autoconfig[,noop]`

Change:

`-q node=`*node*`,{maintstate | reset}`
`–q name=`*devicename*`,{maintstate | reset}`
`–q reset`
`-q installmode`

For SCSI quorum devices only:
`-q autoconfig[,noop]`

Remove:

`–q name=`*devicename*

When `scconf` is interrupted or fails while performing quorum-related operations, quorum configuration information can become inconsistent in the cluster configuration database. If this occurs, either run the same `scconf` command again or run it with the `reset` sub-option to reset the quorum information.

The `-q` option supports the following sub-options:

`autoconfig`
When used with the `add` form of the command, automatically chooses and assigns one quorum device in the two-node cluster. The quorum device is chosen from the available devices. If a quorum device is already configured, the command aborts.

When used with the `change` form of the command, automatically chooses and assigns one device that replaces all existing quorum devices in the two-node cluster. The quorum device is chosen from the available devices.

All available devices in the cluster must be qualified to be a quorum device. The `autoconfig` sub-option does not assess whether an available device is qualified to be a quorum device.

If the cluster contains more than two nodes, the `autoconfig` sub-option makes no changes to the quorum configuration. Do not use the `autoconfig` sub-option if you intend to configure a NAS device as quorum.

`installmode`
Forces the cluster back into installation mode. While in `installmode`, nodes do not attempt to reset their quorum configurations at boot time. Also, while in this mode, many administrative functions are blocked. When a cluster is first installed, it is set up with `installmode` set. Once all of the nodes have joined the cluster for the first time, and shared quorum devices have been added to the configuration, issue `scconf -c -q reset` to reset the vote counts to their default values and to clear the `installmode` setting.

`name=`*devicename*
Specifies the name of an attached shared storage device to use when adding or removing a shared quorum device to or from the cluster. This sub-option can also be used with the `change` form of the command to change the state of a quorum device.

Each quorum device must be connected, or ported, to at least two nodes in the cluster. It is not possible to use a non-shared disk as a quorum device.

The `change` form of `scconf` can be used with `-q name` to either put the device into a maintenance state or to reset the device's quorum configuration to the default. While in maintenance state, the device takes on a vote count of zero and, so, does not participate in forming quorum. When reset to the default, the vote count for the device is changed to N-1, where N is the number of nodes with nonzero vote counts that have ports to the device.

`node=`*node*
When used with the `add` form of the command, selects the nodes that should be configured with ports to the shared quorum device being added. This sub-option can also be used with the `change` form of the command to change the quorum state of a node.

When the node sub-option is used with the change form of the quorum update command, it is used to either place a node into maintenance state or to reset the node's quorum configuration to the default.

You must shut down a node before you can put it into maintenance state. scconf returns an error if you attempt to put a cluster member into maintenance state.

While in maintenance state, the node takes on a vote count of zero and, so, does not participate in quorum formation. In addition, any shared quorum devices configured with ports to the node have their vote counts adjusted down by one to reflect the new state of the node. When the node is reset to the default, its vote count is reset to 1 and the shared quorum device vote counts are readjusted back up. Unless the cluster is in installmode, the quorum configuration for each node is automatically reset at boot time.

A *node* can be specified as either a node name or a node ID.

type=*type*

When used with the add form of the command, specifies the type of quorum device to create.

scsi

Specifies a shared disk quorum device. See scconf_quorum_dev_scsi(1M) for SCSI-type-specific options.

{maintstate}

When used as a flag with the change form of the command, for either the globaldev or node sub-options, puts a shared quorum device or node into a quorum maintenance state. When in maintenance state, a shared device or node no longer participates in quorum formation. This feature can be useful when a node or device must be shut down for an extended period of maintenance. Once a node boots back into the cluster, under usual circumstances, it removes itself from maintenance mode.

It is not legal to specify both maintstate and reset with the same -q option.

[,noop]

Is valid with the autoconfig sub-option. The command prints to standard output the list of quorum devices that the autoconfig sub-option would add or change. The autoconfig,noop sub-option makes no changes to the quorum configuration.

{reset}

When used as a flag with the change form of the command, resets the configured quorum vote count of a shared quorum device or node. This option can be combined with either the globaldev or node sub-options, or it can be its own sub-option.

If used by itself, the entire quorum configuration is reset to the default vote count settings. In addition, if installmode is set, it is cleared by a global quorum configuration reset. installmode cannot be reset on a two-node cluster unless at least one shared quorum device has been successfully configured.

otheroptions
You can use other quorum-device-type-specific options. Refer to scconf_quorum_dev_scsi(1M) for details.

You need solaris.cluster.quorum.modify RBAC authorization to use this command option with -a, -c, or -r. See rbac(5).

-S *slm_options*
When used with the change form of the sconf command, sets properties to configure system resource control. If you do not assign a value to these properties, they are set automatically to the default value.

The syntax for the -S option is:

```
–S [node=node] \
[,globalzoneshares=integer] \
[,defaultpsetmin=integer]
```

The -S option supports the following sub-options:

globalzoneshares=*globalzoneshares*
Sets the number of shares that are assigned to the global zone. The lower limit for globalzoneshares is 1 and the upper limit is 65,535. To understand this upper limit, see the prctl(1) man page for information about the zone.cpu-shares attribute. The default value for globalzoneshares is 1. If, on a running cluster, there are no longer any online resource groups with CPU control configured in the global zone, the number CPU shares assigned to the global zone is set to the value of globalzoneshares.

defaultpsetmin=*defaultpsetmin*
Sets the minimum number of CPU available in the default processor set. The default value is 1. The minimum value of defaultpsetmin is 1. Oracle Solaris Cluster assigns a number of CPU as close as possible to the number you set for defaultpsetmin within the limit of available CPU. If the number assigned is lower than the number you requested Oracle Solaris Cluster periodically attempts to assign the number of CPU you requested. This action might destroy some dedicated_weak processor sets. For information about dedicated_weak processor sets, see the scrgadm(1M) man page.

node=*node*
Identifies nodes on which properties are to be set. Set these properties on each node you want to benefit from CPU control by specifying the name of the node. For each usage of the -S option, you can specify one node.

You need solaris.cluster.node.modify RBAC authorization to use this command option with -c. See rbac(5).

-T *authentication_options*
Establishes authentication policies for nodes that are attempting to add themselves to the cluster configuration. Specifically, when a machine requests that it be added to the cluster as a cluster node (see scinstall(1M)), a check is made to determine whether or not the

node has permission to join. If the node has permission, the joining node is authenticated. By default, any machine is allowed to add itself to the cluster.

The `-T` *authentication_options* for each of the three forms of the command that accept `-T` are as follows:

Add:

`–T node=`*nodename*`[,...][,authtype=`*authtype*`]`

Change:

`–T authtype=`*authtype*

Remove:

`–T {node=`*nodename*`[,...] | all}`

The `-T` option supports the following sub-options:

`all`
: You can clear the list of all node names by specifying `scconf -r -T all`. A cleared authentication list means that any node can attempt to install and configure itself in the cluster.

`node=`*nodename*
: Adds or removes hostnames from the list of nodes that are able to install and configure themselves as nodes in the cluster. At least one `node` sub-option is required for the `add` form of the command and is optional for `remove`. If the authentication list is empty, any host can request that it be added to the cluster configuration. However, if the list has at least one name in it, all such requests are authenticated using the authentication list.

  Illegal *nodename*s are accepted, including the node name of dot (`.`). The dot character is special in that if a *nodename* of `.` is added to the authentication list, all other names are removed. This feature prevents a host from attempting to install and configure itself in the cluster.

`authtype=`*authtype*
: Is used with either the `add` or `change` form of the command.

  The only currently supported authentication types (`authtype`) are `des` and `sys` (or `unix`). The default authentication type is `sys`, which provides the least amount of secure authentication.

  When `des`, or Diffie-Hellman, authentication is used, entries should be added to the `publickey` database for each cluster node to be added before actually running the `scinstall` command to add the node.

You need `solaris.cluster.node.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See rbac(5).

-v
: When used with the -p option, requests a more verbose, or detailed, listing of the cluster configuration. If used with other options, additional information might be printed when an error is encountered.

  You need solaris.cluster.device.read, solaris.cluster.transport.read, solaris.cluster.resource.read, solaris.cluster.node.read, solaris.cluster.quorum.read, and solaris.cluster.system.read RBAC authorizations to use this command option with -p. See rbac(5).

-w *heartbeat_options*
: Changes the global heartbeat parameters of a cluster, which effectively changes the heartbeat parameters across all the adapters of the cluster.

  Oracle Solaris Cluster relies on heartbeats over the private interconnect to detect communication failures among cluster nodes. Reducing the heartbeat timeout enables Oracle Solaris Cluster to detect failures more quickly, as the time that is required to detect failures decreases when you decrease the values of heartbeat timeout. Thus, Oracle Solaris Cluster recovers more quickly from failures, consequently increasing the availability of your cluster.

  The -w option supports the following sub-options:

  heartbeat_quantum=*quantum_milliseconds*
  : Defines how often to send heartbeats. Oracle Solaris Cluster uses a 1 second (1,000 milliseconds) heartbeat quantum by default. Specify a value between 100 milliseconds and 10,000 milliseconds.

  heartbeat_timeout=*timeout_milliseconds*
  : The time interval after which, if no heartbeats are received from the peer nodes, the corresponding path is declared as down. Oracle Solaris Cluster uses a 10 second (10,000 millisecond) heartbeat timeout by default. Specify a value between 2,500 milliseconds and 60,000 milliseconds.

  Note – Even under ideal conditions, when you reduce the values of heartbeat parameters with -w, there is always a risk that spurious path timeouts and node panics might occur. Always test and thoroughly qualify the lower values of heartbeat parameters under relevant workload conditions before actually implementing them in your cluster.

Usage

With the -w option, you can change only one heartbeat sub-option at a time. When decreasing the values of heartbeat parameters, change heartbeat_quantum first, followed by heartbeat_timeout. When increasing the values of heartbeat parameters, change heartbeat_timeout first, followed by heartbeat_quantum.

Note – The value you specify for heartbeat_timeout must always be greater than or equal to five times the value you specify for heartbeat_quantum (heartbeat_timeout >= (5*heartbeat_quantum)).

You need `solaris.cluster.system.modify` RBAC authorization to use `-w`. See `rbac(5)`.

Examples

EXAMPLE 1 Decreasing the Heartbeat

The following example shows how to decrease the heartbeat quantum to 100 milliseconds from the Oracle Solaris Cluster default of 1,000 milliseconds. This example also shows how to decrease the heartbeat timeout to 2500 milliseconds from the Oracle Solaris Cluster default of 10,000 milliseconds.

```
phys-schost-1# scconf -c -w heartbeat_quantum=100
phys-schost-1# scconf -c -w heartbeat_timeout=2500
```

Because `heartbeat_timeout` must always be greater than or equal to five times `heartbeat_quantum`, you need to set `heartbeat_quantum` first. Otherwise, the requirement is not met. In other words, if `heartbeat_quantum` is currently set to the default 1,000 milliseconds, and if you were to set `heartbeat_timeout` to 2500 milliseconds, `heartbeat_timeout` would be *less* than five times `heartbeat_quantum`. The `scconf` command would consequently fail.

Once `heartbeat_quantum` is set to the correct value however, the requirement is maintained, and you can then set `heartbeat_timeout` to the decreased value.

EXAMPLE 2 Increasing the Heartbeat

The following example shows how to increase the heartbeat timeout and heartbeat quantum to Oracle Solaris Cluster default values from the values to which you set these parameters in the previous example.

```
phys-schost-1# scconf -c -w heartbeat_timeout=10000
phys-schost-1# scconf -c -w heartbeat_quantum=1000
```

You set `heartbeat_timeout` first to maintain the requirement that `heartbeat_timeout` always be greater than or equal to five times `heartbeat_quantum`. Once `heartbeat_timeout` is set to the value you want, you can then set `heartbeat_quantum` to the new, increased value.

EXAMPLE 3 Typical Postinstallation Setup Operations

The following commands provide an example of a typical set of postinstallation setup operations that might be performed on a new two-node cluster. These commands add a shared quorum device to the cluster, clear `installmode`, configure a second set of cluster transport connections, and secure the cluster against other machines that might attempt to add themselves to the cluster:

```
phys-red# scconf -a -q globaldev=d0
phys-red# scconf -c -q reset
phys-red# scconf -a \
    -A trtype=dlpi,name=hme1,node=phys-red \
    -A trtype=dlpi,name=hme1,node=phys-green \
    -m endpoint=phys-red:hme1,endpoint=phys-green:hme1
```

EXAMPLE 3 Typical Postinstallation Setup Operations *(Continued)*

```
phys-red# scconf -a -T node=.
```

Exit Status

The following exit values are returned:

`0` The command completed successfully.

nonzero An error has occurred.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/system/core`
Interface Stability	Evolving

See Also

`Intro(1CL)`, `cldevice(1CL)`, `scconf_dg_rawdisk(1M)`, `scconf_dg_svm(1M)`, `scconf_quorum_dev_scsi(1M)`, `scconf_transp_adap_e1000g(1M)`, `scconf_transp_jct_etherswitch(1M)`, `scconf_transp_jct_ibswitch(1M)`, `scdidadm(1M)`, `scprivipadm(1M)`, `hosts(4)`, `nsswitch.conf(4)`, `publickey(4)`, `attributes(5)`, `sctransp_dlpi(7p)`

Warnings

Use the `-w` option only when *all* nodes in a cluster are up. Do not use `-w` when any node in a cluster is down. Nodes might hang or panic as a result.

Clusters that contain one or more single-CPU nodes, or that contain more than eight nodes, are more likely to experience timeouts and node panics when the clusters run with low heartbeat parameter values.

Note – Even under ideal conditions, when you reduce the values of heartbeat parameters with `-w`, there is always a risk that spurious path timeouts and node panics might occur. Always test and thoroughly qualify the lower values of heartbeat parameters under relevant workload conditions before actually implementing them in your cluster.

Notes

You should either back up the root file system on every node after changing the configuration with `scconf`, or keep a log of all changes. If you need to recover configuration changes between normal system backups, use the log to return to the most recent configuration.

Option lists specified with the `scconf` command are always executed in the order that you specify them on the command line. But, whenever possible, certain transport options (`-A`, `-B`, and `-m`) are processed by `scconf` as a single transaction against the cluster configuration database. Try to group all related options of this type together on a single command line to reduce overhead to the cluster.

Name scconf_dg_rawdisk – add, change or update raw-disk device group configuration

Synopsis

```
scconf -a -D type=rawdisk, [generic_options] [,globaldev=gdev1,globaldev=gdev1,...]
 [,localonly=true]

scconf -a -D type=rawdisk, [generic_options] [,globaldev=gdev1,globaldev=gdev1,...]
 [,localonly=true | false]

scconf -c -D name=diskgroup,autogen=true

scconf -r -D device_service_name [,nodelist=node[:node]...]
 [,globaldev=gdev1,...]
```

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The following information is specific to the `scconf` command. To use the equivalent object-oriented commands, see the `cldevicegroup(1CL)` man page.

The `scconf_dg_rawdisk` utility adds, changes or updates raw-disk device group configuration

A raw disk is a disk that is not being used as part of a volume manager volume or metadevice. Raw-disk device groups allow you to define a set of disks within a disk device group.

At system boot, by default, a raw-disk device group is created for every Disk ID pseudo driver (DID) device in the configuration. By convention, the raw-disk device group names are assigned at initialization and are derived from the DID names. For every node added to a raw-disk disk device group, the `scconf` utility verifies that every device in the group is physically ported to the node.

The `scconf -a` (add) command can be used to create a raw-disk device group with multiple disk devices configured in it. A raw-disk device group is created for every disk device in the cluster at boot time.

Before you can add a new raw-disk device group, devices to be used in the new group must be removed from the device group created at boot time. Then a new raw-disk device group can be created containing these devices. This is accomplished by creating a list of these devices in the `globaldev` option of `scconf` along with a potential primary node preference list in the `nodelist` option. If the device group already exists, only new nodes and global devices will be added and nodes or devices which are part of an existing device group will be ignored.

If the `preferenced` sub-option is not given with the `-a` option to create a new device group, then it is, by default, `false`. However, if the `preferenced` sub-option is specified for the existing device group with a value of `true` or `false`, an error is returned. This is done in order to maintain the existing nodelist preference state.

If a device group should be mastered by only a particular node then it should be configured with the otheroption set to localonly=true. Only one node can be specified in the node list to create a localonly device group.

The scconf -c (change) command is used to change the order of the potential primary node preference, to enable or disable failback, to set the desired number of secondaries, and to add more global devices to the device group.

If you want to change the order of node preference list, then all the nodes currently existing in the device group must be specified in the nodelist. In addition, if you are changing the order of node preference, you must also set the preferenced sub-option to true.

If the preferenced sub-option is not specified with the change, the already established true or false setting is used.

New nodes cannot be added using the change form of the command. Change option can also be used for changing a device group to localonly device group and vice-versa. To change a device group to a localonly device group, set otheroption to localonly=true. Specify localonly=false to set it back to not the localonly device group. nodelist must already be set to a list of one node, or an error results. It is legal to specify a nodelist with the change form of the command, when you set localonly to true. This is, however, redundant, since the list can only contain the single node that is already configured. It would be an error to specify any other than the node that is already configured.

The scconf -r (remove) command can be used to remove the nodes, global devices, and the device group name from the cluster device-group configuration. If nodes or global devices are specified with the device-group name, they are removed from the device group first. After the last device and node are removed from the device group, the device group is also removed from cluster configuration. If only the name of the device group is given (no nodes or devices at all), the entire device group is removed.

If a raw-disk device name is registered in a raw-disk device group, then it cannot be registered in a Solaris Volume Manager device group.

Options

See the scconf(1M) man page for the list of supported generic options.

The following action options are used to describe the actions performed by the command. Only one action option is allowed in the command.

The following action options are supported:

-a
: Add a new raw-disk device group to the cluster configuration. You can also use this option to change the device group configuration.

-c
: Change the ordering of the node preference list, change preference and failback policy, change the desired number of secondaries, and also add more devices to the device group with the globaldev option. It is also used to set a device group as local only.

-r Remove the raw-disk device group name from the cluster.

The autogen flag is an indicator of the scconf command. This command does not list devices with the autogen property unless the -v command line option is used. When a device is used with the change form of the scconf command, the device's autogen property is reset, or set to false, unless autogen=true is also specified.

Examples

EXAMPLE 1 Using scconf Commands

The following scconf commands create a raw-disk device group, change the order of the potential primary nodes, change preference and failback policy, change the desired number of secondaries, and remove the raw-disk device group from the cluster configuration.

```
host1# scconf -a -D type=rawdisk,name=rawdisk_groupname,
nodelist=host1:host2:host3,preferenced=false,failback=enabled,
numsecondaries=,globaldev=d1,globaldev=d2

host1# scconf -a -D type=rawdisk,name=rawdisk_groupname,
nodelist=host1,globaldev=d1,globaldev=d2,localonly=true,
globaldev=d1,globaldev=d2

host1# scconf -c -D name=rawdisk_groupname,
nodelist=host3:host2:host1,preferenced=true,failback=disabled,
numsecondaries=2,globaldev=d4,globaldev=d5

host1# scconf -c -D name=rawdisk_groupname,localonly=true

host1# scconf -r -D name=rawdisk_groupname

host1# scconf -r -D name=rawdisk_groupname,nodelist=host1,host2
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	SPARC
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

Intro(1CL), cldevicegroup(1CL), scconf(1M), attributes(5)

Name scconf_dg_svm – change Solaris Volume Manager device group configuration.

Synopsis `scconf -c -D [`*generic_options*`]`

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro`(1CL) man page.

The following information is specific to the `scconf` command. To use the equivalent object-oriented commands, see the `cldevicegroup`(1CL) man page.

A Solaris Volume Manager device group is defined by a name, the nodes upon which this group can be accessed, a global list of devices in the disk set, and a set of properties used to control actions such as potential primary preference and failback behavior.

For Solaris Volume Manager device groups, only one disk set can be assigned to a device group, and the group name must always match the name of the disk set itself.

In Solaris Volume Manager, a multi-hosted or shared device is a grouping of two or more hosts and disk drives that are accessible by all hosts, and that have the same device names on all hosts. This identical device naming requirement is achieved by using the raw disk devices to form the disk set. The device ID pseudo driver (DID) allows multi-hosted devices to have consistent names across the cluster. Only hosts already configured as part of a disk set itself can be configured into the `nodelist` of a Solaris Volume Manager device group. At the time drives are added to a shared disk set, they must not belong to any other shared disk set.

The Solaris Volume Manager `metaset` command creates the disk set, which also initially creates and registers it as a Solaris Volume Manager device group. Next, you must use the `scconf` command to set the node preference list, the `preferenced`, `failback` and `numsecondaries` sub-options.

If you want to change the order of node preference list or the failback mode, you must specify all the nodes that currently exist in the device group in the `nodelist`. In addition, if you are changing the order of node preference, you must also set the `preferenced` sub-option to `true`.

If you do not specify the `preferenced` sub-option with the "change" form of the command, the already established `true` or `false` setting is used.

You cannot use the `scconf` command to remove the Solaris Volume Manager device group from the cluster configuration. Use the Solaris Volume Manager `metaset` command instead. You remove a device group by removing the Solaris Volume Manager disk set.

Options See `scconf`(1M) for the list of supported generic options. See `metaset`(1M) for the list of `metaset` related commands to create and remove disk sets and device groups.

Only one action option is allowed in the command. The following action options are supported.

`-c` Change the ordering of the node preference list, change preference and failback policy, and change the desired number of secondaries.

Examples

EXAMPLE 1 Creating and Registering a Disk Set

The following `metaset` commands create the disk set `diskset` and register the disk set as a Solaris Volume Manager device group.

Next, the `scconf` command is used to specify the order of the potential primary nodes for the device group, change the preferenced and failback options, and change the desired number of secondaries.

```
host1# metaset -s diskset1 -a -h host1 host2
host1# scconf -c -D name=diskset1,nodelist=host2:host1,
preferenced=true,failback=disabled,numsecondaries=1
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

`Intro(1CL)`, `cldevicegroup(1CL)`, `scconf(1M)`, `metaset(1M)`

Name scconf_quorum_dev_quorum_server – add, remove, and configure a quorum server type of quorum device.

Synopsis `scconf [-q quorum-options]`

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

Oracle Solaris Cluster provides the option of configuring a quorum server as a quorum device. This configuration information consists of a device name that must be unique across quorum devices, the address of the host machine on which the quorum server is running, and the port number on which the quorum server is listening for requests. If your cluster requires multiple quorum devices, configure multiple quorum servers or use storage devices for the additional quorum devices. A quorum server can act as only one quorum device for a cluster.

To configure the cluster to use a quorum server, the quorum server software must be installed, configured, and running on a machine that is accessible to all cluster nodes. The quorum server itself must be configured and running when this command is run on a cluster node. See `clquorumserver(1CL)` for information about configuring the quorum server.

Options The following parameters are required for configuring a quorum server type of quorum device. See `scconf(1M)` for the list of supported generic options.

Use the `add` and `remove` forms of the command to add shared quorum devices to and remove shared quorum devices from the configuration file. Use the `change` form of the command to change various cluster quorum configuration properties or states. The following quorum server specific options can be used to change the cluster quorum configuration:

Add a Quorum Server Type of Quorum Device

Before adding a quorum device:

- The quorum server must be running on the quorum server host machine.
- You must enter the quorum server host name in the `/etc/inet/hosts` file.
- You must set the netmask for the quorum server host.

For information about the hosts file and netmask requirements, see the procedure on adding quorum server quorum devices in the *Oracle Solaris Cluster System Administration Guide*. Once the quorum device is added, none of the parameters can be changed.

```
# scconf –q -a name=devicename,type=quorum_server,qshost=qhost,port=portnumber
```

`name=`*devicename*
The name of a quorum server. This name must be unique among all quorum devices in the system.

`type=quorum_server`
Indicates the type of disk device group to create. For a quorum server type of quorum device, the value of this parameter must be `quorum_server`.

qhost=*qhost*
The hostname of the machine on the network that can be reached by all cluster nodes and that is running the quorum server. Depending on the IPv4 or IPv6 configuration of the host, this hostname must have an entry in the `/etc/hosts` file, the `/etc/inet/ipnodes` file, or both.

port=*portnumber*
The port on which the quorum server listens for requests.

Note – If you need to change the port number of a quorum server while maintaining the same host name, remove the quorum device first, make your changes, then add the quorum device back.

Change the Configuration Parameters of a Quorum Server Type Quorum Device

```
# scconf -c -q name=devicename,maintstate | reset
```

If other parameters such as `qshost` or `port` must be changed, add a new quorum device with the new parameters and remove the existing quorum device.

Remove a Quorum Server Type of Quorum Device

```
# scconf -q name=devicename
```

When the `scconf` command is interrupted or fails while performing quorum-related operations, quorum configuration information can become inconsistent in the cluster configuration database. If this occurs, either run the same `scconf` command again or run the `scconf` command with the `reset` option to reset the quorum information.

Examples

EXAMPLE 1 Adding a Quorum Server Type of Quorum Device

The following `scconf` command adds a quorum server quorum device with its port number configured as 9000.

```
# scconf –q -a name=qd1,type=quorum_server,qshost=scclient1,port=9000
```

EXAMPLE 2 Removing a Quorum Server Type of Quorum Device

The following `scconf` command removes the quorum server quorum device named `qd1`.

```
# scconf -r –q name=qd1
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/system/core`
Stability	Evolving

See Also

`Intro(1CL)`, `clquorum(1CL)`, `clquorumserver(1CL)`, `cluster(1CL)`, `scconf(1M)`, `gateways(4)`, `hosts(4)`

Name scconf_quorum_dev_scsi – Add and remove shared SCSI quorum devices and change various SCSI cluster quorum configuration properties or states.

Synopsis

```
scconf {-a|-c|-r} -q globaldev=devicename otheroptions
```

```
scconf {-a|-c|-r} -q name=devicename otheroptions
```

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

A SCSI quorum device is considered to be any Oracle Solaris Cluster supported, attached storage that is connected to two or more nodes of the cluster. The device must be managed by DID, and the device name that is provided must be a DID device name.

The SCSI quorum device has no other properties that can be specified.

Options The following options are specific to shared disk quorum devices. See `scconf(1M)` for the list of supported generic options.

The `add` and `remove` forms of the command are used to add and remove shared quorum devices to or from the configuration. The `change` form of the command is used for changing various properties of cluster quorum configuration. The `-q` *quorum-options* available for each of the three forms of the command can be used to change the cluster quorum configuration are as follows:

Add a shared quorum device:

```
–q -a globaldev=devicename[, node=node,node=node[, ...]]
```

or

```
–q -a name= devicename,type=scsi
```

or

```
 -q -a autoconfig[,noop]
```

Change a property or state of quorum configuration:

```
–q -c globaldev=devicename,{maintstate | reset}
```

or

```
-q -c autoconfig[,noop]
```

Remove a shared quorum device:

```
–q -r globaldev=devicename
```

or

–q -r name=*devicename*

autoconfig
When used with the add form of the command, automatically chooses and assigns one quorum device in the two-node cluster. The quorum device is chosen from the available devices. If a quorum device is already configured, the command aborts.

When used with the change form of the command, automatically chooses and assigns one device that replaces all existing quorum devices in the two-node cluster. The quorum device is chosen from the available devices.

All available devices in the cluster must be qualified to be a quorum device. The autoconfig sub-option does not assess whether an available device is qualified to be a quorum device.

If the cluster contains more than two nodes, the autoconfig sub-option makes no changes to the quorum configuration. Do not use the autoconfig sub-option if you intend to configure a NAS device as quorum.

[,noop]
Is valid with the autoconfig sub-option. The command prints to standard output the list of quorum devices that the autoconfig sub-option would add or change. The autoconfig,noop sub-option makes no changes to the quorum configuration.

When scconf is interrupted or fails while performing quorum-related operations, quorum configuration information can become inconsistent in the cluster configuration database. If an inconsistency occurs, either run the same scconf command again or run it with the reset option to reset the quorum information.

With the add form of the command, if a name is specified without a node list, the quorum device is added with a port defined for every node to which the device is attached. But, if a node list is given, at least two nodes must be provided, and each node in the list must be ported to the device.

Examples

EXAMPLE 1 Adding SCSI Quorum Devices

The following scconf commands adds a SCSI quorum device.

```
-a –q globaldev=/dev/did/rdsk/d4s2
    or
-a –q name=/dev/did/rdsk/d4s2,type=scsi
```

EXAMPLE 2 Changing SCSI Quorum Devices

The following scconf command changes a SCSI quorum device configuration.

```
-c -q globaldev=/dev/did/rdsk/d4s2,reset
    or
-c -q name=/dev/did/rdsk/d4s2,reset
```

EXAMPLE 3 Removing SCSI Quorum Devices

The following `scconf` command removes the SCSI quorum device. `qd1`.

```
-r –q globaldev=qd1
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

`Intro(1CL)`, `clquorum(1CL)`, `cluster(1CL)`, `scconf(1M)`

Name scconf_transp_adap_bge – configure the bge transport adapter

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

You can configure `bge` adapters as cluster transport adapters. These adapters can only be used with the `dlpi` transport type. The `bge` adapter is VLAN capable.

The `bge` adapter connects to a transport switch or to another `bge` adapter on a different node. In either case, the connection is made through a transport cable.

When a transport switch is used and the endpoints of the transport cable are configured by using the `scconf` command, the `scinstall` command, or other tools, you are asked to specify a port name on the transport switch. You can provide any port name, or accept the default, as long as the name is unique for the switch.

The default is to set the port name to the node ID hosting the adapter at the other end of the cable.

There are no user configurable properties for cluster transport adapters of this type.

See Also `Intro(1CL)`, `clinterconnect(1CL)`, `clnode(1CL)`, `scconf(1M)`, `scinstall(1M)`, `bge(7D)`

Name scconf_transp_adap_e1000g – configure the Intel PRO/1000 network adapter

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the Intro(1CL) man page.

You can configure `e1000g` Intel PRO/1000 network adapters as cluster transport adapters. These adapters can only be used with transport type `dlpi`.

The `e1000g` based network adapter connects to a transport switch or to another Ethernet adapter on a different node. In either case, the connection is made through a transport cable.

When a transport switch is used and the endpoints of the transport cable are configured by using `scconf`, `scinstall`, or other tools, you are asked to specify a port name on the transport switch. You can provide any port name, or accept the default, as long as the name is unique for the switch.

The default is to set the port name to the node identifier that hosts the adapter at the other end of the cable.

There are no user configurable properties for cluster transport adapters of this type.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	x86

See Also Intro(1CL), clinterconnect(1CL), clnode(1CL), scconf(1M), scinstall(1M), e1000g(7D)

Name scconf_transp_jct_etherswitch – configure an Ethernet cluster transport switch

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro`(1CL) man page.

You can configure Ethernet switches as cluster transport switches, also called transport junctions. They are of switch type `switch`. There are no user configurable properties.

See Also `Intro`(1CL), `clinterconnect`(1CL), `clnode`(1CL)

Name scconf_transp_jct_ibswitch – configure an InfiniBand cluster transport switch

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

You can configure InfiniBand switches as cluster transport switches, also called transport junctions. They are of switch type `switch`. There are no user configurable properties.

See Also `Intro(1CL)`, `clinterconnect(1CL)`, `clnode(1CL)`

Name scdidadm – device identifier configuration and administration utility wrapper

Synopsis `/usr/cluster/bin/scdidadm -b` *combined-did-instance*

`/usr/cluster/bin/scdidadm -C`

`/usr/cluster/bin/scdidadm -c`

`/usr/cluster/bin/scdidadm -F {pathcount | scsi3 | useglobal}` *instance*

`/usr/cluster/bin/scdidadm -G`

`/usr/cluster/bin/scdidadm -G {pathcount | prefer3}`

`/usr/cluster/bin/scdidadm {-l | -L} [-h] [-o` *fmt*`]... [`*path* `|` *instance*`]`

`/usr/cluster/bin/scdidadm -R {`*path* `|` *instance* `| all}`

`/usr/cluster/bin/scdidadm -r`

`/usr/cluster/bin/scdidadm -T` *remote-nodename* `-e` *replication-type*

`/usr/cluster/bin/scdidadm -t` *source-instance:destination-instance* `-e` *replication-type*
`[-g` *replication-device-group*`]`

`/usr/cluster/bin/scdidadm [-u] [-i]`

`/usr/cluster/bin/scdidadm -v`

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro`(1CL) man page.

The `scdidadm` utility administers the device identifier (DID) pseudo device driver `did`.

The `scdidadm` utility performs the following primary operations:

- Creates driver configuration files
- Modifies entries in the file
- Loads the current configuration into the kernel
- Lists the mapping between device entries and `did` driver instance numbers

The startup script `/etc/init.d/bootcluster` uses the `scdidadm` utility to initialize the `did` driver. You can also use `scdidadm` to update or query the current device mapping between the devices present and the corresponding device identifiers and `did` driver instance numbers.

The `devfsadm`(1M) command creates the file system device entry points.

You can use this command only in the global zone.

Options The following options are supported:

`-b`

Returns a replicated DID instance to its prior state of being two separate DID instances. Use this option to correct a configuration mistake or to prepare for a configuration change that affects the original DID instances.

You can only use this option from a node that is booted in cluster mode. You can use this option only in the global zone.

Before you use the `-b` option, remove the replicated device from all device groups that use it. Then specify this option from one of the nodes whose DID instance was absorbed into the combined DID instance.

You need `solaris.cluster.device.modify` RBAC authorization to use this command option. See `rbac(5)`.

`-C`

Removes all DID references to underlying devices that have been detached from the current node.

You can only use this option from a node that is booted in cluster mode. You can use this option only in the global zone.

Specify this option after the Solaris device commands have been used to remove references to nonexistent devices on the cluster nodes.

The `-F` option does not affect the fencing protocol of a configured quorum device.

You need `solaris.cluster.device.modify` RBAC authorization to use this command option. See `rbac(5)`.

`-c`

Performs a consistency check against the kernel representation of the devices and the physical devices.

You can use this option only in the global zone.

On failing a consistency check, an error message is displayed. The process continues until all devices have been checked.

You need `solaris.cluster.device.read` RBAC authorization to use this command option. See `rbac(5)`.

`-e` *type*

Specifies the replication type.When specifying the SRDF replication type, this option can only be used with the `-t` option.

`-F`

Overrides the global default fencing algorithm for individual specified devices.

The default fencing algorithm for a device can be set to one of the following values:

`pathcount` — Determines the fencing protocol by the number of DID paths that are attached to the shared device.

- For a device that uses fewer than three DID paths, the command sets the SCSI-2 protocol.
- For a device that uses three or more DID paths, the command sets the SCSI-3 protocol.

`scsi3` — Sets the SCSI-3 protocol. If the device does not support the SCSI-3 protocol, the fencing protocol setting remains unchanged.

`useglobal` — Sets the global default fencing setting for the specified devices.

By default, the global default fencing algorithm is set to `pathcount`. See the description of the `-G` option for information about setting the global default for fencing.

You can specify the device to modify by its instance number. The command accepts a space-delimited list of multiple devices. See the description of the `-o` option for more information about the `instance` form of device names.

The `-F` option does not affect the fencing protocol of a configured quorum device.

You need `solaris.cluster.device.modify` RBAC authorization to use this command option. See `rbac(5)`.

`-G`

Sets or displays the current global default fencing algorithm for all shared devices.

When specified alone, the `-G` option displays the current global default fencing algorithm setting.

When specified with a setting value, the `-G` option sets the global default fencing to that value for all devices. The global default fencing can be set to one of the following values:

`prefer3` — Sets the SCSI-3 protocol for device fencing for all devices. The `pathcount` setting is assigned to any devices that do not support the SCSI-3 protocol.

`pathcount` — Determines the fencing protocol by the number of DID paths that are attached to the shared device.

- For devices that use fewer than three DID paths, the command sets the SCSI-2 protocol.
- For devices that use three or more DID paths, the command sets the SCSI-3 protocol.

By default, the global default fencing algorithm is set to `pathcount`.

The `-G` option does not affect the fencing protocol of a configured quorum device.

You need `solaris.cluster.device.modify` RBAC authorization to use this command option. See `rbac(5)`.

`-g`
Specifies the replication device group.

`-h`
Prints a header when listing device mappings.

This option is meaningful only when used with the `-l` and `-L` options.

`-i`
Initializes the `did` driver.

You can use this option only in the global zone.

Use this option if you want to enable I/O requests to the `did` driver.

You need `solaris.cluster.device.modify` RBAC authorization to use this command option. See `rbac(5)`.

`-L`
Lists all the paths, including those on remote hosts, of the devices in the DID configuration file.

You can use this option only in the global zone.

The output of this command can be customized using the `-o` option. When no `-o` options are specified, the default listing displays the *instance* number, all local and remote *fullpath* strings, and the *fullname*.

You need `solaris.cluster.device.read` RBAC authorization to use this command option. See `rbac(5)`.

`-l`
Lists the local devices in the DID configuration.

You can use this option only in the global zone.

The output of this command can be customized using the `-o` option. When no `-o` options are specified, the default listing displays the *instance* number, the local *fullpath*, and the *fullname*.

You need `solaris.cluster.device.read` RBAC authorization to use this command option. See `rbac(5)`.

`-o` *fmt*
Lists the devices currently known to the `did` driver according to the format specification *fmt*.

Multiple `-o` options can be specified. The *fmt* specification is interpreted as a comma-separated list of format option arguments. This option is meaningful only when used with the `-l` and `-L` options. The available format option arguments are the following:

`instance`	Prints the instance number of the device known by the `did` driver, for example, `1`.
`path`	Prints the physical path name of the device associated with this device identifier, for example, `/dev/rdsk/c0t3d0`.
`fullpath`	Prints the full physical path name of the device that is associated with this device identifier. This path name includes the host, for example, `phys-hostA:/dev/rdsk/c0t3d0`.
`host`	With the `-L` option, prints the names of all hosts that have connectivity to the specified device, one per line. With the `-l` option, prints the name of the local host that has connectivity to the specified device.
`name`	Prints the DID name of the device associated with this device identifier, for example, `d1`.
`fullname`	Prints the full DID path name of the device associated with this device identifier, for example, `/dev/did/rdsk/d1`.
`diskid`	Prints the hexadecimal representation of the device identifier associated with the instance of the device being listed.
`asciidiskid`	Prints the ASCII representation of the device identifier associated with the instance of the device being listed.
`defaultfencing`	Prints the default fencing algorithm set to the device.

`-R` {*path* | *instance* | all}

Performs a repair procedure on a particular device instance.

You can use this option only in the global zone.

The argument to this command can be either a particular physical device *path* that has been replaced with a new device, or the *instance* of the device that was just replaced. When used with the `all` keyword, the `scdidadm` utility updates the configuration data of all devices connected to the node.

You can only use this option from a node that is booted in cluster mode.

You need `solaris.cluster.device.modify` RBAC authorization to use this command option. See `rbac(5)`.

`-r`

Reconfigures the database.

You can use this option only in the global zone.

When you specify this option, a thorough search of the `rdsk` and `rmt` device trees is conducted. A new instance number is assigned for all device identifiers that were not recognized before. A new path is added for each newly recognized device.

You can only use this option from a node that is booted in cluster mode.

You need `solaris.cluster.device.modify` RBAC authorization to use this command option. See `rbac(5)`.

`-T` *remote-nodename*
Configures DID devices for use with the storage-based replication type you specify with the `-e` *replication—type* argument.

You can use this option only in the global zone.

Run this option from only one of the nodes configured with replicated devices. Use the *remote-nodename* option argument to specify the name of the remote node.

DID instances on the local node will be combined with the corresponding DID instance on the remote node, merging each pair of replicated devices into a single, logical DID device.

You need `solaris.cluster.device.modify` RBAC authorization to use this command option. See `rbac(5)`.

`-t` *source-instance:destination-instance*
Moves the DID instance from the original source to a new destination instance that you specify with the *destination-instance* option argument.

You can use this option only in the global zone.

Use this option to move a DID instance back to its original location if the instance local was accidentally changed. After you run the command on all cluster nodes that are connected to the shared storage, run the `devfsadm` and `scgdevs` commands from one node to update the global-devices namespace with the configuration change.

If the *destination-instance* does not exist within the cluster, the DID device paths corresponding to the value of the *source-instance* argument are removed and recreated with the *destination-instance* you specify.

If the *destination-instance* already exists within the cluster, the path or paths for the *source-instance* are combined with the path or paths for the *destination-instance*, resulting in a single DID destination instance that contains all the paths for both instances.

Include the `-e` option to specify the replication type. If you are using an SRDF replication device, you must use the `-g` option to specify the replication device group.

You need `solaris.cluster.device.modify` RBAC authorization to use this command option. See `rbac(5)`.

`-u`
Loads the device identifier configuration table into the kernel.

You can use this option only in the global zone.

This option loads all the currently known configuration information about device paths and their corresponding instance numbers into the kernel.

You need `solaris.cluster.device.modify` RBAC authorization to use this command option. See rbac(5).

`-v`
Prints the version number of this program.

You can use this option only in the global zone.

Examples

EXAMPLE 1 Adding Devices Attached to the Local Host to the CCR

```
# scdidadm -r
```

EXAMPLE 2 Listing the Physical Path of the Device

The following example lists the physical path of the device that corresponds to instance `2` of the `did` driver:

```
% scdidadm -l -o path 2
/dev/dsk/c1t4d0
```

EXAMPLE 3 Specifying Multiple Format Options

You can specify multiple format option arguments in either of the following ways:

```
% scdidadm –l –o path –o name 2
```

```
% scdidadm -l -o path,name 2
```

In either example, the output might look like this:

```
/dev/dsk/c1t4d0 d1
```

EXAMPLE 4 Configuring DID Devices for Use With EMC SRDF Storage-Based Replication

The following example configures a local DID device and a remote DID device for use with EMC SRDF storage-based replication. The command is run from a local source node that is configured with replicated devices. DID instances on the source node are combined with the corresponding DID instance on the remote destination node, `phys-schost-1` .

```
# scdidadm -t 15:10 -e srdf -g devgroup1
```

EXAMPLE 5 Unconfiguring a Replicated DID Device

The following example returns the replicated DID device `d25` to its original DID device components. This DID device was created by combining path `d15` on `phys-schost-1` with

EXAMPLE 5 Unconfiguring a Replicated DID Device *(Continued)*

path `d25` on `phys-schost-2`. Because path `d15` was merged into path `d25` when the two paths were combined, you must run the command from `phys-schost-1` to ensure that path `d15` is restored.

```
phys-schost-1# scdidadm -b 25
```

EXAMPLE 6 Moving a DID Instance

The following example moves the DID instance on the source instance, `15`, to a new DID instance, `10`, then updates the configuration change in the global-devices namespace.

```
# scdidadm -t 15:10
# devfsadm
# scgdevs
```

EXAMPLE 7 Performing a Repair Procedure

The following example performs the repair procedure for a particular device path. The device `/dev/dsk/c1t4d0` has been replaced with a new device with which a new device identifier is associated. The database is updated to show that this new device identifier corresponds to the instance number that was previously associated with the old device identifier:

```
# scdidadm -R c1t4d0
```

EXAMPLE 8 Performing a Repair Procedure

An alternative method of performing a repair procedure is to use the instance number associated with the device path. For example, if the instance number for the device `c1t4d0` in the previous example is `2`, then the following syntax performs the same operation as the previous example:

```
# scdidadm -R 2
```

EXAMPLE 9 Globally Setting the SCSI Protocol

The following example sets all SCSI devices in the cluster to the SCSI-3 protocol, except configured quorum devices and devices that do not support the SCSI-3 protocol. Any devices that do not support the SCSI-3 protocol are instead set to `pathcount`.

```
# scdidadm -G prefer3
```

EXAMPLE 10 Displaying the SCSI Protocol of a Single Device

The following example displays the SCSI protocol setting for the device `/dev/rdsk/c0t3d0`.

```
# scdidadm -L -o defaultfencing /dev/rdsk/c0t3d0
```

EXAMPLE 11 Setting the SCSI Protocol of a Single Device

The following example sets the device `11`, specified by instance number, to the SCSI-3 protocol. This device is not a configured quorum device and supports the SCSI-3 protocol.

```
# scdidadm -F scsi3 11
```

Exit Status

The following exit values are returned:

`0` The command completed successfully.

`1` An error occurred.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

`Intro(1CL)`, `cldevice(1CL)`, `devfsadm(1M)`, `scgdevs(1M)`, `did(7)`

Oracle Solaris Cluster System Administration Guide

Notes

Each multiported tape drive or CD-ROM drive appears in the namespace once per physical connection.

Name scdpm – manage disk path monitoring daemon

Synopsis

```
scdpm [-a] {node | all}

scdpm -f filename

scdpm -m {[node | all][:/dev/did/rdsk/]dN | [:/dev/rdsk/]cNtXdY | all}

scdpm -n {node | all}

scdpm -p [-F] {[node | all][:/dev/did/rdsk/]dN | [/dev/rdsk/]cNtXdY | all}

scdpm -u {[node | all][:/dev/did/rdsk/]dN | [/dev/rdsk/]cNtXdY | all}
```

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the Intro(1CL) man page.

The `scdpm` command manages the disk path monitoring daemon in a cluster. You use this command to monitor and unmonitor disk paths. You can also use this command to display the status of disk paths or nodes. All of the accessible disk paths in the cluster or on a specific node are printed on the standard output. You must run this command on a cluster node that is online and in cluster mode.

You can specify either a global disk name or a UNIX path name when you monitor a new disk path. Additionally, you can force the daemon to reread the entire disk configuration.

You can use this command only in the global zone.

Options The following options are supported:

`-a`

Enables the automatic rebooting of a node when all monitored disk paths fail, provided that the following conditions are met:

- All monitored disk paths on the node fail.
- At least one of the disks is accessible from a different node in the cluster.

You can use this option only in the global zone.

Rebooting the node restarts all resource and device groups that are mastered on that node on another node.

If all monitored disk paths on a node remain inaccessible after the node automatically reboots, the node does not automatically reboot again. However, if any monitored disk paths become available after the node reboots but then all monitored disk paths again fail, the node automatically reboots again.

You need `solaris.cluster.device.admin` role-based access control (RBAC) authorization to use this option. See rbac(5).

`-F`
: If you specify the `-F` option with the `-p` option, `scdpm` also prints the faulty disk paths in the cluster. The `-p` option prints the current status of a node or a specified disk path from all the nodes that are attached to the storage.

`-f` *filename*
: Reads a list of disk paths to monitor or unmonitor in *filename*.

You can use this option only in the global zone.

The following example shows the contents of *filename*.

```
u schost-1:/dev/did/rdsk/d5
m schost-2:all
```

Each line in the file must specify whether to monitor or unmonitor the disk path, the node name, and the disk path name. You specify the `m` option for monitor and the `u` option for unmonitor. You must insert a space between the command and the node name. You must also insert a colon (:) between the node name and the disk path name.

You need `solaris.cluster.device.admin` RBAC authorization to use this option. See `rbac(5)`.

`-m`
: Monitors the new disk path that is specified by *node*:*diskpath*.

You can use this option only in the global zone.

You need `solaris.cluster.device.admin` RBAC authorization to use this option. See `rbac(5)`.

`-n`
: Disables the automatic rebooting of a node when all monitored disk paths fail.

You can use this option only in the global zone.

If all monitored disk paths on the node fail, the node is *not* rebooted.

You need `solaris.cluster.device.admin` RBAC authorization to use this option. See `rbac(5)`.

`-p`
: Prints the current status of a node or a specified disk path from all the nodes that are attached to the storage.

You can use this option only in the global zone.

If you also specify the `-F` option, `scdpm` prints the faulty disk paths in the cluster.

Valid status values for a disk path are `Ok`, `Fail`, `Unmonitored`, or `Unknown`.

The valid status value for a node is `Reboot_on_disk_failure`. See the description of the `-a` and the `-n` options for more information about the `Reboot_on_disk_failure` status.

You need `solaris.cluster.device.read` RBAC authorization to use this option. See `rbac(5)`.

`-u`

Unmonitors a disk path. The daemon on each node stops monitoring the specified path.

You can use this option only in the global zone.

You need `solaris.cluster.device.admin` RBAC authorization to use this option. See `rbac(5)`.

Examples

EXAMPLE 1 Monitoring All Disk Paths in the Cluster Infrastructure

The following command forces the daemon to monitor all disk paths in the cluster infrastructure.

```
# scdpm -m all
```

EXAMPLE 2 Monitoring a New Disk Path

The following command monitors a new disk path. All nodes monitor `/dev/did/dsk/d3` where this path is valid.

```
# scdpm -m /dev/did/dsk/d3
```

EXAMPLE 3 Monitoring New Disk Paths on a Single Node

The following command monitors new paths on a single node. The daemon on the `schost-2` node monitors paths to the `/dev/did/dsk/d4` and `/dev/did/dsk/d5` disks.

```
# scdpm -m schost-2:d4 -m schost-2:d5
```

EXAMPLE 4 Printing All Disk Paths and Their Status

The following command prints all disk paths in the cluster and their status.

```
# scdpm -p
     schost-1:reboot_on_disk_failure   enabled
     schost-2:reboot_on_disk_failure   disabled
     schost-1:/dev/did/dsk/d4          Ok
     schost-1:/dev/did/dsk/d3          Ok
     schost-2:/dev/did/dsk/d4          Fail
     schost-2:/dev/did/dsk/d3          Ok
     schost-2:/dev/did/dsk/d5          Unmonitored
     schost-2:/dev/did/dsk/d6          Ok
```

EXAMPLE 5 Printing All Failed Disk Paths

The following command prints all of the failed disk paths on the `schost-2` node.

EXAMPLE 5 Printing All Failed Disk Paths *(Continued)*

```
# scdpm -p -F all
     schost-2:/dev/did/dsk/d4         Fail
```

EXAMPLE 6 Printing the Status of All Disk Paths From a Single Node

The following command prints the disk path and the status of all disks that are monitored on the `schost-2` node.

```
# scdpm -p schost-2:all
     schost-2:reboot_on_disk_failure   disabled
     schost-2:/dev/did/dsk/d4          Fail
     schost-2:/dev/did/dsk/d3          Ok
```

Exit Status

The following exit values are returned:

`0` The command completed successfully.

`1` The command failed completely.

`2` The command failed partially.

Note – The disk path is represented by a node name and a disk name. The node name must be the host name or `all`. The disk name must be the global disk name, a UNIX path name, or `all`. The disk name can be either the full global path name or the disk name: `/dev/did/dsk/d3` or `d3`. The disk name can also be the full UNIX path name: `/dev/rdsk/c0t0d0s0`.

Disk path status changes are logged with the `syslogd` `LOG_INFO` facility level. All failures are logged with the `LOG_ERR` facility level.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Stability	Evolving

See Also

`Intro(1CL)`, `cldevice(1CL)`, `clnode(1CL)`, `attributes(5)`

Oracle Solaris Cluster System Administration Guide

Name sceventmib – manage Oracle Solaris Cluster event MIB module

Synopsis

`sceventmib -a -c` *community* `-h` *host* `...`

`sceventmib -a -t` *auth-type* `-u` *username* `[-f` *password-file*`]`

`sceventmib -d -s` *security-level* `-u` *username*

`sceventmib {-e | -n}`

`sceventmib -l` *protocol*

`sceventmib -m -t` *auth-type* `-u` *username*

`sceventmib -p {all | hosts | users}`

`sceventmib -r -c` *community* `-h` *host*`...`

`sceventmib -r -u` *username*

Description

Note – Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `sceventmib` command enables, disables, and configures the Oracle Solaris Cluster event Management Information Base (MIB) module. When you issue this command on a cluster node, it affects only the configuration of the MIB module on that node. Each cluster node MIB module runs independently of others in the cluster.

You can use this command to enable or disable the MIB module on a cluster node. You can also use this command to set configuration properties, such as the version of SNMP trap notifications or the host name for an IP address to which to send trap notifications. The Oracle Solaris Cluster Event MIB sends trap notifications on port 11162. The SNMP tree is viewed on port 11161.

You can use this command only in the global zone.

Options

Basic Options

The following options direct the basic form and function of the command:

`-a`
Adds an entry for the specified SNMP host and community or for the specified user to the node configuration file.

You can use this option only in the global zone.

`-d`
Sets the default security level and user that you want used when you specify the `SNMPv3` protocol.

You can use this option only in the global zone.

You must specify a default user when you specify `SNMPv3`. SNMPv3 allows you to configure more than one user for the MIB module. Only a single default user can exist at any time. The first user that you add is automatically defined as the default user, regardless of the setting of this option. In this context, a default user is *not* necessarily the same as an Oracle Solaris OS user.

`-e`

Enables the Oracle Solaris Cluster event MIB module on the node. This setting remains in effect until you change it, even after you reboot the node.

You can use this option only in the global zone.

`-l` *protocol*

Sets the version of the SNMP protocol to use with the MIBs.

You can use this option only in the global zone.

You can specify either `SNMPv2` or `SNMPv3` for the *protocol*. You cannot specify the `SNMPv3` protocol unless you have first configured at least one SNMPv3 user.

`-m`

Modifies the authentication type for an SNMP user.

You can use this option only in the global zone.

`-n`

Disables the Oracle Solaris Cluster event MIB module on the node. This setting remains in effect until you change it, even after you reboot the node.

You can use this option only in the global zone.

`-p {all | hosts | users}`

Displays one of the following types of MIB configuration information:

`all` All MIB module configuration information

`hosts` Only the configuration information for SNMP hosts that are configured for use with the MIB module

`users` Only the configuration information for SNMP users who are configured to use the MIB module

You can use this option only in the global zone.

`-r`

Removes the entry for the specified SNMP host and community or for the specified SNMP user from the node configuration file.

You can use this option only in the global zone.

Additional Options

You can combine additional options with the basic options to modify the default behavior of each form of the command. Refer to the SYNOPSIS section for additional details about which of these options are legal with which forms of `sceventmib`.

The following additional options are supported:

`-c` *community*
Specifies the name of the SNMP community that you want to add to or remove from the node configuration file.

`-f` *password-file*
Specifies the name of a password file that contains one or more SNMP user names and their corresponding passwords.

Use the following syntax on every line that you include in the *password-file* file:

user:*password*

For example, specify the following lines for users Joseph Bloggs and Andrew Smith:

```
jbloggs:fgrxty_0
asmith:artfli!9
```

`-h` *host* …
Specifies the name of an SNMP host. You can specify either an IP address or a host name for *host*.

You can include a host in more than one community. However, if a host with the same name in the same community already exists, an error is returned.

`-s` *security-level*
Specifies the security level of the specified SNMPv3 user. This setting determines the degree to which the user can access the SNMP MIB module.

You can assign more than one security level to a user.

You specify one of the following **case-sensitive** settings for *security-level*:

`authNoPriv`	Authentication security measure is required, but privacy security measure is not required.
`authPriv`	Both authentication and privacy security measures are required.
`noAuthNoPriv`	Authentication and privacy security measures are not required.

`-t` *auth-type*
Specifies the authentication encryption mechanism that you want to use. You can specify either `MD5` or `SHA` for *auth-type*.

`-u` *username*
Specifies the name of an SNMPv3 user.

If you add an entry for a user and the same user name and security level already exists, the information is overwritten.

If you remove a default SNMPv3 user, the command automatically selects another default user.

Examples

EXAMPLE 1 Enabling the Event MIB

The following command enables the event MIB.

```
# sceventmib -e
```

EXAMPLE 2 Adding an SNMP Host to a Community

The following commands add a host to SNMP community `public`.

- The first example specifies the host by its host name, `sc-host`.

  ```
  # sceventmib -a -h sc-host -c public
  ```

- The second example specifies the host by its IP address, `10.0.0.25`.

  ```
  # sceventmib -a -h 10.0.0.25 -c public
  ```

EXAMPLE 3 Adding an SNMP User Without Providing a Password File

The following command adds the user `jbloggs` and specifies the MD5 authentication encryption mechanism. Because a password file is not specified, the command prompts the user to provide a password.

```
# sceventmib -a -t MD5 -u jbloggs
Enter password for user jbloggs: ********
```

EXAMPLE 4 Adding an SNMP User and Providing a Password File

The following command adds the user `jbloggs` and specifies the MD5 authentication encryption mechanism and the password file `pfile`. Because a password file is specified, the command does not prompt the user to provide a password.

```
# cat pfile
jbloggs:fgrxty_0
# sceventmib -a -f pfile -t MD5 -u jbloggs
```

EXAMPLE 5 Displaying All SNMP Configuration Information

The following command displays all SNMP configuration information.

```
# sceventmib -p all
```

EXAMPLE 6 Displaying Only Configuration Information About SNMP Hosts

The following command displays only configuration information about SNMP hosts.

```
# sceventmib -p hosts
```

EXAMPLE 7 Setting the Version of SNMP Protocol

The following command sets the SNMP protocol version to SNMPv3.

```
# sceventmib -l SNMPv3
```

EXAMPLE 8 Setting the Default SNMP User

The following command sets the default SNMP user to the user `jbloggs`, with authentication and privacy security measures required.

```
# sceventmib -d -s authPriv -u jbloggs
```

EXAMPLE 9 Modifying the Authentication Type of a User

The following command changes the authentication type of user `jbloggs` to SHA.

```
# sceventmib -m -t SHA -u jbloggs
```

EXAMPLE 10 Removing an SNMP Host

The following command removes the SNMP host with IP address `10.0.0.25` in community `public`.

```
# sceventmib -r -c public -h 10.0.0.25
```

EXAMPLE 11 Removing an SNMP User

The following command removes SNMP user `jbloggs`.

```
# sceventmib -r -u jbloggs
```

Exit Status

This command returns the following exit status codes:

`0` The command completed successfully.

nonzero An error occurred.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/system/core`
Interface Stability	Evolving

Files

`/usr/cluster/lib/mib/sun-cluster-event-mib.mib`
Oracle Solaris Cluster SNMP Event MIB definition file

See Also

`Intro(1CL)`, `clsnmphost(1CL)`, `clsnmpmib(1CL)`, `clsnmpuser(1CL)`, `attributes(5)`

Oracle Solaris Cluster System Administration Guide

Name scgdevs – global devices namespace administration script

Synopsis `/usr/cluster/bin/scgdevs`

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `scgdevs` command manages the global devices namespace. The global devices namespace is mounted under the `/global` directory and consists of a set of logical links to physical devices. As the `/dev/global` directory is visible to each node of the cluster, each physical device is visible across the cluster. This fact means that any disk, tape, or CD-ROM that is added to the global-devices namespace can be accessed from any node in the cluster.

The `scgdevs` command enables you to attach new global devices (for example, tape drives, CD-ROM drives, and disk drives) to the global-devices namespace without requiring a system reboot. You must run the `devfsadm` command before you run the `scgdevs` command.

Alternatively, you can perform a reconfiguration reboot to rebuild the global namespace and attach new global devices. See the `boot(1M)` man page for more information about reconfiguration reboots.

You must run this command from a node that is a current cluster member. If you run this command from a node that is not a cluster member, the command exits with an error code and leaves the system state unchanged.

You can use this command only in the global zone.

You need `solaris.cluster.system.modify` RBAC authorization to use this command. See the `rbac(5)` man page.

You must also be able to assume a role to which the Oracle Solaris Cluster Commands rights profile has been assigned to use this command. Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the `pfsh`, `pfcsh`, or `pfksh` profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run the `su` command to assume a role. You can also use the `pfexec` command to issue privileged Oracle Solaris Cluster commands.

Exit Status The following exit values are returned:

`0` The command completed successfully.

nonzero An error occurred. Error messages are displayed on the standard output.

Files

`/devices`	Device nodes directory
`/global/.devices`	Global devices nodes directory
`/dev/md/shared`	Solaris Volume Manager metaset directory

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also `pfcsh`(1), `pfexec`(1), `pfksh`(1), `pfsh`(1), `Intro`(1CL), `cldevice`(1CL), `boot`(1M), `devfsadm`(1M), `su`(1M), `did`(7)

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Notes The `scgdevs` command, called from the local node, will perform its work on remote nodes asynchronously. Therefore, command completion on the local node does not necessarily mean that the command has completed its work cluster-wide.

This document does not constitute an API. The `/global/.devices` directory and 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. This interface should be considered an unstable interface.

Name scinstall – initialize Oracle Solaris Cluster software and establish new cluster nodes

Synopsis

`/usr/cluster/bin/scinstall -i [-F [-C` *clustername*`]`
`[-T` *authentication-options*`] [-o]] [-A` *adapter-options*`]`
`[-B` *switch-options*`] [-m` *cable-options*`] [-w` *netaddr-options*`]]`

`/usr/cluster/bin/scinstall -i [-N` *cluster-member* `[-C` *clustername*`]`
`[-A` *adapter-options*`] [-B` *switch-options*`] [-m` *cable-options*`]]`

`/usr/cluster/bin/scinstall -c` *iso-file* `-U` *password-file* `-h` *nodename*
`-n` *nodeip-mac-options* `-W` *software-specs* `[-F [-C` *clustername*`]`
`[-T` *authentication-options* `[-A` *adapter-options*`] [-B` *switch-options*`]`
`[-m` *cable-options*`] [-w` *netaddr-options*`]]`

`/usr/cluster/bin/scinstall -c` *iso-file* `-U` *password-file* `-h` *nodename*
`-n` *nodeip-mac-options* `-W` *software-specs* `[-N` *cluster-member*
`[-C` *clustername*`] [-A` *adapter-options*`] [-B` *switch-options*`]`
`[-m` *cable-options*`]]`

`/usr/cluster/bin/scinstall -u update` *upgrade-options*

`/usr/cluster/bin/scinstall -r [-N` *cluster-member*`]`

`scinstall -p [-v]`

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `scinstall` command performs a number of Oracle Solaris Cluster node creation and upgrade tasks, as follows.

- The “initialize” form (`-i`) of `scinstall` establishes a node as a new Oracle Solaris Cluster configuration member. It either establishes the first node in a new cluster (`-F`) or adds a node to an already-existing cluster (`-N`). Always run this form of the `scinstall` command from the node that is creating the cluster or is being added to the cluster.
- The “add install client” form (`-c`) of `scinstall` establishes the specified *nodename* as a custom Automated Installer (AI) client on the AI install server from which the command is run. Typically, the *iso-file* is located on, or accessible from, an already-established AI install server that is configured to install the *nodename* install client. Always run this form of the `scinstall` command from the AI install server.
- The “remove” form (`-r`) of `scinstall` removes cluster configuration information and uninstalls Oracle Solaris Cluster software from a cluster node.
- The “upgrade” form (`-u`) of `scinstall`, which has multiple modes and options, upgrades an Oracle Solaris Cluster node. Always run this form of the `scinstall` command from the node being upgraded.

- The “print release” form (`-p`) of `scinstall` prints release and package versioning information for the Oracle Solaris Cluster software that is installed on the node from which the command is run.

Without options, the `scinstall` command attempts to run in interactive mode.

Run all forms of the `scinstall` command other than the “print release” form (`-p`) as superuser.

The `ha-cluster/system/install` software package includes a copy of the `scinstall` command.

You can run this command only from the global zone.

Options

Basic Options

The following options direct the basic form and function of the command.

None of the following options can be combined on the same command line.

`-c`

Specifies the “add install client” form of the `scinstall` command. This option establishes the specified *nodename* as a custom Automated Installer (AI) client on the AI install server from which you issued the command.

You can use this option only in the global zone.

Typically, the AI ISO image *iso-file* is located on, or accessible from, an already-established AI install server that is configured to install the *nodename* install client.

This form of the command enables fully-automated cluster installation from an AI server by helping to establish each cluster node, or *nodename*, as a custom AI client on an already-established Automated Installer install server.

You can customize the AI configuration by using an AI manifest file. To create a custom AI manifest, see *Installing Oracle Solaris 11.1 Systems*.

Before you use the `scinstall` command to set up a node as a custom Oracle Solaris Cluster AI client, you must first establish each node as an AI install client. For more information about setting up an AI install server, see Chapter 8, “Setting Up an Install Server,” in *Installing Oracle Solaris 11.1 Systems*.

`-i`

Specifies the “initialize” form of the `scinstall` command. This form of the command establishes a node as a new cluster member. The new node is the node from which you issue the `scinstall` command.

You can use this option only in the global zone.

If the `-F` option is used with `-i`, `scinstall` establishes the node as the first node in a new cluster.

If the `-o` option is used with the `-F` option, `scinstall` establishes a single-node cluster.

If the `-N` option is used with `-i`, `scinstall` adds the node to an already-existing cluster.

`-p`
Prints release and package versioning information for the Oracle Solaris Cluster software that is installed on the node from which the command is run. This is the only form of `scinstall` that you can run as a non-superuser.

You can use this option only in the global zone.

`-r`
Removes cluster configuration information and uninstalls Oracle Solaris Cluster framework and data-service software from a cluster node. You can then reinstall the node or remove the node from the cluster. You must run the command on the node that you uninstall, from a directory that is not used by the cluster software. The node must be in noncluster mode.

You can use this option only in the global zone.

`-u`
Upgrades Oracle Solaris Cluster software on the node from which you invoke the `scinstall` command. See `Upgrade Options` below for information specific to the type of upgrade that you intend to perform.

You can use this option only in the global zone.

Additional Options

You can combine additional options with the basic options to modify the default behavior of each form of the command. Refer to the `SYNOPSIS` section for additional details about which of these options are legal with which forms of the `scinstall` command.

The following additional options are supported:

`-h` *nodename*
Specifies the node name. The `-h` option is only legal with the "add install client" (`-c`) form of the command.

The *nodename* is the name of the cluster node (that is, AI install client) to set up for custom AI installation.

`-v`
Prints release information in verbose mode. The `-v` option is only legal with the "print release" (`-p`) form of the command to specify verbose mode.

In the verbose mode of "print release," the version string for each installed Oracle Solaris Cluster software package is also printed.

`-F` [*config-options*]
Establishes the first node in the cluster. The `-F` option is only legal with the "initialize" (`-i`) or "add install client" (`-c`) forms of the command.

The establishment of secondary nodes will be blocked until the first node is fully instantiated as a cluster member and is prepared to perform all necessary tasks that are associated with adding new cluster nodes. If the `-F` option is used with the `-o` option, a single-node cluster is created and no additional nodes can be added during the cluster-creation process.

`-N` *cluster-member* [*config-options*]

Specifies the cluster member. The `-N` option is only legal with the "initialize" (`-i`), "add install client" (`-c`) or "remove" (`-r`) forms of the command.

When used with the `-i` or `-c` option, the `-N` option is used to add additional nodes to an existing cluster. The specified *cluster-member* is typically the name of the first cluster node that is established for the cluster. However, the *cluster-member* can be the name of any cluster node that already participates as a cluster member. The node that is being initialized is added to the cluster of which *cluster-member* is already an active member. The process of adding a new node to an existing cluster involves updating the configuration data on the specified *cluster-member*, as well as creating a copy of the configuration database onto the local file system of the new node.

When used with the `-r` option, the `-N` option specifies the *cluster-member*, which can be any other node in the cluster that is an active cluster member. The `scinstall` command contacts the specified *cluster-member* to make updates to the cluster configuration. If the `-N` option is not specified, `scinstall` makes a best attempt to find an existing node to contact.

Configuration Options

The *config-options* which can be used with the `-F` option or `-N` *cluster-member* option are as follows.

```
/usr/cluster/bin/scinstall
{-i |  -c  iso-file -U password-file -h nodename -n nodeip-mac-options -W software-spec}
[-F
   [ -C  clustername]
   [-T authentication-options]
   [-A adapter-options]
   [-B switch-options]
   [-m endpoint=[this-node]:name[@port],endpoint=[node:]name[@port] ]
   [-o]
   [ -w  netaddr-options]
]

/usr/cluster/bin/scinstall
{-i |  -c  iso-file -U password-file -h nodename -n nodeip-mac-options -W software-spec}
[-N cluster-member
   [-C clustername]
   [-A adapter-options]
   [-B switch-options]
   [-m endpoint=cable-options]
]
```

`-m` *cable-options*

Specifies the cluster interconnect connections. This option is only legal when the `-F` or `-N` option is also specified.

The `-m` option helps to establish the cluster interconnect topology by configuring the cables connecting the various ports found on the cluster transport adapters and switches. Each new cable configured with this form of the command establishes a connection from a cluster transport adapter on the current node to either a port on a cluster transport switch or an adapter on another node already in the cluster.

If you specify no `-m` options, the `scinstall` command attempts to configure a default cable. However, if you configure more than one transport adapter or switch with a given instance of `scinstall`, it is not possible for `scinstall` to construct a default. The default is to configure a cable from the singly-configured transport adapter to the singly-configured (or default) transport switch.

The `-m` *cable-options* are as follows.

`-m endpoint=[`*this-node*`]:`*name*`[@`*port*`],endpoint=[`*node*`:]`*name*`[@`*port*`]`

The syntax for the `-m` option demonstrates that at least one of the two endpoints must be an adapter on the node that is being configured. For that endpoint, it is not required to specify *this-node* explicitly. The following is an example of adding a cable:

```
-m endpoint=:bge1,endpoint=switch1
```

In this example, port 0 of the `bge1` transport adapter on this node, the node that `scinstall` is configuring, is cabled to a port on transport switch `switch1`. The port number that is used on `switch1` defaults to the node ID number of this node.

You must always specify two `endpoint` options with each occurrence of the `-m` option. The *name* component of the option argument specifies the name of either a cluster transport adapter or a cluster transport switch at one of the endpoints of a cable.

- If you specify the *node* component, the *name* is the name of a transport adapter.
- If you do not specify the *node* component, the *name* is the name of a transport switch.

If you specify no *port* component, the `scinstall` command attempts to assume a default port name. The default *port* for an adapter is always `0`. The default port *name* for a switch endpoint is equal to the node ID of the node being added to the cluster.

Refer to the `clinterconnect`(1CL) man page for more information regarding *port* assignments and other requirements.

Before you can configure a cable, you must first configure the adapters and/or switches at each of the two endpoints of the cable (see `-A` and `-B`).

`-n` *nodeip-mac-options*

Specifies the IP address and MAC address of the node. This option is only legal when the `-c` option is also specified.

The `-n` *nodeip-mac-options* syntax is as follows:

`-n ip=`*node-ipaddr*`/`*N*`,mac=`*mac-address*

`-o`

Specifies the configuration of a single-node cluster. This option is only legal when the `-i` and `-F` options are also specified.

Other `-F` options are supported but are not required. If the cluster name is not specified, the name of the node is used as the cluster name. You can specify transport configuration options, which will be stored in the CCR. Once a single-node cluster is established, it is not necessary to configure a quorum device or to disable `installmode`.

`-w` *netaddr-options*

Specifies the network address for the private interconnect, or cluster transport. This option is only legal when the `-F` option is also specified.

Use this option to specify a private-network address for use on the private interconnect. You can use this option when the default private-network address collides with an address that is already in use within the enterprise. You can also use this option to customize the size of the IP address range that is reserved for use by the private interconnect. For more information, see the networks(4) and netmasks(4) man pages.

If not specified, the default network address for the private interconnect is `172.16.0.0`. The default netmask is `255.255.240.0`. This IP address range supports up to 62 nodes, 10 private networks, 12 zone clusters, and three exclusive–IP zone clusters.

The `-w` *netaddr-options* are as follows:

```
–w netaddr=netaddr[,netmask=netmask]
–w netaddr=netaddr[,maxnodes=nodes,maxprivatenets=maxprivnets,\
numvirtualclusters=zoneclusters, numxipvirtualclusters=xipzoneclusters]
–w netaddr=netaddr[,netmask=netmask,maxnodes=nodes,\maxprivatenets=maxprivnets\
,numvirtualclusters=zoneclusters]
```

`netaddr=`*netaddr*

Specifies the private network address. The last two octets of this address must always be zero.

`[netmask=`*netmask*`]`

Specifies the netmask. The specified value must provide an IP address range that is greater than or equal to the default.

To assign a smaller IP address range than the default, specify the `maxnodes`, `maxprivatenets`, and `numvirtualclusters` operands.

`[,maxnodes=`*nodes*`,maxprivatenets=`*maxprivnets*`,numvirtualclusters=`*zoneclusters*`]`

Specifies the maximum number of nodes, private networks, and zone clusters that the cluster is ever expected to have. The command uses these values to calculate the minimum netmask that the private interconnect requires to support the specified number of nodes, private networks, and zone clusters. The maximum value for *nodes* is 62 and the minimum value is 2. The maximum value for *maxprivnets* is 128 and the minimum value is 2. You can set a value of 0 for *zoneclusters*.

[`,netmask=`*netmask*`,maxnodes=`*nodes*`,maxprivatenets=`*maxprivnets*`\`
`,numvirtualclusters=`*zoneclusters*]

Specifies the netmask and the maximum number of nodes, private networks, and zone clusters that the cluster is ever expected to have. You must specify a netmask that can sufficiently accommodate the specified number of *nodes*, *privnets*, and *zoneclusters*. The maximum value for *nodes* is 62 and the minimum value is 2. The maximum value for *privnets* is 128 and the minimum value is 2. You can set a value of 0 for *zoneclusters*.

If you specify only the `netaddr` suboption, the command assigns the default netmask of `255.255.240.0`. The resulting IP address range accommodates up to 62 nodes, 10 private networks, and 12 zone clusters.

To change the private-network address or netmask after the cluster is established, use the `cluster` command or the `clsetup` utility.

`-A` *adapter-options*

Specifies the transport adapter and, optionally, its transport type. This option is only legal when the `-F` or `-N` option is also specified.

Each occurrence of the `-A` option configures a cluster transport adapter that is attached to the node from which you run the `scinstall` command.

If no `-A` options are specified, an attempt is made to use a default adapter and transport type. The default transport type is `dlpi`. On the SPARC platform, the default adapter is `hme1`.

When the adapter transport type is `dlpi`, you do not need to specify the `trtype` suboption. In this case, you can use either of the following two forms to specify the `-A` *adapter-options*:

`-A [trtype=type,]name=`*adaptername*`[,vlanid=`*vlanid*`][,`*other-options*`]`
`-A` *adaptername*

[trtype=*type*]

Specifies the transport type of the adapter. Use the `trtype` option with each occurrence of the `-A` option for which you want to specify the transport type of the adapter. An example of a transport `type` is `dlpi`.

The default transport type is `dlpi`.

name=*adaptername*

Specifies the adapter name. You must use the `name` suboption with each occurrence of the `-A` option to specify the *adaptername*. An *adaptername* is constructed from a *device name* that is immediately followed by a *physical-unit* number, for example, `hme0`.

If you specify no other suboptions with the `-A` option, you can specify the *adaptername* as a standalone argument to the `-A` option, as `-A` *adaptername*.

vlanid=*vlanid*
Specifies the VLAN ID of the tagged-VLAN adapter.

[*other-options*]
Specifies additional adapter options. When a particular adapter provides any other options, you can specify them by using the `-A` option.

`-B` *switch-options*
Specifies the transport switch, also called transport junction. This option is only legal when the `-F` or `-N` option is also specified.

Each occurrence of the `-B` option configures a cluster transport switch. Examples of such devices can include, but are not limited to, Ethernet switches, other switches of various types, and rings.

If you specify no `-B` options, `scinstall` attempts to add a default switch at the time that the first node is instantiated as a cluster node. When you add additional nodes to the cluster, no additional switches are added by default. However, you can add them explicitly. The default switch is named `switch1`, and it is of type `switch`.

When the switch type is type `switch`, you do not need to specify the `type` suboption. In this case, you can use either of the following two forms to specify the `-B` *switch-options*.

`-B [type=`*type*`,]name=`*name*`[,`*other-options*`]`
`-B` *name*

If a cluster transport switch is already configured for the specified switch *name*, `scinstall` prints a message and ignores the `-B` option.

If you use directly-cabled transport adapters, you are not required to configure any transport switches. To avoid configuring default transport switches, use the following special `-B` option:

```
-B type=direct
```

[type=*type*]
Specifies the transport switch type. You can use the `type` option with each occurrence of the `-B` option. Ethernet switches are an example of a cluster transport switch which is of the switch type `switch`. See the `clinterconnect`(1CL) man page for more information.

You can specify the `type` suboption as `direct` to suppress the configuration of any default switches. Switches do not exist in a transport configuration that consists of only directly connected transport adapters. When the `type` suboption is set to `direct`, you do not need to use the `name` suboption.

name=*name*
Specifies the transport switch name. Unless the `type` is `direct`, you must use the `name` suboption with each occurrence of the `-B` option to specify the transport switch *name*.

The *name* can be up to 256 characters in length and is made up of either letters or digits, with the first character being a letter. Each transport switch name must be unique across the namespace of the cluster.

If no other suboptions are needed with `-B`, you can give the switch *name* as a standalone argument to `-B` (that is, `-B` *name*).

[*other-options*]
Specifies additional transport switch options. When a particular switch type provides other options, you can specify them with the `-B` option. Refer to the `clinterconnect(1CL)` man page for information about any special options that you might use with the switches.

`-C` *clustername*
Specifies the name of the cluster. This option is only legal when the `-F` or `-N` option is also specified.

- If the node that you configure is the first node in a new cluster, the default *clustername* is the same as the name of the node that you are configuring.
- If the node that you configure is being added to an already-existing cluster, the default *clustername* is the name of the cluster to which *cluster-member* already belongs.

It is an error to specify a *clustername* that is not the name of the cluster to which *cluster-member* belongs.

`-T` *authentication-options*
Specifies node-authentication options for the cluster. This option is only legal when the `-F` option is also specified.

Use this option to establish authentication policies for nodes that attempt to add themselves to the cluster configuration. Specifically, when a machine requests that it be added to the cluster as a cluster node, a check is made to determine whether or not the node has permission to join. If the joining node has permission, it is authenticated and allowed to join the cluster.

You can only use the `-T` option with the `scinstall` command when you set up the very first node in the cluster. If the authentication list or policy needs to be changed on an already-established cluster, use the `claccess` command.

The default is to allow any machine to add itself to the cluster.

The `-T` *authentication-options* are as follows.

`-T node=`*nodename*`[,...][,authtype=`*authtype*`]`

node=*nodename*[,…]
Specifies node names to add to the node authentication list. You must specify at least one `node` suboption to the `-T` option. This option is used to add node names to the list of nodes that are able to configure themselves as nodes in the cluster. If the authentication

list is empty, any node can request that it be added to the cluster configuration. However, if the list has at least one name in it, all such requests are authenticated by using the authentication list. You can modify or clear this list of nodes at any time by using the `claccess` command or the `clsetup` utility from one of the active cluster nodes.

[`authtype=`*authtype*]
Specifies the type of node authentication. The only currently supported `authtypes` are `des` and `sys` (or `unix`). If no `authtype` is specified, `sys` is the default.

If you will you specify `des` (Diffie-Hellman) authentication, first add entries to the `publickey(4)` database for each cluster node to be added, before you run the `-T` option to the `scinstall`command.

You can change the authentication type at any time by using the `claccess` command or the `clsetup` utility from one of the active cluster nodes.

`-U` *password-file*
Specifies the name of the file that contains the root-user password. This option is only legal when the `-c` option is also specified.

This option enables automated setting of the root password during initial Oracle Solaris installation and configuration. The user creates a file that contains the text to use as the root user password for the system being installed. Typically, the *password-file* is located on, or accessible from, an already-established AI install server that is configured to install the *nodename* install client. The `scinstall` utility retrieves the contents of this file and supplies it to the Oracle Solaris configuration utility.

`-W` *software-specs*
Specifies the location of one or more publishers and package repositories. This option is only legal when the `-c` option is also specified.

The `-W` *software-specs* are as follows, where *publisher* is the publisher name `ha-cluster` or `solaris`, *repo* is the repository location, and *pkg* is a software package name:

```
-W [publisher=repo::pkg[,...][:::publisher=repo::pkg[,...]]...
```

Upgrade Options

The `-u` update *upgrade-modes* and the *upgrade-options* for standard (nonrolling) upgrade, and rolling upgrade are as follows.

Standard (Nonrolling) and Rolling Upgrade

Use the `-u update` mode to upgrade a cluster node to a later Oracle Solaris Cluster software release in standard (nonrolling) or rolling upgrade mode.

- A standard, or nonrolling, upgrade process upgrades an inactive boot environment (BE) while your cluster node continues to serve cluster requests. If you do not specify an existing inactive BE, the `scinstall` utility automatically creates a new BE. Once the upgrade is complete, the `scinstall` utility activates the upgraded BE and notifies the user to reboot the node into the upgraded BE.

- A rolling upgrade process takes only one cluster node out of production at a time. This process can only be used to upgrade Oracle Solaris or Oracle Solaris Cluster software or both to an update release of the versions that are already installed. While you upgrade one node, cluster services continue on the rest of the cluster nodes. After a node is upgraded, you bring it back into the cluster and repeat the process on the next node to upgrade. After all nodes are upgraded, you must run the `scversions` command on one cluster node to commit the cluster to the upgraded version. Until this command is run, some new functionality that is introduced in the update release might not be available.

The *upgrade-options* to `-u update` for standard and rolling mode are as follows.

```
/usr/cluster/bin/scinstall -u update [-b be-name] \
[-L {accept|licenses | accept,licenses | licenses,accept }]
```

`-b` *be-name*
Specifies the name to assign the new boot environment (BE). If you do not specify this option, `scinstall`assigns the name of the new BE. This name is based on the name of the current BE, of the form *currentBE*-*N*, where the suffix -*N* is an incremented number. The first new BE is named *currentBE*`-1`, the next new BE is named *currentBE*`-2`, and so forth. If a BE is deleted, its name is not reused for the next new BE if a BE name with a higher suffix number exists. For example, if BEs `sc4.0`, `sc4.0-1`, and `sc4.0-2` exist, and `sc4.0-1` is deleted, the next new BE is named `sc4.0-3`.

If you specify a BE name that already exists, the command exits with an error.

`-L` {`accept`|`licenses` | `accept,licenses` | `licenses,accept` }
Specifies whether to accept or display, or both, the licenses of the packages you upgrade to.

The `accept` argument corresponds to the `--accept` option of the `pkg` command and the `licenses` argument corresponds to the `--licenses` option.

Specifying the `-L accept`option indicates that you agree to and accept the licenses of the packages that are updated. If you do not provide this option, and any package licenses require acceptance, the update operation fails.

Specifying `-L licenses` displays all of the licenses for the packages that are updated.

When both `accept` and `licenses` are specified to the `-L` option, the licenses of the packages that are updated are displayed as well as accepted. The order you specify the `accept` and `licenses` arguments does not affect the behavior of the command.

Examples

Establishing a Two-Node Cluster

The following sequence of commands establishes a typical two-node cluster with Oracle Solaris Cluster software for Oracle Solaris 11 on SPARC based platforms. The example assumes that Oracle Solaris Cluster software packages are already installed on the nodes.

On `node1`, issue the following command:

```
node1# /usr/cluster/bin/scinstall -i -F
```

On node2, issue the following command:

```
node2# /usr/cluster/bin/scinstall -i -N node1
```

Establishing a Single-Node Cluster

The following command establishes a single-node cluster with Oracle Solaris Cluster software for Oracle Solaris 11 on SPARC based platforms, with all defaults accepted. The example assumes that Oracle Solaris Cluster software packages are already installed on the node.

```
# /usr/cluster/bin/scinstall -i -F -o
```

Setting Up an Oracle Solaris Install Server

The following sequence of commands sets up an AI install server to install and initialize Oracle Solaris Cluster software for Oracle Solaris 11 on SPARC based platforms in a two-node cluster.

On the install server, issue the following commands. Note that the -W option is broken into multiple lines for readability, but should be specified in a single unbroken string.

```
# ls./scinstall –c /export/home/11-ga-ai-x86.iso -h phys-schost-1 \
          -U /export/pwdfile \
          -C schost \
          -F \
          -W solaris=http://ipkg.us.oracle.com/solaris11/release::\
          entire,server_install:::ha-cluster=cluster-repository::\
          ha-cluster-framework-full,ha-cluster-data-services-full,\
          ha-cluster-geo-full \
          -n ip=10.255.85.163/24,mac=12:34:56:78:90:ab \
          -T node=phys-schost-1,node=phys-schost-2,authtype=sys \
          -w netaddr=172.16.0.0,netmask=255.255.240.0,maxnodes=62,\
          maxprivatenets=10,numvirtualclusters=12,numxipvirtualclusters=3 \
          -A trtype=dlpi,name=e1000g1 -A trtype=dlpi,name=nxge1 \
          -B type=switch,name=switch1 -B type=switch,name=switch2 \
          -m endpoint=:e1000g1,endpoint=switch1 \
          -m endpoint=:nge1,endpoint=switch2

# ./scinstall –c /export/home/11-ga-ai-x86.iso -h phys-schost-2 \
          -U /export/pwdfile \
          -C schost \
          -N phys-schost-1 \
          -W solaris=http://ipkg.us.oracle.com/solaris11/release::\
          entire,server_install:::ha-cluster=cluster-repository::\
          ha-cluster-framework-full,ha-cluster-data-services-full,\
          ha-cluster-geo-full \
          -n ip=10.255.85.164/24,mac=12:34:56:78:90:ab \
          -A trtype=dlpi,name=e1000g1 -A trtype=dlpi,name=nxge1 \
          -m endpoint=:e1000g1,endpoint=switch1 \
          -m endpoint=:nge1,endpoint=switch2
```

Upgrading the Framework and Data Service Software (Standard or Rolling Upgrade)

The following sequence of commands upgrades the framework and data service software of a cluster to the next Oracle Solaris Cluster release. Perform these operations on each cluster node.

Note – For a rolling upgrade, perform these operations on one node at a time, after you use the `clnode evacuate` command to move all resource groups and device groups to the other nodes which will remain in the cluster.

```
# /usr/cluster/bin/scinstall -u update
# init 6
```

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	`ha-cluster/system/install`
Interface Stability	Evolving

See Also

`Intro(1CL)`, `claccess(1CL)`, `clinterconnect(1CL)`, `clnode(1CL)`, `clsetup(1CL)`, `cluster(1CL)`, `newfs(1M)`, `scversions(1M)`, `netmasks(4)`, `networks(4)`, `lofi(7D)`

Oracle Solaris Cluster Software Installation Guide, *Oracle Solaris Cluster System Administration Guide*, *Oracle Solaris Cluster Upgrade Guide*

Name scnas – manage network-attached storage (NAS) device configuration data for Oracle Solaris Cluster.

Synopsis

```
scnas [-H]

scnas -a [-H] [-n] -h device-name -t device-type -o specific-options
 [-f input-file]

scnas -c [-H] [-n ] -h device-name -o specific-options
 [-f input-file]

scnas -p [-H] [-h device-name] [-t device-type]

scnas -r [-H ] -h device-name
```

Description

Note – Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `scnas` command manages NAS devices in an Oracle Solaris Cluster configuration. To manage NAS directories in the cluster, use the `scnasdir` command.

You can use the `scnas` command to create the NAS device configuration, to update the NAS type-specific properties, and to remove the device configuration from Oracle Solaris Cluster. The options to this command are processed in the order in which they are typed on the command line.

The `scnas` command can only be run from an active cluster node. The results of running the command are always the same, regardless of the node that is used.

All forms of the `scnas` command accept the `-H` option. Specifying `-H` displays help information. All other options are ignored. Help information is also printed when `scnas` is run without options.

The NAS device must be set up before using the `scnas` command to manage a NAS device. Refer to the documentation for the particular NAS device for procedures for setting up a device.

You can use this command only in the global zone.

Options

Basic Options

The following options are common to all forms of the `scnas` command:

`-H`

If this option is specified on the command line at any position, the command prints help information. All other options are ignored and are not executed. Help information is also printed if `scnas` is run with no options.

You can use this option only in the global zone.

`-n`
If this option is specified on the command line at any position, the `scnas` command only checks the usage and does not write the configuration data. If the `-n` option is specified with the `-f` option, the `scnas` command checks the input file for the password.

The following options modify the basic form and function of the `scnas` command. None of these options can be combined on the same command line.

`-a`
Specifies the `add` form of the `scnas` command.

You can use this option only in the global zone.

The `-a` option can be used to add a NAS device into the Oracle Solaris Cluster configuration.

Depending on the type of your NAS device, you might have to set additional properties. These required properties are also explained in the `-t` option description in the “Additional Options” section.

`-c`
Specifies the `change` form of the `scnas` command. The `-c` option is used to change specific NAS device properties.

You can use this option only in the global zone.

`-r`
Specifies the `remove` form of the `scnas` command. The `-r` option is used to remove the NAS device from the Oracle Solaris Cluster configuration.

You can use this option only in the global zone.

Before removing a device, all its exported directories must be removed by using `scnasdir`.

`-p`
Specifies the `print` form of the `scnas` command.

You can use this option only in the global zone.

When no other options are given, the `-p` option prints a listing of all the current NAS devices configured in Oracle Solaris Cluster and all their associated properties. This option can be used with additional options to query a particular device or a particular type of device.

Additional Options

The following additional options can be combined with one or more of the previously described basic options to configure all properties for a device. The device does not need to be online to use these options. Refer to the SYNOPSIS section to see the options that can be used with each form of `scnas`.

The additional options are as follows:

-h *device-name*
Use this option to specify the name of the NAS device in the Oracle Solaris Cluster configuration. The device name identifies the device and can be used to remotely access the device by using `rhs` or `telnet`.

This device name must be specified for the `add`, `change`, and `remove` forms of the `scnas` command.

-t *device-type*
The NAS device type. You must specify this option when you add a NAS device to the Oracle Solaris Cluster configuration. The NAS device type is identified by the vendor name.

You can specify either `sun` for a NAS device from Sun Microsystems, `netapp` for a NAS device from Network Appliance, Inc., or `sun_uss` for Oracle's Sun ZFS Storage Appliance.

Different types of NAS devices have different or in some cases, no properties.

-o *specific-options*
Use this option to provide the properties that are specific to a NAS device type. For example, the NAS device from Network Appliance, Inc. has the following property:

-o userid=*userid*

Note – You do *not* specify properties for NAS devices from Oracle's Sun StorageTek products. Because this device does not have any properties, the `-f` and `-o` options do *not* apply.

The `userid` property is used by the cluster to perform administrative duties on the device. When you add a `userid` to the device configuration, you are prompted for its password. You can also place the password in a text file and use it by specifying the `-f` option.

-f *input-file*
For security reasons, the password cannot be specified in command-line options. To keep the password secure, place it in a text file and specify the file by using the `-f` option. If you do not specify an input file for the password, the command prompts for the password.

Note – You do *not* specify properties for NAS devices from Oracle's Sun StorageTek products. Because this device does not have any properties, the `-f` and `-o` options do *not* apply.

Set permissions of the input file to readable by root and prohibit access by either group or world.

In the input file, the password cannot be entered across multiple lines. Leading white spaces and tabs are ignored. Comments begin with an unquoted pound (#) sign, and continue to the next new line.

The parser ignores all comments. When you use an input file for the device user password, the # sign cannot be part of the password.

Examples

EXAMPLE 1 Adding a NAS Device to a Cluster

The following `scnas` command adds a NAS device from Oracle's Sun StorageTek storage systems to the Oracle Solaris Cluster configuration.

```
# scnas -a -h sunnas1 -t sun
```

EXAMPLE 2 Adding a NAS Device From Network Appliance, Inc. to a Cluster

The following `scnas` command adds a Network Appliance, Inc. storage system to the Oracle Solaris Cluster configuration.

```
# scnas -a -h netapp1 -t netapp -o userid=root
Please enter password:
```

EXAMPLE 3 Removing a NAS Device From a Cluster

The following `scnas` command removes a NAS device from the Oracle Solaris Cluster configuration.

```
# scnas -r -h sunnas1
```

Exit Status

The following exit values are returned:

`0`	The command executed successfully.
nonzero	An error has occurred.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Stability	Evolving

See Also

`Intro(1CL)`, `clnasdevice(1CL)`, `clquorum(1CL)`, `cluster(1CL)`, `scconf(1M)`, `scnasdir(1M)`

Name scnasdir – manage the exported directories on a network-attached storage (NAS) device in an Oracle Solaris Cluster configuration.

Synopsis

```
scnasdir [-H]

scnasdir [-a] [-H] [-n] -h device-name [-d directory [-d directory...]] [-f input-file]

scnasdir -p [-H] [-h device-name] [-t device-type]

scnasdir -r [-H ] [-n ] -h device-name [-d all | -d directory [-d directory...]]
[-f input-file]
```

Description

Note – Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `scnasdir` command manages the exported directories on NAS devices in an Oracle Solaris Cluster configuration. The device must already have been configured in the cluster by using the `scnas` command.

The `scnasdir` command can be used to add directories to a device's cluster configuration, to remove directories from a device's cluster configuration, and to print the directories of a particular device or particular device types.

The options in this command are processed in the order in which they are typed on the command line. The `scnasdir` command can only be run from an active cluster node. The results of running the command are always the same, regardless of the node that is used.

All forms of the `scnasdir` command accept the `-H` option. Specifying `-H` displays help information, and all other options are ignored and not executed. Help information is also printed when `scnasdir` is run without options.

You can use this command only in the global zone.

Options

Basic Options

The following options are common to all forms of the `scnasdir` command:

`-H`
: If this option is specified on the command line at any position, the command prints help information. All other options are ignored and are not executed. Help information is also printed if `scnasdir` is run with no options.

  You can use this option only in the global zone.

`-n`
: If this option is specified on the command line at any position, the `scnasdir` command only checks the usage and does not write the configuration data. If the `-n` option is specified with the `-f` option, the `scnasdir` command displays the data that will be processed for the

user to review.

The following options modify the basic form and function of the `scnasdir` command. None of these options can be combined on the same command line.

`-a`
Specifies the add form of the `scnasdir` command. The `-a` option can be used to add directories into the device's Oracle Solaris Cluster configuration.

You can use this option only in the global zone.

`-p`
Specifies the print form of the `scnasdir` command. When no other option is given, this `-p` option prints a listing of all the directories of all the NAS devices configured in Oracle Solaris Cluster. This option can be used with additional options to query a particular device or particular types of NAS devices.

You can use this option only in the global zone.

`-r`
Specifies the remove form of the `scnasdir` command. The `-r` option is used to remove all the directories, or the specified directories of a NAS device from its Oracle Solaris Cluster configuration.

You can use this option only in the global zone.

Additional Options The following additional options can be combined with one or more of the previously described basic options to manage the directories of a device.

The additional options are as follows:

`-h` *device-name*
Use this option to specify the name of the NAS device in the Oracle Solaris Cluster configuration. The `-h` option identifies the device and can be used to remotely access the device by using `rhs` or `telnet`.

This device name must be specified for the add, change, and remove forms of the `scnasdir` command.

`-d` *all* | *directory*
Use this option to list the directories (or volumes) exported on the NAS device to be configured into the Oracle Solaris Cluster. These directories must be created and exported on the device before using the `scnasdir` command. See the documentation for the NAS device type for procedures for exporting directories.

The `-d all` option can only be accepted by the remove option, `-r`.

The directories must be specified by using either the `-d` option, or the `-f` option, for the add and remove forms of the `scnasdir` command.

`-f` *input-file*
Directories can be placed into a plain text file, one directory per line, and used with the `-f` option. Leading white spaces and tabs are ignored. Comments begin with an unquoted pound (#) sign, and continue to the next new line. The parser ignores all comments.

Examples

EXAMPLE 1 Adding Two NAS Storage Device Directories to a Cluster

The following `scnasdir` command adds two directories of a NAS device to the Oracle Solaris Cluster configuration.

```
# scnasdir -a -h sunnas1 -d /vol/DB1 -d /vol/DB2
```

EXAMPLE 2 Removing All of a NAS Storage Device's Directories From a Cluster

The following `scnasdir` command removes all the directories that are configured for a NAS device.

```
# scnasdir -r -h sunnas1 -d all
```

Exit Status

The following exit values are returned:

`0` The command executed successfully.

nonzero An error has occurred.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

`Intro(1CL)`, `clnasdevice(1CL)`, `clquorum(1CL)`, `cluster(1CL)`, `scconf(1M)`, `scnas(1M)`

Name scprivipadm – administer the private IP address range

Synopsis

```
scprivipadm -c netaddr=netaddr[,netmask=netmask]
scprivipadm -c netaddr=netaddr[,maxnodes=nodes,maxprivatenets=privnets]
scprivipadm -c netaddr=netaddr[,netmask=netmask,maxnodes=nodes,maxprivatenets=privnets]
scprivipadm -p
scprivipadm -R
```

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `scprivipadm` command modifies the current IP address range that is assigned to the Oracle Solaris Cluster private interconnect.

All nodes in the cluster must be in noncluster mode before you run any form of this command. Run this command from one node in the cluster.

The `scprivipadm` command takes as input the private network address. Optionally, the command also takes one or both of the following:

- The netmask
- The maximum number of nodes and the maximum number of private networks that are ever expected to be in the cluster

The command then performs the IP address assignment for the physical adapters and the per-node IP addresses.

You can use this command only in the global zone.

Options The following options are supported:

`-c`
: Modifies the IP address range that is currently assigned to the cluster. Run the `-c` option on each node of the cluster.

  You can use this option only in the global zone.

  The `-c` option supports the following sub-options:

`netaddr=`*netaddr*	Specifies the private network address
`netmask=`*netmask*	Specifies the netmask
`maxnodes=`*nodes*	Specifies the maximum expected number of nodes in the cluster
`maxprivatenets=`*privnets*	Specifies the maximum expected number of private networks in the cluster

The `-c` option performs the following tasks for each combination of sub-options:

- If you specify the `netaddr` sub-option alone, the command assigns the default netmask, `255.255.248.0`, to the private interconnect. The default IP address range accommodates a maximum of 64 nodes and 10 private networks.
- If you also specify the `netmask` sub-option, the value that you specify must be equal to or greater than the default netmask. If the specified netmask is less than the default netmask, the command fails and exits with an error. If the specified netmask is equal to or greater than the default netmask, the command assigns the specified netmask to the private interconnect. The resulting IP address range can accommodate a maximum of 64 nodes and 10 private networks.

  To assign a smaller IP address range than the default, specify the `maxnodes` and `maxprivatenets` sub-options.
- If you also specify the `maxnodes` and `maxprivatenets` sub-options, the command calculates the minimum netmask to support the specified number of nodes and private networks. The command then assigns the calculated netmask to the private interconnect. The maximum value for *nodes* is 64 and the minimum value is 2. The maximum value for *privnets* is 128 and the minimum value is 2.
- If you also specify the `netmask` sub-option as well as the `maxnodes` and `maxprivatenets` sub-options, the command calculates the minimum netmask that supports the specified number of nodes and private networks. The command compares that calculation to the specified netmask. If the specified netmask is less than the calculated netmask, the command fails and exits with an error. If the specified netmask is equal to or greater than the calculated netmask, the command assigns the specified netmask to the private interconnect. The maximum value for *nodes* is 64 and the minimum value is 2. The maximum value for *privnets* is 128 and the minimum value is 2.

If the `-c` option fails, you must run the `-R` option on each node to repair the configuration before you rerun the `-c` option.

Users other than superuser require `solaris.cluster.modify` Role-Based Access Control (RBAC) authorization to use this subcommand. See the `rbac(5)` man page.

`-R` Repairs the cluster configuration. Use this option if the command fails while modifying the IP address range on the cluster nodes and the failure results in inconsistent cluster configuration on the nodes.

You can use this option only in the global zone.

Run the `-R` option on each node of the cluster.

The -R option repairs the cluster configuration and removes any inconsistencies that were caused by a failure to modify the IP address range on all nodes.

If you attempt to rerun the -c option without first running the -R option, the configuration change might again fail.

Users other than superuser require solaris.cluster.modify Role-Based Access Control (RBAC) authorization to use this subcommand. See the rbac(5) man page.

-p
: Displays the current private network address that is assigned to the private interconnect. Run the -p option from any node.

  You can use this option only in the global zone.

  The -p option prints the following information:

  - The private network address
  - The IP address range in the form of a netmask
  - The maximum number of nodes and the maximum number of private networks that can be supported by the IP address range

  Users other than superuser require solaris.cluster.read Role-Based Access Control (RBAC) authorization to use this subcommand. See the rbac(5) man page.

  To display the current private network address from a node that is in cluster mode, instead run the scconf -p command or the cluster show-netprops command.

Examples

EXAMPLE 1 Calculating a Custom Private IP Address Range

The following command specifies the private network address 172.16.0.0 and calculates the netmask. The command specifies that the calculated netmask must support up to sixteen nodes and up to four private networks in the cluster.

```
# scprivipadm -c netaddr=172.16.0.0,maxnodes=16,maxprivatenets=4
```

EXAMPLE 2 Specifying a Private Network Address and Netmask

The following command specifies the private network address 172.16.0.0 and the netmask 255.255.248.0.

```
# scprivipadm -c netaddr=172.16.0.0,netmask=255.255.248.0
```

Exit Status

The scprivipadm command returns with a non-zero value if either of the following conditions occur:

- Invalid arguments were provided.

- The command was unable to successfully modify the IP address range on all nodes of the cluster.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also Intro(1CL), cluster(1CL), scconf(1M), scinstall(1M), netmasks(4), networks(4), rbac(5)

Oracle Solaris Cluster Software Installation Guide, *Oracle Solaris Cluster System Administration Guide*, *Configuring and Administering Oracle Solaris 11.1 Networks*

Notes The superuser can run all forms of this command. Users other than superuser require RBAC authorizations. See the following table.

Option	RBAC Authorization
-c	solaris.cluster.modify
-R	solaris.cluster.modify
-p	solaris.cluster.read

Name scprivipd – Oracle Solaris Cluster Private IP address service daemon

Synopsis `/usr/cluster/lib/sc/scprivipd`

Description The `scprivipd` daemon is started at system boot time. It is used to configure or unconfigure the private IP addresses that are assigned on zone boot or shutdown or as a result of `scconf` operations.

Diagnostics The `scprivipd` daemon has no direct `stdin`, `stdout`, or `stderr` connection to the outside. All diagnostic messages are logged through the `syslog` function.

Notes The `scprivipd` daemon must be run in superuser mode.

The `scprivipd` daemon is a Service Management Facility (SMF) service and is started through SMF. Also, if the `scprivipd` daemon is killed by a signal, it is automatically restarted by SMF.

The `SIGTERM` signal can be used to kill `scprivipd` gracefully. Other signals should not be used to kill the daemon.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Private

See Also `clnode(1CL)`, `scconf(1M)`, `syslog(3C)`, `attributes(5)`

Name scrgadm – manage registration and unregistration of resource types, resource groups, and resources

Synopsis

`scrgadm -p[v[v]] [-t` *resource_type_name*`] [-g` *resource_group_name*`] [-j` *resource_name*`]`

`scrgadm -a -t` *resource_type_name* `[-h` *RT_installed_node_list*`] [-f` *registration_file_path*`]`

`scrgadm -a -g` *RG_name* `[-h` *nodelist*`] [-y` *property*=*value*`...]`

`scrgadm -a -j` *resource_name* `-t` *resource_type_name* `-g` *RG_name* `[-y` *property*=*value*`...]`
`[-x "`*extension_property*`[{`*node_specifier*`}]=`*value*`..."]`

`scrgadm -a -L -g` *RG_name* `-l` *hostnamelist* `[-j` *resource_name*`] [-n` *netiflist*`]`
`[-y` *property*=*value*`...]`

`scrgadm -a -S -g` *RG_name* `-l` *hostnamelist* `[-j` *resource_name*`] [-n` *netiflist*`]`
`[-X` *auxnodelist*`] [-y` *property*=*value*`...]`

`scrgadm -c -t` *resource_type_name* `[-h` *RT_installed_node_list*`] [-y RT_system={TRUE|FALSE}]`

`scrgadm -c -g` *RG_name* `[-h` *nodelist*`] -y` *property*=*value*`...`

`scrgadm -c -j` *resource_name* `[-y` *property*`...]`
`[-x "`*extension_property*`[{`*node_specifier*`}]=`*value*`..."]`

`scrgadm -r -t` *resource_type_name*

`scrgadm -r -g` *RG_name*

`scrgadm -r -j` *resource_name*

Description

Note – Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

A resource type specifies common properties and callback methods for all resources of that type. Before you can create a resource of a particular type, you must first register the resource type using the following form of the command:

`#` **`scrgadm`** `-a -t` *resource_type_name*

A resource group contains a set of resources, all of which are brought online or offline together on a given node or set of nodes. You first create an empty resource group before placing any resources in it. To create a resource group, use the following command:

`#` **`scrgadm`** `-a -g` *RG_name*

There are two types of resource groups: failover and scalable.

A failover resource group is online on only one node at a time. A failover resource group can contain resources of any type although scalable resources that are configured in a failover resource group run on only one node at a time.

To create a failover resource group named `MyDatabaseRG`, use the following command:

```
# scrgadm -a -g MyDatabaseRG
```

A scalable resource group can be online on several nodes at once. A scalable resource group can contain only resources that support scaling and cannot contain resources that are constrained, by their resource type definition, to only failover behavior.

To create a scalable resource group named `MyWebServerRG`, use the following command:

```
# scrgadm -a -g MyWebServerRG \
-y Maximum_primaries=integer \
-y Desired_primaries=integer
```

A newly created resource group is in an `UNMANAGED` state. After creating resources in the group, use the `scswitch` command to put a resource group in a `MANAGED` state.

To create a resource of a given type in a resource group, use the following command:

```
# scrgadm -a -j resource_name -t resource_type_name -g RG_name
```

Creating a resource causes the underlying RGM mechanism to take several actions. The underlying RGM mechanism calls the `VALIDATE` method on the resource to verify that the property settings of the resource are valid. If the `VALIDATE` method completes successfully and the resource group has been put in a `MANAGED` state, the RGM initializes the resource by calling the `INIT` method on the resource. The RGM then brings the resource online if it is enabled and its resource group is online.

To remove a managed resource group, first remove all resources from that resource group. To remove a resource, first disable it with the `scswitch` command. Removing a resource causes the RGM to clean up after the resource by calling the `FINI` method on that resource.

You can use this option only in the global zone.

Options

Action Options

Action options specify the actions performed by the command. Only one action option is allowed on the command line.

The following action options are supported:

`-a`

Adds a new configuration. Use with these options:

`-g` Creates a resource group.

You can use this option only in the global zone.

You need `solaris.cluster.resource.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-j` Creates a resource.

You can use this option only in the global zone.

You need `solaris.cluster.resource.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-t` Adds a resource type.

You can use this option only in the global zone.

You need `solaris.cluster.resource.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-c`

Modifies an existing configuration. Only values of the specified properties are set. Other properties retain their current values. Use with these options:

`-g` Modifies a resource group.

You can use this option only in the global zone.

You need `solaris.cluster.resource.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-j` Modifies a resource.

You can use this option only in the global zone.

You need `solaris.cluster.resource.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-t` Modifies a resource type.

You can use this option only in the global zone.

You need `solaris.cluster.resource.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-r`

Removes configuration. Use with these options:

`-g` Removes a resource group.

You can use this option only in the global zone.

You need `solaris.cluster.resource.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-j` Removes a resource.

You can use this option only in the global zone.

You need `solaris.cluster.resource.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-t` Removes a resource type.

You can use this option only in the global zone.

You need `solaris.cluster.resource.modify` RBAC authorization to use this command option with `-a`, `-c`, or `-r`. See `rbac(5)`.

`-p`
Displays existing configuration information.

You can use this option only in the global zone. Use with these options:

`-g` *resource_group_name*
Displays specific resource group configuration information.

You need `solaris.cluster.resource.read` RBAC authorization to use this command option with `-p`. See `rbac(5)`.

`-j` *resource_name*
Displays specific resource configuration information.

You need `solaris.cluster.resource.read` RBAC authorization to use this command option with `-p`. See `rbac(5)`.

`-t` *resource_type_name*
Displays specific resource type configuration information.

You need `solaris.cluster.resource.read` RBAC authorization to use this command option with `-p`. See `rbac(5)`.

`-v[v]`
Displays more verbose output.

You need `solaris.cluster.resource.read` RBAC authorization to use this command option with `-p`. See `rbac(5)`.

If you do not specify any `-g`, `-j`, or `-t` options, information about all resource types, resource groups, and resources that are currently configured on the cluster are provided by default.

Multiple `-g`, `-j`, and `-t` options are supported and can be combined with any combination of `-v` options.

You can use up to two `-v` options on a single command line.

Target Options Target options identify the target object. The following target options are supported:

Note – Property names for resource groups, resources, and resource types are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify property names.

`-g` *RG_name*
Resource group.

`-j` *resource_name*
Resource. When used with the `-a` option, the `-t` and `-g` target options must be specified in the command to indicate the type of the resource that is to be instantiated and the name of the containing resource group.

`-t` *resource_type_name*
Resource type.

Resource Type-Specific Options

The following options are supported:

`-f` *registration_file_path*
Is valid with `-a`. Specifies the path name of the resource type registration (RTR) file. By convention, the RTR file resides in the `/opt/cluster/lib/rgm/rtreg` directory. If the RTR file is not located in this directory, you must specify this option.

`-h` *RT_installed_node_list*
Is valid with `-a` and `-c`. Specifies a comma-separated list of node names upon which this resource type is installed. Resources of this type can be instantiated only in resource groups whose node list is a subset of this list.

The `-h` option is optional with the `-a` option. If `-h` is not specified, it implies that the resource type has been installed on all nodes. Doing so permits resources of this type to be instantiated in any resource group.

When used with the `-c` option, `-h` must be specified with either a new installed node list or with an escaped wildcard character (`\*`). The wildcard character indicates that the resource type has been installed on all nodes.

Note – A comma is not allowed in a node name.

`-t` *resource_type_name*
Is valid with `-a`, `-c`, and `-r`. A resource type is defined by a resource type registration file that specifies standard and extension property values for the resource type. Placing a valid resource type registration file in the well-known directory where registration files are usually installed (`/opt/cluster/lib/rgm/rtreg`) enables the shorthand notation:

```
# scrgadm -a -t SUNW.rt:2.0
```

As a result, you do not need to use the following notation:

```
# scrgadm -a -t rtn -f full_path_to_SUNW.rt:2.0
```

To view the names of the currently registered resource types, use the following command:

```
# scrgadm -p
```

Starting in Sun Cluster 3.1, the syntax of a resource type name is as follows:

vendor_id.*resource_type*:*version*

The three components of the resource type name are properties specified in the RTR file as *Vendor_id*, *Resource_type*, and *RT_version*. The `scrgadm` command inserts the period and colon delimiters. The optional *Vendor_id* prefix is necessary only if it is required to distinguish between two registration files of the same name provided by different vendors. The *RT_version* is used for upgrading from one version of a data service to another version of the data service.

To ensure that the *Vendor_id* is unique, use the stock symbol for the company that is creating the resource type. The *resource_type_name* that is used with the `-t` option can either be the full resource type name or an abbreviation that omits the *Vendor_id*. For example, both `-t SUNW.iws` and `-t iws` are valid. If there are two resource types in the cluster with names that differ only in the *Vendor_id* prefix, the use of the abbreviated name fails.

The `scrgadm` command fails to register the resource type if the *RT_version* string includes a blank, tab, slash (`/`), backslash (`\`), asterisk (`*`), question mark (`?`), left square bracket (`[`), or right square bracket (`]`) character.

When you specify the *resource_type_name* with the `-t` option, you can omit the version component if only one version is registered.

Resource type names that you created before the Sun Cluster 3.1 release continue to conform to the following syntax:

vendor_id`.`*resource_type*

`-y RT_system={TRUE|FALSE}`
Sets the `RT_system` property of a resource type either to `TRUE` or to `FALSE`. The default value of the `RT_system` property is `FALSE`. See `rt_properties(5)` for a description of the `RT_system` property.

Resource Group-Specific Options

The following options are supported:

`-h` *nodelist*
Is valid with `-a` and `-c`. This option is a shortcut for `–y Nodelist=`*nodelist*.

`-y` *property=value*
Is valid with `-a` and `-c`. Multiple instances of `-y` *property=value* are allowed. The form of the *value* is dictated by each *property*. In the following example, *property1* takes a single string as the *value*, while *property2* takes a comma-separated string array:

`-y` *property1*`=`*value1* `-y` *property2*`=`*value2a*`,`*value2b*

To set a string property to an empty value, use this option without specifying a value, as follows:

`-y` *property=*

Recognition of `-y` property names is not case-sensitive.

See `rg_properties(5)` for a description of the resource group properties.

Resource-Specific Options

The following options are supported:

-x *extension_property=value*
-x "*extension_property*{*node_specifier*}=*value*"
Is valid with -a and -c. Multiple instances of -x *extension_property=value* or -x "*extension_property*{*node_specifier*}=*value*" are allowed.

node_specifier is an *optional* qualifier that indicates that the value of *extension_property* is to be set or changed on *only* the specified node or nodes. The value for the specified property is not set or changed on other nodes in the cluster. If you do not include *node_specifier*, the value for the specified property is set or changed on all nodes in the cluster. Examples of the syntax of *node_specifier* are as follows:

```
-x "myprop{phys-schost-1}=100"
```

You specify the braces ({ }) to indicate the particular node or nodes on which you want to set the property.

You can also use the following syntax for *node_specifier* to specify different values on two different nodes at the same time:

```
-x "myprop{phys-schost-1}=100" -x "myprop{phys-schost-2}=10"
```

Alternately, you can use the following syntax to set or change one value on two different nodes at the same time:

```
-x "myprop{phys-schost-1,phys-schost-2}=100"
```

The form of *value* is dictated by each *extension_property*. In the following example, *extension_property1* takes a single string as the *value*, while *extension_property2* takes a comma-separated string:

```
-x "extension_property1{node_specifier}=value1" \
-x "extension_property2{node_specifier}=value2a,value2b"
```

For information about the extension properties that are available for a particular data service, see the man page for that data service.

-y *property=value*
Is valid with -a and -c. Multiple instances of -y *property=value* are allowed. The form of the *value* is dictated by each *property*. In the following example, *property1* takes a single string as the *value*, while *property2* takes a comma-separated string array:

```
-y property1=value1 -y property2=value2a,value2b
```

To set a property to an empty value, use this option without specifying a value, as follows:

```
-y property=
```

Recognition of -y *property* names is not case-sensitive.

See the r_properties(5) man page for a description of the resource properties.

LogicalHostname Specific Options

These options apply to logical host name resources. There are no special commands for removing a `LogicalHostname` resource:

```
# scrgadm -r -j resource_name
```

resource_name is the same name that is supplied with the optional `-j` option when you create the `LogicalHostname` resource. If the `-j` option and *resource_name* are omitted when the `LogicalHostname` resource is created, then the name is generated by `scrgadm`.

The following options are supported:

`-j` *resource_name*

The `-j` option is required when you use an IP address rather than a host name as the first argument to the `-l` *hostnamelist* option.

Use `-j` with `-a` to explicitly name a `LogicalHostname` resource when the resource is created and with `-r` to remove a resource from a resource group. If you do not use the `-j` option to explicitly name the `resource`, the `scrgadm` command creates the resource and assigns the name of the first host name in *hostnamelist* to that resource.

`-L`

Indicates that the options that are used on the command line apply to a logical host name. If you issue the command when any cluster node is not an active cluster member, you must also use the `-n` *netiflist* option.

`-l` *hostnamelist*

Specifies the IPv4 or IPv6 addresses to be shared. Use host names even though you can specify IP addresses. *hostnamelist* is a comma-separated list of host names that are to be made available by this `LogicalHostname` resource.

`-n` *netiflist*

Specifies the list of network interfaces. The `-L` option requires the `-n` option if the command is issued when any cluster node is not an active cluster member.

The *netiflist* takes the following form:

netif@*node*`[,...]`

netif may be given as network adapter name, such as `le0`, or as an IP Network Multipathing group name, such as `sc_ipmp`. The *node* may be a node name or node identifier. All nodes in the *nodelist* of the resource group must be represented in *netiflist*. If `-n` *netiflist* is omitted, an attempt is made to discover a net adapter on the subnet identified by the *hostnamelist* for each node in the *nodelist*. Single-adapter IP Network Multipathing groups are created for discovered network adapters not already in an IP Network Multipathing group. Similarly, a single-adapter IP Network Multipathing group is created for a named adapter, if a group does not already exist.

Refer to the NOTES section for more information.

`-y` *property=value*
Refer to the Resource-Specific Options section for details.

SharedAddress Specific Options

All of the `LogicalHostname`-specific options also apply to `SharedAddress` resources with the following changes and additions:

`-S`
Indicates that the options that are used on the command line apply to a shared address.

`-X` *auxnodelist*
Specifies a comma-separated list of node names or identifiers. Entries on this list must be members of the cluster. These nodes are nodes that may host the specified shared addresses, but never serve as the primary node in the case of failover.

This list is mutually exclusive with *nodelist*. See the description of *nodelist* under Resource-Group Specific Options.

Exit Status

The following exit values are returned:

`0` The command completed successfully.

A warning message might be written to the standard error even when this command completes successfully.

nonzero An error has occurred.

Writes an error message to standard error when it exits with nonzero status.

Some operations are not permitted on resource types whose `RT_System` property is `TRUE`. Similarly, some operations are not permitted on a resource group (and its resources) whose `RG_System` property is `TRUE`. See `rt_properties(5)` and `rg_properties(5)`.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/system/core`
Interface Stability	Evolving

See Also

`Intro(1CL)`, `clreslogicalhostname(1CL)`, `clresource(1CL)`, `clresourcegroup(1CL)`, `clresourcetype(1CL)`, `clressharedaddress(1CL)`, `ifconfig(1M)`, `scstat(1M)`, `scswitch(1M)`, `r_properties(5)`, `rbac(5)`, `rg_properties(5)`, `rt_properties(5)`

Notes

A network adapter that is not already configured for use cannot be discovered or placed into an IP Network Multipathing group during `LogicalHostname` and `SharedAddress` add operations. See `ifconfig(1M)`.

If `scrgadm` exits nonzero with the error message `cluster is reconfiguring`, the requested operation might have completed successfully, despite the error status. If you doubt the result, you can execute `scrgadm` again with the same arguments after the reconfiguration is complete.

Name scsetup – interactive cluster configuration tool

Synopsis `scsetup [-f` *logfile*`]`

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `scsetup` command provides the following configuration capabilities, depending on what state the cluster is in when you issue the command:

- When you run the `scsetup` command at post-installation time, the command performs initial setup tasks, such as configuring quorum devices and resetting the `installmode` property. If you did not use automatic quorum configuration when you created the cluster, run the `scsetup` command immediately after the cluster is installed. Ensure that all nodes have joined the cluster before you run the `scsetup` command and reset the `installmode` property.

  If you used automatic quorum configuration when you created the cluster, you do not need to run the `scsetup` command after cluster installation. The automatic quorum configuration feature also resets the `installmode` property of the cluster.
- When you run the command during normal cluster operation, the `scsetup` command provides a menu-driven utility. You can use this utility to perform most ongoing cluster-administration tasks.
- When you issue the command from a node that is in noncluster mode, the `scsetup` utility provides a menu-driven utility for changing and displaying the private IP address range. You must reboot all nodes into noncluster mode before you start this form of the `scsetup` utility.

You can issue the `scsetup` command from any node in the cluster.

You can use this command only in the global zone.

Options The following options are supported:

`-f` *logfile* Specifies the name of a log file to which commands can be logged. If you specify this option, most command sets that the `scsetup` utility generates are run and logged, or only logged, depending on user responses.

Attributes See `attributes(5)` for descriptions of the following attributes.

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also Intro(1CL), cltelemetryattribute(1CL), cldevicegroup(1CL), clnode(1CL), clquorum(1CL), clreslogicalhostname(1CL), clresourcegroup(1CL), clresourcetype(1CL), clressharedaddress(1CL), cluster(1CL),

Name scshutdown – shut down a cluster

Synopsis `scshutdown [-y] [-g` *grace-period*`] [`*message*`]`

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `scshutdown` utility shuts down an entire cluster in an orderly fashion.

Before starting the shutdown, `scshutdown` sends a warning message, then a final message asking for confirmation.

Only run the `scshutdown` command from one node.

The `scshutdown` command performs the following actions when it shuts down a cluster:

- Changes all functioning resource groups on the cluster to an offline state. If any transitions fail, `scshutdown` does not complete and displays an error message.
- Unmounts all cluster file systems. If any unmounts fail, `scshutdown` does not complete and displays an error message.
- Shuts down all active device services. If any transition of a device fails, `scshutdown` does not complete and displays an error message.
- Runs `/usr/sbin/init 0` on all nodes. See `init(1M)` for more information.

You can use this command only in the global zone.

You need `solaris.cluster.system.admin` RBAC authorization to use this command. See `rbac(5)`.

Options The following options are supported:

`-g` *grace-period* — Changes the number of seconds from the 60-second default to the time specified by *grace-period*.

`-y` — Pre-answers the confirmation question so the command can be run without user intervention.

Operands The following operands are supported:

message — Is a string that is issued after the standard warning message `The system will be shut down in …` is issued. If *message* contains more than one word, delimit it with single (`'`) or double (`"`) quotation marks. The warning message and the user-provided *message* are output when there are `7200`, `3600`, `1800`, `1200`, `600`, `300`, `120`, `60`, and `30` seconds remaining before `scshutdown` begins.

Examples

EXAMPLE 1 Shutting Down a Cluster

```
phys-palindrome-1# scshutdown
```

Exit Status

The following exit values are returned:

`0` The command completed successfully.

nonzero An error occurred. Error messages are displayed on the standard output.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

`Intro(1CL)`, `cluster(1CL)`, `shutdown(1M)`, `init(1M)`, `attributes(5)`

Name scstat – monitor the status of an Oracle Solaris Cluster configuration

Synopsis `scstat [-DWginpqv [v]] [-h node]`

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `scstat` command displays the current state of Oracle Solaris Cluster components. Only one instance of the `scstat` command needs to run on any machine in the Oracle Solaris Cluster configuration.

When run without any options, `scstat` displays the status for all components of the cluster. This display includes the following information:

- A list of cluster members
- The status of each cluster member
- The status of resource groups and resources
- The status of every path on the cluster interconnect
- The status of every disk device group
- The status of every quorum device
- The status of every IP network multipathing (IPMP) group and public network adapter

You need `solaris.cluster.device.read`, `solaris.cluster.transport.read`, `solaris.cluster.resource.read`, `solaris.cluster.node.read`, `solaris.cluster.quorum.read`, and `solaris.cluster.system.read` RBAC authorization to use this command without options. See `rbac(5)`.

Resources and Resource Groups

The resource state, resource group state, and resource status are all maintained on a per-node basis. For example, a given resource has a distinct state on each cluster node and a distinct status on each cluster node.

The resource state is set by the Resource Group Manager (RGM) on each node, based only on which methods have been invoked on the resource. For example, after the `STOP` method has run successfully on a resource on a given node, the resource's state will be `OFFLINE` on that node. If the `STOP` method exits nonzero or times out, then the state of the resource is `Stop_failed`.

Possible resource states include: `Online`, `Offline`, `Start_failed`, `Stop_failed`, `Monitor_failed`, `Online_not_monitored`, `Starting`, and `Stopping`.

Possible resource group states are: `Unmanaged`, `Online`, `Offline`, `Pending_online`, `Pending_offline`, `Error_stop_failed`, `Online_faulted`, and `Pending_online_blocked`.

In addition to resource state, the RGM also maintains a resource status that can be set by the resource itself by using the API. The field `Status Message` actually consists of two components: status keyword and status message. Status message is optionally set by the resource and is an arbitrary text string that is printed after the status keyword.

Descriptions of possible values for a resource's status are as follows:

`DEGRADED` The resource is online, but its performance or availability might be compromised in some way.

`FAULTED` The resource has encountered an error that prevents it from functioning.

`OFFLINE` The resource is offline.

`ONLINE` The resource is online and providing service.

`UNKNOWN` The current status is unknown or is in transition.

Device Groups

Device group status reflects the availability of the devices in that group.

The following are possible values for device group status and their descriptions:

`DEGRADED` The device group is online, but not all of its potential primaries (secondaries) are up. For two-node connectivity, this status basically indicates that a standby primary does not exist, which means a failure of the primary node will result in a loss of access to the devices in the group.

`OFFLINE` The device group is offline. There is no primary node. The device group must be brought online before any of its devices can be used.

`ONLINE` The device group is online. There is a primary node, and devices within the group are ready for I/O.

`WAIT` The device group is between one status and another. This status might occur, for example, when a device group is going from offline to online.

IP Network Multipathing Groups

IP network multipathing (IPMP) group status reflects the availability of the backup group and the adapters in the group.

The following are possible values for IPMP group status and their descriptions:

`OFFLINE` The backup group failed. All adapters in the group are offline.

`ONLINE` The backup group is functional. At least one adapter in the group is online.

`UNKNOWN` Any other state than those listed before. This could result when an adapter is detached or marked as down by Solaris commands such as `if_mpadm` or `ifconfig`.

The following are possible values for IPMP adapter status and their descriptions:

`OFFLINE`	The adapter failed or the backup group is offline.
`ONLINE`	The adapter is functional.
`STANDBY`	The adapter is on standby.
`UNKNOWN`	Any other state than those listed before. This could result when an adapter is detached or marked as down by Solaris commands such as `if_mpadm` or `ifconfig`.

Options

You can specify command options to request the status for specific components.

If more than one option is specified, the `scstat` command prints the status in the specified order.

The following options are supported:

`-D`
: Shows status for all disk device groups.

  You can use this option in the global zone.

  You need `solaris.cluster.device.read` RBAC authorization to use this command option. See `rbac(5)`.

`-g`
: Shows status for all resource groups.

  You can use this option in the global zone.

  You need `solaris.cluster.resource.read` RBAC authorization to use this command option. See `rbac(5)`.

`-h` *node*
: Shows status for the specified node (*node*) and status of the disk device groups of which this node is the primary node. Also shows the status of the quorum devices to which this node holds reservations of the resource groups to which the node is a potential master, and holds reservations of the transport paths to which the *node* is attached.

  You need `solaris.cluster.device.read`, `solaris.cluster.transport.read`, `solaris.cluster.resource.read`, `solaris.cluster.node.read`, `solaris.cluster.quorum.read`, and `solaris.cluster.system.read` RBAC authorization to use this command option. See `rbac(5)`.

`-i`
: Shows status for all IPMP groups and public network adapters.

  You can use this option only in the global zone.

`-n`
: Shows status for all nodes.

  You can use this option in the global zone.

You need `solaris.cluster.node.read` RBAC authorization to use this command option. See `rbac(5)`.

`-p` Shows status for all components in the cluster. Use with `-v` to display more verbose output.

You can use this option in the global zone.

You need `solaris.cluster.device.read`, `solaris.cluster.transport.read`, `solaris.cluster.resource.read`, `solaris.cluster.node.read`, `solaris.cluster.quorum.read`, and `solaris.cluster.system.read` RBAC authorization to use `-p` with `-v`. See `rbac(5)`.

`-q` Shows status for all device quorums and node quorums.

You can use this option in the global zone.

You need `solaris.cluster.quorum.read` RBAC authorization to use this command option. See `rbac(5)`.

`-v[v]` Shows verbose output.

`-W` Shows status for cluster transport path.

You can use this option in the global zone.

You need `solaris.cluster.transport.read` RBAC authorization to use this command option. See `rbac(5)`.

Examples

EXAMPLE 1 Using the `scstat` Command

The following command displays the status of all resource groups followed by the status of all components related to the specified host:

% **scstat -g -h** *host*

The output that is displayed appears in the order in which the options are specified.

These results are the same results you would see by typing the two commands:

% **scstat -g**

and

% **scstat -h** *host*

Exit Status

The following exit values are returned:

`0`	The command completed successfully.
nonzero	An error has occurred.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also Intro(1CL), cluster(1CL), if_mpadm(1M), ifconfig(1M), scha_resource_setstatus(1HA), scha_resource_setstatus(3HA), attributes(5)

Notes An online quorum device means that the device was available for contributing to the formation of quorum when quorum was last established. From the context of the quorum algorithm, the device is online because it actively contributed to the formation of quorum. However, an online quorum device might not necessarily continue to be in a healthy enough state to contribute to the formation of quorum when quorum is reestablished. The current version of Oracle Solaris Cluster does not include a disk monitoring facility or regular probes to the quorum devices.

Name scswitch – perform ownership and state change of resource groups and device groups in Oracle Solaris Cluster configurations

Synopsis

`scswitch -c -h` *node*`[,...] -j` *resource[,...]* `-f` *flag-name*

`scswitch {-e | -n} [-M] -j` *resource[,...]* `[-h` *node*`[,...]]`

`scswitch -F {-g` *resource-grp[,...]* `| -D` *device-group[,...]*`}`

`scswitch -m -D` *device-group[,...]*

`scswitch -Q [ -g` *resource-grp[,...]*`] [-k]`

`scswitch -R -h` *node*`[,...] -g` *resource-grp[,...]*

`scswitch -r [-g` *resource-grp[,...]*`]`

`scswitch -S -h` *node*`[,...] [-K` *continue_evac*`]`

`scswitch -s [-g` *resource-grp[,...]*`] [-k]`

`scswitch {-u | -o} -g` *resource-grp[,...]*

`scswitch -Z [-g` *resource-grp[,...]*`]`

`scswitch -z -D` *device-group[,...]* `-h` *node* `[,...]`

`scswitch -z [-g` *resource-grp[,...]*`] [-h` *node* `[,...]]`

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `scswitch` command moves resource groups or device groups, also called disk device groups, to new primary nodes. It also provides options for evacuating all resource groups and device groups from a node by moving ownership elsewhere, bringing resource groups or device groups offline and online, enabling or disabling resources, switching resource groups to or from an `Unmanaged` state, or clearing error flags on resources.

You can run the `scswitch` command from any node in an Oracle Solaris Cluster configuration. If a device group is offline, you can use `scswitch` to bring the device group online onto any host in the node list. However, once the device group is online, a switchover to a spare node is not permitted. Only one invocation of `scswitch` at a time is permitted.

Do not attempt to kill an `scswitch` operation that is already underway.

For more information about valid uses of this command, see the descriptions of the individual options. For ease of administration, use this command in the global zone.

Options

Basic Options

The following basic options are supported. Options that you can use with some of these basic options are described in "Additional Options."

`-c`
: Clears the `-f` *flag-name* error flag on the specified set of resources on the specified nodes. For the current release of Oracle Solaris Cluster software, the `-c` option is *only* implemented for the `Stop_failed` resource state. Clearing the `Stop_failed` resource state places the resource into the offline state on the specified nodes.

  Use this option in the global zone.

  If the `Stop` method fails on a resource and the `Failover_mode` property of the resource is set to `Hard`, the Resource Group Manager (RGM) halts or reboots the node to force the resource (and all other resources mastered by that node offline.

  If the `Stop` method fails on a resource and the `Failover_mode` property is set to a value other than `Hard`, the individual resource goes into the `Stop_failed` resource state, and the resource group is placed into the `Error_stop_failed` state. A resource group in the `Error_stop_failed` state on any node cannot be brought online on any node, nor can it be edited (you cannot add or delete resources or change resource group properties or resource properties). You must clear the `Stop_failed` resource state by performing the procedure that is documented in the *Oracle Solaris Cluster Data Services Planning and Administration Guide*.

  Caution – Make sure that both the resource and its monitor are stopped on the specified node before you clear the `Stop_failed` resource state. Clearing the `Stop_failed` resource state without fully killing the resource and its monitor can lead to more than one instance of the resource executing on the cluster simultaneously. If you are using shared storage, this situation can cause data corruption. If necessary, as a last resort, execute a `kill(1)` command on the associated processes.

`-e`
: Enables the specified *resource*s.

  Use this option in the global zone.

  Once you have enabled a resource, it goes online or offline depending on whether its resource group is online or offline.

  You can specify the `-h` option with the `-e` option to enable a resource on only a specified subset of nodes. If you omit the `-h` option, the specified resources are enabled on all nodes.

`-F`
: Takes offline the specified resource groups (`-g`) or device groups (`-D`) on all nodes.

  When you specify the `-F` option with the `-D` option, you can run the `-F` option only from the global zone.

When the `-F` option takes a device group offline, the associated Solaris Volume Manager disk set is deported or released by the primary node. Before a device group can be taken offline, all access to its devices must be stopped, and all dependent file systems must be unmounted. You can start an offline device group by issuing an explicit `scswitch` call, by accessing a device within the group, or by mounting a file system that depends on the group.

`-m` Takes the specified device groups offline from the cluster for maintenance. The resulting state survives reboots.

You can use this option only in the global zone.

Before a device group can be placed in maintenance mode, all access to its devices must be stopped, and all dependent file systems must be unmounted. If a device group is currently being accessed, the action fails and the specified device groups are not taken offline from the cluster.

Device groups are brought back online by using the `-z` option. Only explicit calls to the `scswitch` command can bring a device group out of maintenance mode.

`-n` Disables the specified resources.

Use this option in the global zone.

A disabled resource that is online on its current masters is immediately brought offline from its current masters. The disabled resource remains offline regardless of the state of its resource group.

You can specify the `-h` option with the `-e` option to disable a resource on only a specified subset of nodess. If you omit the `-h` option, the specified resources are disabled on all nodes.

`-o` Takes the specified unmanaged resource groups out of the unmanaged state.

Once a resource group is in the managed state, the RGM attempts to bring the resource group online.

`-Q` Brings the specified resource groups to a quiescent state.

If you omit the `-g` option, the `-Q` option applies to all resource groups.

This option stops the specified resource groups from continuously switching from one node to another in the event of the failure of a `Start` or `Stop` method. This form of the `scswitch` command does not exit until the resource groups have reached a quiescent state in which they are no longer stopping or starting on any node.

If a `Monitor_stop`, `Stop`, `Postnet_stop`, `Start`, or `Prenet_start` method fails on any resource in a group while the `scswitch -Q` command is executing, the resource behaves as if its `Failover_mode` property was set to `None`, regardless of its actual setting. Upon failure of one of these methods, the resource moves to an error state (either the `Start_failed` or `Stop_failed` resource state) rather than initiating a failover or a reboot of the node.

When the `scswitch -Q` command exits, the specified resource groups might be online or offline or in the `ONLINE_FAULTED` or `ERROR_STOPPED_FAILED` state. You can determine their current state by executing the `clresourcegroup status` command.

If a node dies during execution of the `scswitch -Q` command, execution might be interrupted, leaving the resource groups in a non-quiescent state. If execution is interrupted, `scswitch -Q` returns a nonzero exit code and writes an error message to the standard error. In this case, you can reissue the `scswitch -Q` command.

You can specify the `-k` option with the `-Q` option to hasten the quiescing of the resource groups. If you specify the `-k` option, it immediately kills all methods that are running on behalf of resources in the affected resource groups. If you do not specify the `-k` option, methods are allowed to continue running until they exit or exceed their configured timeout.

`-R`
: Takes the specified resource groups offline and then back online on the specified primary nodes.

  The specified node must be a current primary node of the resource group.

`-r`
: Resumes the automatic recovery actions on the specified resource group, which were previously suspended by the `-s` option.

  If you omit the `-g` option, the `-r` option applies to all resource groups.

  A suspended resource group is *not* automatically restarted or failed over until you explicitly issue the command that resumes automatic recovery. Whether online or offline, suspended data services remain in their current state. You can still manually switch the resource group to a different state on specified nodes. You can also still enable or disable individual resources in the resource group.

  For information about how to suspend automatic recovery actions on resource groups, see the description of the `-s` option.

`-S`
: Switches all resource groups and device groups off the specified *node*.

  When executed in a global zone, this option can evacuate any specified node in the cluster.

The system attempts to select new primaries based on configured preferences for each group. All evacuated groups are not necessarily re-mastered by the same primary. If all groups that are mastered by the specified node cannot be successfully evacuated from the specified node, the command exits with an error.

Resource groups are first taken offline before they are relocated to new primary nodes. An evacuated resource group might remain offline if the system cannot start it on a new primary node.

If the primary ownership of a device group cannot be changed to one of the other nodes, primary ownership for that device group is retained by the original node.

`-s`
Suspends the automatic recovery actions on and quiesces the specified resource group.

If you omit the `-g` option, the `-s` option applies to all resource groups.

A suspended resource group is not automatically started, restarted, or failed over until you explicitly resume monitoring of the resource group with this option. While monitoring of the resource group remains suspended, data services remain online. You can still manually switch the resource group online or offline on specified nodes. You can also still enable or disable individual resources in the resource group.

You might need to suspend the automatic recovery of a resource group to investigate and fix a problem in the cluster. Or, you might need to perform maintenance on resource group services.

You can also specify the `-k` option to immediately kill all methods that are running on behalf of resources in the affected resource groups. By using the `-k` option, you can speed the quiescing of the resource groups. If you do not specify the `-k` option, methods are allowed to continue running until they exit or exceed their configured timeout.

For information about how to resume automatic recovery actions on resource groups, see the description of the `-r` option.

`-u`
Puts the specified managed resource groups into the unmanaged state.

As a precondition of the `-u` option, all resources that belong to the indicated resource groups must first be disabled.

`-Z`
This option does the following:

- Enables all resources of the specified resource groups
- Moves those resource groups into the managed state
- Brings those resource groups online on all the default primaries

If you omit the -g option, the -Z option applies to all resource groups.

When the -g option is not specified, the scswitch command attempts to bring all resource groups online, except resource groups that are suspended.

-z
Requests a change in mastery of the specified resource group or device group.

If you omit the -g option, the -z option applies to all resource groups.

When used with the -D option, the -z option switches one or more specified device groups to the specified node. Only one primary node name can be specified for a device group's switchover. When multiple device groups are specified, the -D option switches the device groups in the order specified. If the -z -D operation encounters an error, the operation stops and no further switches are performed.

When used with only the -g option, the -z option brings the specified resource groups, which must already be managed, online on their most preferred nodes . This form of scswitch does not bring a resource group online in violation of its strong RG_affinities, and it writes a warning message if the affinities of a resource group cannot be satisfied on any node. This option does not enable any resources, enable monitoring on any resources, or take any resource groups out of the unmanaged state, as the -Z option does.

When used with the -g and -h options, the -z option brings the specified resource groups online on the nodes that are specified by the -h option, and it takes them offline on all other cluster nodes . If the node list that is specified with the -h option is empty (-h ""), the -z option takes the resource groups that are specified by the -g option offline from all of their current masters. All nodes that are specified by the -h option must be current members of the cluster and must be potential primaries of all of the resource groups that are specified by the -g option. The number of nodes that are specified by the -h option must not exceed the setting of the Maximum_primaries property of any of the resource groups that are specified by the -g option.

When used alone (scswitch -z). the -z option switches online all managed resource groups that are not suspended in their most preferred nodes.

If you configure the RG_affinities property of one or more resource groups and you issue the scswitch -z -g command (with or without the -h option), additional resource groups other than those that are specified after the -g option might be switched as well. RG_affinities is described in rg_properties(5).

Additional Options

You can combine the following additional options with the previous basic options as follows:

-D
Specifies the name of one or more device groups.

This option is only legal with the -F, -m, and -z options.

You need `solaris.cluster.device.admin` role-based access control (RBAC) authorization to use this command option with the `-F`, `-m`, or `-z` option (in conjunction with the `-h` option). See `rbac(5)`.

You must also be able to assume a role to which the Oracle Solaris Cluster Commands rights profile has been assigned to use this command. Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the `pfsh`, `pfcsh`, or `pfksh` profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run `su` to assume a role. You can also use `pfexec` to issue privileged Oracle Solaris Cluster commands.

`-f` Specifies the error *flag-name*.

This option is only legal with the `-c` option.

The only error flag that is currently supported is `Stop_failed`.

You need `solaris.cluster.resource.admin` RBAC authorization to use this command option with the `-c` option. See `rbac(5)`.

You must also be able to assume a role to which the Oracle Solaris Cluster Commands rights profile has been assigned to use this command. Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the `pfsh`, `pfcsh`, or `pfksh` profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run `su` to assume a role. You can also use `pfexec` to issue privileged Oracle Solaris Cluster commands.

`-g` Specifies the name of one or more resource groups.

This option is legal only with the `-F`, `-o`, `-Q`, `-r`, `-R`, `-s`, `-u`, `-z`, and `-Z` options.

You need `solaris.cluster.resource.admin` RBAC authorization to use this command option with the following options:

- `-F` option
- `-o` option
- `-Q` option
- `-R` option in conjunction with the `-h` option
- `-r` option
- `-s` option
- `-u` option
- `-Z` option
- `-z` option in conjunction with the `-h` option

See rbac(5).

You must also be able to assume a role to which the Oracle Solaris Cluster Commands rights profile has been assigned to use this command. Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the pfsh, pfcsh, or pfksh profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run su to assume a role. You can also use pfexec to issue privileged Oracle Solaris Cluster commands.

-h Specifies the name of one or more cluster nodes.

This option is only legal with the -c, -e, -n, -R, -S, and -z options.

When used with the -c, -e, -n, -R, or -z options, the -h option accepts a comma-delimited list of nodes.

To specify an empty node list to the -z option, specify two double quotation marks "" as the argument to the -h option.

For resource groups that are configured with multiple primaries, the node names that the -h option lists must all be valid potential primaries of each resource group that the -g option specifies.

If a resource group fails to start successfully on the node that the -h option specifies, the resource group might fail over to a different node. This behavior is determined by the setting of the Failover_mode resource property. See r_properties(5) for more information.

When used with the -S option, the -h option specifies the name of a single node from which to evacuate resource groups and device groups.

You need solaris.cluster.resource.admin RBAC authorization to use this command option with the -c, -R option (in conjunction with the -g option), -S, or -z option (in conjunction with the -g option). In addition, you need solaris.cluster.device.admin RBAC authorization to use this command option with the -z option (in conjunction with the -D option). See rbac(5).

You must also be able to assume a role to which the Oracle Solaris Cluster Commands rights profile has been assigned to use this command. Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the pfsh, pfcsh, or pfksh profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run `su` to assume a role. You can also use `pfexec` to issue privileged Oracle Solaris Cluster commands.

`-j` Specifies the names of one or more *resource*s.

This option is legal only with the `-c`, `-e`, and `-n` options.

You need `solaris.cluster.resource.admin` RBAC authorization to use this command option with the `-c`, `-e`, or `-n` option. See rbac(5).

You must also be able to assume a role to which the Oracle Solaris Cluster Commands rights profile has been assigned to use this command. Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the `pfsh`, `pfcsh`, or `pfksh` profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run `su` to assume a role. You can also use `pfexec` to issue privileged Oracle Solaris Cluster commands.

`-K` Specifies the number of seconds to keep resource groups from switching back onto a node after that node has been successfully evacuated.

Resource groups cannot fail over or automatically switch over onto the node while that node is being evacuated, and, after evacuation is completed, for the number of seconds that you specify with this option. You can override the `-K` timer by switching a resource group onto the evacuated node, using the `scswitch -z -g -h` command before *continue_evac* seconds have passed. When such a switch is done, the `-K` timer is immediately considered to have expired. However, `scswitch -z -g` or `-Z` commands without the `-h` flag will continue to respect the `-K` timer and will avoid switching any resource groups onto the evacuated node.

This option is legal only with the `-S` option. You must specify an integer value between 0 and 65535. If you do not specify a value, 60 seconds is used by default.

You need `solaris.cluster.resource.admin` RBAC authorization to use this command option. See rbac(5).

You must also be able to assume a role to which the Oracle Solaris Cluster Commands rights profile has been assigned to use this command. Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the `pfsh`, `pfcsh`, or `pfksh` profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run `su` to assume a role. You can also use `pfexec` to issue privileged Oracle Solaris Cluster commands.

-k
: Immediately kills Resource Group Manager (RGM) resource methods that are running on behalf of resources in the specified resource groups.

  You can use this option with the `-Q` and `-s` options. If you do not specify the `-k` option, methods are allowed to continue running until they exit or they exceed their configured timeout.

-M
: Enables (`-e`) or disables (`-n`) monitoring for the specified resources. When you disable a resource, you need not disable monitoring on it because both the resource and its monitor are kept offline.

  This option is legal only with the `-e` and `-n` options.

  You need `solaris.cluster.resource.admin` RBAC authorization to use this command option with the `-e` or `-n` option. See `rbac(5)`.

  You must also be able to assume a role to which the Oracle Solaris Cluster Commands rights profile has been assigned to use this command. Authorized users can issue privileged Oracle Solaris Cluster commands on the command line from the `pfsh`, `pfcsh`, or `pfksh` profile shell. A profile shell is a special kind of shell that enables you to access privileged Oracle Solaris Cluster commands that are assigned to the Oracle Solaris Cluster Commands rights profile. A profile shell is launched when you run `su` to assume a role. You can also use `pfexec` to issue privileged Oracle Solaris Cluster commands.

Examples

EXAMPLE 1 Switching Over a Resource Group

The following command switches over `resource-grp-2` to be mastered by `schost-1`.

```
schost-1# scswitch –z –h schost-1 –g resource-grp-2
```

EXAMPLE 2 Bringing Online a Managed Resource Group Without Enabling Monitoring or Resources

The following command brings `resource-grp-2` online if `resource-grp-2` is already managed, but does not enable any resources or enable monitoring on any resources that are currently disabled.

```
schost-1# scswitch –z –g resource-grp-2
```

EXAMPLE 3 Switching Over a Resource Group Configured to Have Multiple Primaries

The following command switches over `resource-grp-3`, a resource group that is configured to have multiple primaries, to be mastered by `schost-1,schost-2,schost-3`.

```
schost-1# scswitch –z –h schost-1,schost-2,schost-3 –g resource-grp-3
```

EXAMPLE 4 Moving All Resource Groups and Device Groups Off a Node

The following command switches over all resource groups and device groups from `schost-1` to a new set of primaries.

```
schost-1# scswitch –S –h schost-1
```

EXAMPLE 5 Moving All Resource Groups and Device Groups Persistently Off a Node

The following command switches over all resource groups and device groups from `schost-1` to a new set of primaries. The command also specifies a 120-second wait before resource groups and device groups are permitted to switch back to `schost-1`.

The use of the `-K` option in the following command prevents resource groups from automatically switching back to `schost-1` after `schost-1` is successfully evacuated. An example of when a resource group might attempt to switch back to `schost-1` is if the resource group fails to start on its new master. Another example is if a resource group has strong negative affinities configured with the `RG_affinities` property.

```
schost-1# scswitch –S –h schost-1 -K 120
```

EXAMPLE 6 Disabling Resources

```
schost-1# scswitch –n –j resource-1,resource-2
```

EXAMPLE 7 Enabling a Resource

```
schost-1# scswitch –e –j resource-1
```

EXAMPLE 8 Taking Resource Groups to the Unmanaged State

```
schost-1# scswitch –u –g resource-grp-1,resource-grp-2
```

EXAMPLE 9 Taking Resource Groups Out of the Unmanaged State

```
schost-1# scswitch –o –g resource-grp-1,resource-grp-2
```

EXAMPLE 10 Switching Over a Device Group

The following command switches over `device-group-1` to be mastered by `schost-2`.

```
schost-1# scswitch –z –h schost-2 –D device-group-1
```

EXAMPLE 11 Putting a Device Group Into Maintenance Mode

The following command puts `device-group-1` into maintenance mode.

```
schost-1# scswitch –m –D device-group-1
```

EXAMPLE 12 Quiescing Resource Groups

The following command brings resource groups `RG1` and `RG2` to a quiescent state.

```
schost-1# scswitch –Q -g RG1,RG2
```

EXAMPLE 13 Clearing a Start_failed Resource State by Switching Over a Resource Group

The `Start_failed` resource state indicates that a `Start` or `Prenet_start` method failed or timed out on a resource, but its resource group came online anyway. The resource group comes online even though the resource has been placed in a faulted state and might not be providing service. This state can occur if the resource's `Failover_mode` property is set to `None` or to another value that prevents the failover of the resource group.

Unlike the `Stop_failed` resource state, the `Start_failed` resource state does *not* prevent you or the Oracle Solaris Cluster software from performing actions on the resource group. You do not need to issue the `scswitch -c` command to clear a `Start_failed` resource state. You only need to execute a command that restarts the resource.

The following command clears a `Start_failed` resource state that has occurred on a resource in the `resource-grp-2` resource group. The command clears this condition by switching the resource group to the `schost-2` node.

```
schost-1# scswitch –z –h schost-2 –g resource-grp-2
```

EXAMPLE 14 Clearing a Start_failed Resource State by Restarting a Resource Group

The following command clears a `Start_failed` resource state that has occurred on a resource in the `resource-grp-2` resource group. The command clears this condition by restarting the resource group on the `schost-1` node.

For more information about the `Start_failed` resource state, see the `r_properties(5)` man page.

```
schost-1# scswitch –R –h schost-1 –g resource-grp-2
```

EXAMPLE 15 Clearing a Start_failed Resource State by Disabling and Enabling a Resource

The following command clears a `Start_failed` resource state that has occurred on the resource `resource-1` by disabling and then re-enabling the resource.

For more information about the `Start_failed` resource state, see the `r_properties(5)` man page.

```
schost-1# scswitch –n –j resource-1
schost-1# scswitch –e –j resource-1
```

Exit Status

This command blocks until requested actions are completely finished or an error occurs.

The following exit values are returned:

`0`	The command completed successfully.
nonzero	An error has occurred. `scswitch` writes an error message to the standard error.

If the `scswitch` command exits with a nonzero exit status and the error message "`cluster is reconfiguring`" is displayed, the requested operation might have completed successfully, despite the error. If you doubt the result, you can execute the `scswitch` command again with the same arguments after the reconfiguration is complete.

If the `scswitch` command exits with a nonzero exit status and the error message "`Resource group failed to start on chosen node and may fail over to other node(s)`" is displayed, the resource group continues to reconfigure for some time after the `scswitch` command exits. Additional `scswitch` or `clresourcegroup` operations on that resource group fail until the resource group has reached a terminal state such as the `Online`, `Online_faulted`, or `Offline` state on all nodes.

If you invoke the `scswitch` command on multiple resources or resource groups and multiple errors occur, the exit value might only reflect one of the errors. To avoid this possibility, invoke the `scswitch` command on just one resource or resource group at a time.

Some operations are not permitted on a resource group (and its resources) whose `RG_system` property is `True`. See `rg_properties(5)` for more information.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/system/core`
Interface Stability	Evolving

See Also `kill(1)`, `pfcsh(1)`, `pfexec(1)`, `pfksh(1)`, `pfsh(1)`, `Intro(1CL)`, `cldevicegroup(1CL)`, `clresourcegroup(1CL)`, `su(1M)`, `attributes(5)`, `rbac(5)`, `r_properties(5)`, `rg_properties(5)`

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Warnings If you take a resource group offline by using the `-z` or `-F` option with the `-g` option, the `Offline` state of the resource group does not survive node reboots. If a node dies or joins the cluster, or if other resource groups are switching over, the resource group might come online. The resource group comes online on a node even if you previously switched the resource group offline. Even if all of the resources are disabled, the resource group comes online.

To prevent the resource group from coming online automatically, use the `-s` option to suspend the automatic recovery actions of the resource group. To resume automatic recovery actions, use the `-r` option.

Name sctelemetry – initialize system resource monitoring

Synopsis

```
sctelemetry -d
```

```
sctelemetry -e
```

sctelemetry -i -o hasp_rg=*rg*,hasp_rs=*rs* [,hasp_mnt_pt=*mnt_pt*] [,db_rg=*rg*] [,db_rs=*rs*] [,telemetry_rg=*rg*] [,telemetry_rs=*rs*]

sctelemetry -i -o hasp_mnt_pt=*mnt_pt*,hasp_nodelist=*node*[:...] [,hasp_rs=*rs*] [,db_rg=*rg*] [,db_rs=*rs*] [,telemetry_rg=*rg*,telemetry_rs=*rs*]

```
sctelemetry -u
```

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the Intro(1CL) man page.

The sctelemetry command initializes system resource monitoring, brings monitoring online, and takes it offline. When initializing, use the -o option with the hasp_rg=*rg*,hasp_rs=*rs* parameters to rely on an existing resource of type SUNW.HAStoragePlus. Use the -o option with the hasp_mnt_pt=*mnt_pt*,hasp_nodelist=*node*[:,...]parameters to have the sctelemetry command create a resource of type SUNW.HAStoragePlus. For more information about the resource types, see the SUNW.derby(5), SUNW.HAStoragePlus(5), and SUNW.SCTelemetry(5) man pages.

SUNW.SCTelemetry is instantiated in a multi-master resource group, that is the resource group is configured on all cluster nodes and does not use network load balancing.

You can use this command only in the global zone.

Options The options for sctelemetry are as follows:

-d

Disables the collection of system resource usage data and the database in which telemetry data is stored.

You can use this option only in the global zone.

Users other than superuser require solaris.cluster.system.modify RBAC authorization to use the -d option of sctelemetry. For more information, see the rbac(5) man page.

-e

Brings collection of system resource usage data online. By default, system resource monitoring is online when you use the -i option of the sctelemetry command.

You can use this option only in the global zone.

Users other than superuser require `solaris.cluster.system.modify` RBAC authorization to use the `-e` option of `sctelemetry`. For more information, see the `rbac(5)` man page.

`-i`

Creates resource groups containing resources of type `SUNW.SCTelemetry` and `SUNW.derby`. By default, when you create these resources and resource groups by using the `-i` option, system resource monitoring is online.

You can use this option only in the global zone.

Users other than superuser require `solaris.cluster.system.modify` RBAC authorization to use the `-i` option of `sctelemetry`. For more information, see the `rbac(5)` man page.

`-o` hasp_rg=*rg*,hasp_rs=*rs*[,hasp_mnt_pt=*mnt_pt*][,db_rg=*rg*][,db_rs=*rs*][,telemetry_rg=*rg*][,telemetry_rs=*rs*]

When used with the `-i` option, identifies the resource of type `SUNW.HAStoragePlus` to be used by the database and the resource group that contains this resource. The data collection facility must have access to a file system for `SUNW.HAStoragePlus`.

The parameters are as follows:

hasp_rg=*rg*	The resource group that contains the resource of type `SUNW.HAStoragePlus` that is used for system resource monitoring. You must specify *rg*, the name of this resource group.
hasp_rs=*rs*	The resource of type `SUNW.HAStoragePlus` that is used for system resource monitoring. You must specify *rs*, the name of this resource.
hasp_mnt_pt=*mnt_pt*	The mount point on which `sctelemetry` stores database files for system resource monitoring. This mount point must be a property of the resource, `hasp_rs`. Specifying this mount point is obligatory if there is more than one mount point in `hasp_rs`.
db_rg=*rg*	The resource group in which `sctelemetry` configures the resource of type `SUNW.derby`. You can specify *rg*, the name of this resource group.
db_rs=*rs*	The resource of type `SUNW.derby` that `sctelemetry` configures. You can specify *rs*, the name of this resource.
telemetry_rg=*rg*	The resource group in which `sctelemetry` configures a resource of type `SUNW.SCTelemetry`. You can specify *rg*, the name of this resource group.

telemetry_rs=*rs*	The resource of type `SUNW.SCTelemetry` that `sctelemetry` configures. You can specify *rs*, the name of this resource.

`-o` hasp_mnt_pt=*mnt_pt*,hasp_nodelist=*node*[:...][,hasp_rs=*rs*][,db_rg=*rg*][,db_rs=*rs*]\
[,telemetry_rg=*rg*][,telemetry_rs=*rs*]

When used with the `-i` option, specifies the nodes on which the `SUNW.HAStoragePlus` file system for data collection is accessible and specifies the mount point for the file system in which Oracle Solaris Cluster stores system resource data.

The parameters are as follows:

hasp_mnt_pt=*mnt_pt*
: The mount point that `sctelemetry` uses to configure a resource of type `SUNW.HAStoragePlus`. You must specify *mnt_pt*, the name of the mount point. The shared storage must be configured before the `HAStoragePlus` resource to be created. This mount point refers to the shared storage and must appear in `/etc/vfstab` as follows:

```
/dev/md/ddg/dsk/d20 /dev/md/ddg/rdsk/d20    \
/mntpt ufs     2       no logging
```

hasp_nodelist=*node*[:...]
: The nodes with which `sctelemetry` configures a resource of type `SUNW.HAStoragePlus`. You must specify *node*:[...], the name of the nodes.

hasp_rs=*rs*
: The resource of type `SUNW.HAStoragePlus` that `sctelemetry` configures. You can specify *rs*, the name of this resource.

db_rg=*rg*
: The resource group in which `sctelemetry` configures a resource of type `SUNW.derby`. You can specify *rg*, the name of this resource group.

db_rs=*rs*
: The resource of type `SUNW.derby` that `sctelemetry` configures. You can specify *rs*, the name of this resource.

telemetry_rg=*rg*
: The resource group in which `sctelemetry` configures a resource of type `SUNW.SCTelemetry`. You can specify *rg*, the name of this resource group.

telemetry_rs=*rs*
: The resource of type `SUNW.SCTelemetry` that `sctelemetry` configures. You can specify *rs*, the name of this resource.

`-u`

Removes the resources and resource groups that were previously created by using the `-i` option.

You can use this option only in the global zone.

Users other than superuser require `solaris.cluster.system.modify` RBAC authorization to use the `-u` option of the `sctelemetry` command. For more information, see the `rbac(5)` man page.

Examples

Initializing System-Resource Monitoring, When a HAStoragePlus Resource Exists

This example initializes system-resource monitoring and verifies that monitoring has been initialized. This example assumes that you have a `SUNW.HAStoragePlus` resource available for system-resource monitoring.

This example does not specify the names of the resources *db_rs* and *telemetry_rs* or the resource groups *db_rg* and *telemetry_rg*. The `sctelemetry` command gives these resources and resource groups default names.

The output of the `scstat -g` command shows the relationship between resources and resource groups involved in system resource monitoring. The output also shows that the *db_rs* and *hasp_rs* resources and the *db_rg* resource group are each `online` on one node, the *telemetry_rg* and *telemetry_rs* are `online` on all cluster nodes.

```
# sctelemetry -i \
-o hasp_mnt_pt=DBDATA,hasp_nodelist=l6-lx-1:l6-lx-4,hasp_rs=anto

# scstat -g
```

Disabling System-Resource Monitoring

This example disables system-resource monitoring then verifies that the monitoring has been disabled. When monitoring is disabled, the output of the `scstat -g` command shows that the *db_rs*, *hasp_rs*, and *telemetry_rs* resources and the *db_rg* and *telemetry_rg* resource groups are `offline`.

```
# sctelemetry -d
# scstat -g
```

Exit Status

The following exit values are returned:

`0` The command completed successfully.

nonzero An error has occurred.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

`Intro(1CL)`, `cltelemetryattribute(1CL)`, `cluster(1CL)`, `scstat(1M)`, `sctelemetry(1M)`, `SUNW.derby(5)`, `SUNW.HAStoragePlus(5)`, `SUNW.SCTelemetry(5)`

Name scversions – Oracle Solaris Cluster version management

Synopsis `scversions [-c]`

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `scversions` command commits the cluster to a new level of functionality after a rolling–upgrade to new Oracle Solaris Cluster software. With no arguments, the `scversions` command prints a message indicating whether a commitment is needed.

Operands The following operands are supported:

`-c`
: Commit the set of nodes that are currently active members of the cluster to the highest possible level of functionality.

When you upgrade a node (either through upgrade to a new release of the product or by application of a patch) and boot it back into the cluster, some of the internal protocols on that node might have to run at lower versions in order to cooperate correctly with other nodes in the cluster. When the cluster is in this state, some administrative actions might be disabled and some new functionality introduced in the upgrade might be unavailable.

When you run this command once from any node after all nodes are upgraded, the cluster switches to the highest versions of internal protocols possible. Assuming that all nodes have the same Oracle Solaris Cluster software installed at that time, all new functionality becomes available and any administrative restrictions are removed.

If a node that has not been upgraded is an active member of the cluster at the time you run the `-c` option to `scversions`, the command has no effect because the cluster is already running at the highest possible level of functionality.

If a node has not been upgraded and is not an active member of the cluster when you run the `-c` option to `scversions` (for example, if that node is down for maintenance), the internal protocols of the cluster are upgraded to the highest possible versions. You might have to upgrade the node that was not an active member of the cluster to enable it to rejoin the cluster.

Exit Status

0
: Success

non-zero
: Failure

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also scinstall(1M)

Name sc_zonesd – Oracle Solaris Cluster zone administration daemon

Synopsis `/usr/cluster/lib/sc/sc_zonesd`

Description The `sc_zonesd` daemon is a system daemon that is used by Oracle Solaris Cluster software. This daemon initially starts when the system comes up.

The daemon runs in the global zone only.

Diagnostics All diagnostic messages are logged through the `syslog` function.

Notes The `sc_zonesd` daemon must be started in superuser mode.

The `sc_zonesd` daemon is controlled by the SMF service `sc_zones`. If the daemon is killed or if the SMF service is disabled, the cluster node will panic.

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Private

See Also `syslog(3C)`, `attributes(5)`

REFERENCE

OSC4 3ha

Name scds_calls – Oracle Solaris Cluster Data Services Development Library (DSDL) functions

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>
```

Description The Data Services Development Library (DSDL) is a set of higher-level library functions that encapsulate and extend the functionality of the `scha` library functions. The `scha` library functions are described in the `scha_calls(3HA)` man page.

DSDL functions are implemented in the `libdsdev.so` library.

DSDL functions are generally divided into the following categories.

- General-purpose functions

  General-purpose functions include initialization functions, retrieval functions, failover and restart functions, and execution functions. These functions enable you to perform the following operations:

  - Initialize the DSDL environment
  - Retrieve resource type, resource, and resource group names, and extension property values
  - Fail over and restart a resource group and restart a resource
  - Convert error strings to error messages
  - Execute a command under a timeout
- Property functions

  These functions provide convenience APIs for accessing specific properties of the relevant resource type, resource, and resource group, including some commonly used extension properties. The DSDL provides the `scds_initialize()` function to parse the command-line arguments. The library *caches* the various properties of the relevant resource type, resource, and resource group.
- Network resource access functions

  These functions manage network resources that are used by resources and resource groups. These functions handle host names, port lists, and network addresses, and they enable TCP-based monitoring.
- Process Monitor Facility (PMF) functions

  These functions encapsulate the Process Monitor Facility (PMF) functionality.
- Fault monitor functions

  These functions provide a predetermined model of fault monitoring by keeping the failure history and evaluating it in conjunction with the `Retry_count` and `Retry_interval` properties.
- Utility functions

  These functions enable you to write messages and debugging messages to the system log.

Initialization Functions

The following functions initialize the calling method:

- scds_initialize(3HA) – Allocates resources and initializes the DSDL environment.
- scds_close(3HA) – Frees resources that are allocated by the scds_initialize() function.

Retrieval Functions

The following functions retrieve information about resource types, resources, resource groups, and extension properties:

- scds_get_resource_type_name(3HA) – Retrieves the name of the resource type for the calling program.
- scds_get_resource_name(3HA) – Retrieves the name of the resource for the calling program.
- scds_get_resource_group_name(3HA) – Retrieves the name of the resource group for the calling program.
- scds_get_ext_property(3HA) – Retrieves the value of the specified extension property.
- scds_get_current_method_name(3HA) – Retrieves the last element of the path name by which the data service method was called. See the basename(3C) man page.
- scds_free_ext_property(3HA) – Frees the memory that is allocated by scds_get_ext_property().

The following function retrieves status information about the SUNW.HAStoragePlus resources that are used by a resource:

scds_hasp_check(3HA) – Retrieves status information about SUNW.HAStoragePlus resources that are used by a resource. This information is obtained from the state (online or otherwise) of all SUNW.HAStoragePlus resources on which the resource depends by using the Resource_dependencies or Resource_dependencies_weak system properties that are defined for the resource. See the SUNW.HAStoragePlus(5) man page for more information.

Failover and Restart Functions

The following functions fail over or restart a resource or resource group:

- scds_failover_rg(3HA) – Fails over a resource group.
- scds_restart_rg(3HA) – Restarts a resource group.
- scds_restart_resource(3HA) – Restarts a resource.

Execution Functions

The following functions execute a command under a timeout and convert an error code to an error message:

- scds_timerun(3HA) – Executes a command under a timeout value.
- scds_error_string(3HA) and scds_error_string_i18n(3HA) – Translates an error code to an error string. Strings that are returned by scds_error_string() are displayed in English. Strings that are returned by scds_error_string_i18n() are displayed in the native language that is specified by the LC_MESSAGES locale category.
- scds_svc_wait(3HA) - Waits for the specified timeout period for a monitored process to die.

Property Functions

These functions provide convenience APIs for accessing specific properties of the relevant resource type, resource, and resource group, including some commonly used extension properties. The DSDL provides the `scds_initialize()` function to parse the command-line arguments. The library *caches* the various properties of the relevant resource type, resource, and resource group.

The `scds_property_functions(3HA)` man page describes these functions, which include the following:

- `scds_get_ext_`*property-name*
- `scds_get_rg_`*property-name*
- `scds_get_rs_`*property-name*
- `scds_get_rt_`*property-name*

Network Resource Access Functions

You use these functions to manage network resources.

The following functions handle host names:

- `scds_get_rs_hostnames(3HA)` – Retrieves a list of host names that is used by the resource.
- `scds_get_rg_hostnames(3HA)` – Retrieves a list of host names that is used by the network resources in a resource group.
- `scds_print_net_list(3HA)` – Writes the contents of the host name list to `syslog(3C)`. You typically use this function for debugging.
- `scds_free_net_list(3HA)` – Frees the memory that is allocated by `scds_get_rs_hostnames()` or `scds_get_rg_hostnames()`.

The following functions handle port lists:

- `scds_get_port_list(3HA)` – Retrieves a list of port-protocol pairs that is used by a resource.
- `scds_print_port_list(3HA)` – Writes the contents of the port-protocol list to `syslog(3C)`. You typically use this function for debugging.
- `scds_free_port_list(3HA)` – Frees the memory that is allocated by `scds_get_port_list()`.

The following functions handle network addresses:

- `scds_get_netaddr_list(3HA)` – Retrieves a list of network addresses that is used by a resource.
- `scds_print_netaddr_list(3HA)` – Writes the contents of the network address list to `syslog(3C)`. You typically use this function for debugging.
- `scds_free_netaddr_list(3HA)` – Frees the memory that is allocated by `scds_get_netaddr_list()`.

The following functions enable TCP-based monitoring. Typically, a fault monitor uses these functions to establish a simple socket connection to a service, read and write data to the service to ascertain its status, and disconnect from the service.

This set of functions includes the following functions:

- `scds_fm_tcp_connect`(3HA) – Establishes a TCP connection to a process that uses IPv4 addressing only.
- `scds_fm_net_connect`(3HA) – Establishes a TCP connection to a process that uses either IPv4 or IPv6 addressing.
- `scds_fm_tcp_read`(3HA) – Uses a TCP connection to read data from the process that is being monitored.
- `scds_fm_tcp_write`(3HA) – Uses a TCP connection to write data to a process that is being monitored.
- `scds_simple_probe`(3HA) – Probes a process by establishing and terminating a TCP connection to the process. This function handles only IPv4 addresses.
- `scds_simple_net_probe`(3HA) – Probes a process by establishing and terminating a TCP connection to the process. This function handles either IPv4 or IPv6 addresses.
- `scds_fm_tcp_disconnect`(3HA) – Terminates the connection to a process that is being monitored. This function handles only IPv4 addresses.
- `scds_fm_net_disconnect`(3HA) – Terminates the connection to a process that is being monitored. This function handles either IPv4 or IPv6 addresses.

PMF Functions

These functions encapsulate the Process Monitor Facility (PMF) functionality. The DSDL model for monitoring through the PMF creates and uses implicit *tag* values for `pmfadm`. See the `pmfadm`(1M) man page for more information.

The PMF facility also uses implicit values for the `Restart_interval`, `Retry_count`, and `action_script` (the `-t`, `-n`, and `-a` options to `pmfadm`). Most important, the DSDL ties the process failure history, as determined by the PMF, into the application failure history as detected by the fault monitor to compute the restart or failover decision.

The set includes the following functions:

- `scds_pmf_get_status`(3HA) – Determines if the specified instance is being monitored under the PMF's control.
- `scds_pmf_restart_fm`(3HA) – Uses the PMF to restart the fault monitor.
- `scds_pmf_signal`(3HA) – Sends the specified signal to a process tree that is running under the PMF's control.
- `scds_pmf_start`(3HA) and `scds_pmf_start_env`(3HA) – Executes a specified program (including a fault monitor) under the PMF's control. In addition to performing the same operations as the `scds_pmf_start()` function, the `scds_pmf_start_env()` function also passes a provided environment to the executed program.

- scds_pmf_stop(3HA) – Terminates a process that is running under the PMF's control.
- scds_pmf_stop_monitoring(3HA) – Stops monitoring a process that is running under the PMF's control.

Fault Monitor Functions

These functions provide a predetermined model of fault monitoring by keeping the failure history and evaluating it in conjunction with the Retry_count and Retry_interval properties.

This set includes the following functions:

- scds_fm_sleep(3HA) – Waits for a message on a fault monitor control socket.
- scds_fm_action(3HA) – Takes action after a probe completes.
- scds_fm_print_probes(3HA) – Writes probe status information to the system log.

Utility Functions

The following functions enable you to write messages and debugging messages to the system log:

- scds_syslog(3HA) – Writes messages to the system log.
- scds_syslog_debug(3HA) – Writes debugging messages to the system log.

Files

/usr/cluster/include/scds.h	Include file
/usr/cluster/lib/libdsdev.so	Library

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also

pmfadm(1M), scds_close(3HA), scds_error_string(3HA), scds_error_string_i18n(3HA), scds_failover_rg(3HA), scds_fm_action(3HA), scds_fm_net_connect(3HA), scds_fm_net_disconnect(3HA), scds_fm_print_probes(3HA), scds_fm_sleep(3HA), scds_fm_tcp_connect(3HA), scds_fm_tcp_disconnect(3HA), scds_fm_tcp_read(3HA), scds_fm_tcp_write(3HA), scds_free_ext_property(3HA), scds_free_net_list(3HA), scds_free_netaddr_list(3HA), scds_free_port_list(3HA), scds_get_ext_property(3HA), scds_get_netaddr_list(3HA), scds_get_port_list(3HA), scds_get_resource_group_name(3HA), scds_get_resource_name(3HA), scds_get_resource_type_name(3HA), scds_get_rg_hostnames(3HA), scds_get_rs_hostnames(3HA), scds_get_zone_name(3HA), scds_hasp_check(3HA), scds_initialize(3HA), scds_pmf_get_status(3HA), scds_pmf_restart_fm(3HA), scds_pmf_signal(3HA), scds_pmf_start(3HA), scds_pmf_stop(3HA), scds_pmf_stop_monitoring(3HA), scds_print_net_list(3HA), scds_print_netaddr_list(3HA), scds_print_port_list(3HA), scds_property_functions(3HA), scds_restart_resource(3HA), scds_restart_rg(3HA), scds_simple_net_probe(3HA), scds_simple_probe(3HA), scds_svc_wait(3HA), scds_syslog(3HA), scds_syslog_debug(3HA), bscds_timerun(3HA), scha_calls(3HA), SUNW.HAStoragePlus(5), attributes(5)

Name scds_close – free DSDL environment resources

Synopsis
```
cc [flags...]-I
/usr/cluster/include file -L /usr/cluster/lib  -l
dsdev
#include <rgm/libdsdev.h>

void scds_close(scds_handle_t*handle);
```

Description The `scds_close()` function reclaims resources that were allocated during data service method initialization by using `scds_initialize(3HA)`. Call this function once, prior to termination of the program.

Parameters The following parameters are supported:

handle The handle returned from `scds_initialize()`.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_initialize(3HA)`, `attributes(5)`

Name scds_error_string, scds_error_string_i18n – generate an error string from an error code

Synopsis
```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>
const char *scds_error_string(scha_err_t error_code);

const char *scds_error_string_i18n(scha_err_t error_code);
```

Description The `scds_error_string()` and `scds_error_string_i18n()` functions generate a short string that describes an error from an error code that is returned by a DSDL function. Strings that are returned by `scds_error_string()` are displayed in English. Strings that are returned by `scds_error_string_i18n()` are displayed in the native language that is specified by the `LC_MESSAGES` locale category. See `setlocale(3C)`. Invalid error codes return `NULL`.

The pointer that is returned by this function points to memory that belongs to the DSDL. Do not modify this memory.

Parameters The following parameters are supported:

error_code Error code that is returned by a DSDL function.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scha_calls(3HA)`, `setlocale(3C)`, `attributes(5)`

Name scds_failover_rg – failover a resource group

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_failover_rg(scds_handle_t handle);
```

Description The `scds_failover_rg()` function performs a `scha_control(3HA)` `SCHA_GIVEOVER` operation on the resource group containing the resource passed to the calling program.

When this function succeeds, it does not return. Therefore, treat this function as the last piece of code to be executed in the calling program.

Parameters The following parameters are supported:

handle The handle that is returned from `scds_initialize(3HA)`.

Return Values The following return values are supported:

`SCHA_ERR_NOERR` Indicates the function succeeded.

Other values Indicate the function failed. See `scha_calls(3HA)` for a description of other error codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scha_calls(3HA)`, `scha_control(3HA)`, `attributes(5)`

Name scds_fm_action – take action after probe completion function

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_fm_action(scds_handle_t handle, int probe_status, long elapsed_milliseconds);
```

Description The `scds_fm_action()` function uses the `probe_status` of the data service in conjunction with the past history of failures to take one of the following actions:

- Restart the application.
- Fail over the resource group.
- Do nothing.

Use the value of the input `probe_status` argument to indicate the severity of the failure. For example, you might consider a failure to connect to an application as a complete failure, but a failure to disconnect as a partial failure. In the latter case you would have to specify a value for `probe_status` between 0 and `SCDS_PROBE_COMPLETE_FAILURE`.

The DSDL defines `SCDS_PROBE_COMPLETE_FAILURE` as `100`. For partial probe success or failure, use a value between `0` and `SCDS_PROBE_COMPLETE_FAILURE`.

Successive calls to `scds_fm_action()` compute a failure history by summing the value of the `probe_status` input parameter over the time interval defined by the `Retry_interval` property of the resource. Any failure history older than `Retry_interval` is purged from memory and is not used towards making the restart or failover decision.

The `scds_fm_action()` function uses the following algorithm to choose which action to take:

Restart If the accumulated history of failures reaches `SCDS_PROBE_COMPLETE_FAILURE`, `scds_fm_action()` restarts the resource by calling the `STOP` method of the resource followed by the `START` method. It ignores any `PRENET_START` or `POSTNET_STOP` methods defined for the resource type.

The status of the resource is set to `SCHA_RSSTATUS_DEGRADED` by making a `scha_resource_setstatus()` call, unless the resource is already set.

If the restart attempt fails because the `START` or `STOP` methods of the resource fail, a `scha_control()` is called with the `GIVEOVER` option to fail the resource group over to another node. If the `scha_control()` call succeeds, the resource group is failed over to another cluster node, and the call to `scds_fm_action()` never returns.

Upon a successful restart, failure history is purged. Another restart is attempted only if the failure history again accumulates to `SCDS_PROBE_COMPLETE_FAILURE`.

Failover If the number of restarts attempted by successive calls to `scds_fm_action()` reaches the `Retry_count` value defined for the resource, a failover is attempted by making a call to `scha_control()` with the `GIVEOVER` option.

The status of the resource is set to `SCHA_RSSTATUS_FAULTED` by making a `scha_resource_setstatus()` call, unless the resource is already set.

If the `scha_control()` call fails, the entire failure history maintained by `scds_fm_action()` is purged.

If the `scha_control()` call succeeds, the resource group is failed over to another cluster node, and the call to `scds_fm_action()` never returns.

No Action If the accumulated history of failures remains below `SCDS_PROBE_COMPLETE_FAILURE`, no action is taken. In addition, if the `probe_status` value is `0`, which indicates a successful check of the service, no action is taken, irrespective of the failure history.

The status of the resource is set to `SCHA_RSSTATUS_OK` by making a `scha_resource_setstatus()` call, unless the resource is already set.

Parameters

The following parameters are supported:

handle The handle that is returned from `scds_initialize(3HA)`.

probe_status A number you specify between 0 and `SCDS_PROBE_COMPLETE_FAILURE` that indicates the status of the data service. A value of `0` implies that the recent data service check was successful. A value of `SCDS_PROBE_COMPLETE_FAILURE` means complete failure and implies that the service has completely failed. You can also supply a value in between 0 and `SCDS_PROBE_COMPLETE_FAILURE` that implies a partial failure of the service.

elapsed_milliseconds The time, in milliseconds, to complete the data service check. This value is reserved for future use.

Return Values

The `scds_fm_action()` function returns the following values:

`0` The function succeeded.

nonzero The function failed.

Errors

`SCHA_ERR_NOERR` No action was taken, or a restart was successfully attempted.

`SCHA_ERR_FAIL` A failover attempt was made but it did not succeed.

`SCHA_ERR_NOMEM` System is out of memory.

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also

`scds_fm_sleep(3HA)`, `scds_initialize(3HA)`, `scha_calls(3HA)`, `scha_control(3HA)`, `scds_fm_print_probes(3HA)`, `scha_resource_setstatus(3HA)`, `attributes(5)`

Name scds_fm_net_connect – establish a TCP connection to an application

Synopsis
```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_fm_net_connect(scds_handle_t handle, scds_socket_t *socklist,
     int count, scds_netaddr_t addr, time_t timeout);
```

Description The `scds_fm_net_connect()` function establishes one or more TCP connections (depending on the protocol value of `Port_list` for each address, as described below) to a process that is being monitored.

You can retrieve a list of network addresses for the resource by using `scds_get_netaddr_list`(3HA). That call also fills the protocol value for each address in the list. If `tcp6` is specified as the protocol in `Port_list` for that address, the protocol value is set to `SCDS_IPPROTO_TCP6`. If `tcp` is specified as the protocol in `Port_list` for that address or if no protocol is specified in `Port_list`, the protocol value is set to `SCDS_IPPROTO_TCP`.

This function also resolves the `hostname` that is supplied in `addr` and connects to:

- The IPv4 address of the `hostname` at the specified port, if the protocol that is specified in `addr` is `SCDS_IPPROTO_TCP`.
- Both the IPv4 address (if there is one) and the IPv6 address (if there is one) of the `hostname` at the specified port, if the protocol specified in `addr` is `SCDS_IPPROTO_TCP6`. The status and the file descriptor, if applicable, are stored in the `scds_socket_t` array that is supplied to this function. The first member of this array is used for the IPv4 mapping and the second member of this array is used for IPv6. The status can be set to one of the following values:
  - `SCDS_FMSOCK_OK` — The operation succeeded and the associated socket file descriptor is valid.
  - `SCDS_FMSOCK_NA` — The address type (IPv4 or IPv6) does not apply to this `hostname`. If the `hostname` contains only one or more IPv4 mappings, the status of the second member in the array that is passed to this function is set to `SCDS_FMSOCK_NA`. The associated socket file descriptor is set to an unknown value, and should never be used.
  - `SCDS_FMSOCK_ERR` — The operation failed or timed out. The associated socket file descriptor is set to an unknown value, and should never be used.

Parameters The following parameters are supported:

handle The handle that is returned by `scds_initialize`(3HA).

socklist An array of `SCDS_MAX_IPADDR_TYPES` members of type `scds_socket_t`. Each member in the array holds a status and a socket file descriptor for a TCP connection. This parameter is an output argument that is set by this function.

count	The number of members in the *socklist* array. Set this parameter to `SCDS_MAX_IPADDR_TYPES`.
addr	The `hostname`, TCP port number, and protocol identifier that specify where the process is listening.
timeout	The timeout value in seconds. Each socket gets the same time period for a connection to be established before it is timed out. As these time intervals proceed in parallel, this value is effectively the maximum time that the function takes to execute.

Return Values

The `scds_fm_net_connect()` function returns the following values:

`0`	The function succeeded. At least one socket connected.
`SCHA_ERR_INVAL`	The function was called with invalid paramaters.
nonzero	Not a single connection could be established, due to a timeout, a refused connection, or some other error. You can inspect the `status` field of all members of the `socklist` array that are set to `SCDS_FMSOCK_ERR` to determine the exact error.

Errors

`SCHA_ERR_NOERR`	Indicates that the function succeeded.
`SCHA_ERR_INTERNAL`	Indicates that an internal error occurred while the function was executing.
`SCHA_ERR_STATE`	Indicates that the connection request was refused by the server.
`SCHA_ERR_TIMEOUT`	Indicates that the connection request timed out.

Examples

EXAMPLE 1 Using the `scds_fm_net_connect()` Function

```
/* this function is called repeatedly,
   after thorough_probe_interval seconds */
int probe(scds_handle_t scds_handle, ...)
{
    scds_socket_t socklist[SCDS_MAX_IPADDR_TYPES];
    ...

    /* for each hostname/port/proto */
    for (i = 0; i < netaddr->num_netaddrs, i++) {
        if (scds_fm_net_connect(scds_handle, socklist,
            SCDS_MAX_IPADDR_TYPES, netaddr[i], timeout) !=
            SCHA_ERR_NOERR)
            {
                /* failed completely */
                ...
        } else {
```

EXAMPLE 1 Using the `scds_fm_net_connect()` Function *(Continued)*

```
                /* at least one sock connected */
                for (j = 0, j < SCDS_MAX_IPADDR_TYPES, j++) {
                    if (socklist[j].status == SCDS_FM_SOCK_NA)
                        continue;

                    if (socklist[j].status == SCDS_FMSOCK_ERR) {
                        /* this particular connection failed */
                        scds_syslog(LOG_ERR, "Failed: %s",
                            scds_error_string(socklist[j].err));
                        continue;
                    }

                    /* use socklist[i].fd to perform write/read */
                    ...
                }
                (void) scds_fm_net_disconnect(scds_handle, socklist,
                    SCDS_MAX_IPADDR_TYPES, remaining_time);
            }

        }
        ...
        return (result);
}
```

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Evolving

See Also

`scds_fm_net_disconnect(3HA)`, `scds_fm_tcp_connect(3HA)`, `scds_get_netaddr_list(3HA)`, `scds_initialize(3HA)`, `scha_calls(3HA)`, `attributes(5)`

Name scds_fm_net_disconnect – terminate a TCP connection to an application

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t  scds_fm_net_disconnect(scds_handle_t handle, scds_socket_t *socklist,
     int count, time_t timeout);
```

Description The `scds_fm_net_disconnect()` function terminates one or more TCP connections to a process that is being monitored.

An attempt is made to close all valid socket connections in the `socklist` array within the specified `timeout` interval. On return, each member of `socklist` contains the value `SCDS_FMSOCK_NA`.

Parameters The following parameters are supported:

handle — The handle that is returned by `scds_initialize(3HA)`.

socklist — The socket list that is returned by `scds_fm_net_connect(3HA)`. This argument is an input/output argument.

count — The number of members in the *socklist* array. Set this parameter to `SCDS_MAX_IPADDR_TYPES`.

timeout — The timeout value in seconds. Each socket gets the same time period to disconnect before it is timed out. As these time intervals proceed in parallel, this value is effectively the maximum time that the function takes to execute.

Return Values The `scds_fm_net_disconnect()` function returns the following values:

`0` — The function succeeded.

`SCHA_ERR_INVAL` — The function was called with invalid parameters.

Other nonzero values — The function failed. See `scha_calls(3HA)` for the meaning of failure codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Interface Stability	Evolving

See Also scds_fm_net_connect(3HA), scds_fm_tcp_disconnect(3HA), scds_initialize(3HA), scha_calls(3HA), attributes(5)

Name scds_fm_print_probes – print probe debugging information

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

void scds_fm_print_probes(scds_handle_t handle, int debug_level);
```

Description The `scds_fm_print_probes()` function writes probe status information, reported with `scds_fm_action`(3HA), to the system log. This information includes a list of all probe status history maintained by the DSDL and the timestamp associated with the probe status.

The DSDL defines the maximum debugging level, `SCDS_MAX_DEBUG_LEVEL`, as `9`.

If you specify a `debug_level` greater than the current debugging level being used, no information is written.

Parameters The following parameters are supported:

handle The handle returned from `scds_initialize`(3HA).

debug_level Debugging level at which the data is to be written. It is an integer between `1` and `SCDS_MAX_DEBUG_LEVEL`, defined as `9` by the DSDL.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_fm_action`(3HA), `scds_initialize`(3HA), `scds_syslog_debug`(3HA), `attributes`(5)

Name scds_fm_sleep – wait for a message on a fault monitor control socket

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_fm_sleep(scds_handle_t handle, time_t timeout);
```

Description The`scds_fm_sleep()` function waits for a data service application process tree that running under control of the process monitor facility to die. If no such death occurs within the specified timeout period, the function returns `SCHA_ERR_NOERR`.

If a data service application process tree death occurs, `scds_fm_sleep()` records `SCDS_COMPLETE_FAILURE` in the failure history and either restarts the process tree or fails it over according to the algorithm described in the `scds_fm_action(3HA)` man page. If a failover attempt is unsuccessful, a restart of the application is attempted.

If an attempted restart fails, the function returns `SCHA_ERR_INTERNAL`.

Note that if the failure history causes this function to do a failover, and the failover attempt succeeds, `scds_fm_sleep()` never returns.

Parameters The following parameters are supported:

handle	The handle returned from `scds_initialize(3HA)`.
timeout	The timeout period measured in seconds.

Return Values The `scds_fm_sleep()` function returns the following:

`0`	The function succeeded.
nonzero	The function failed.

Errors

`SCHA_ERR_NOERR`	Indicates that the process tree has not died.
`SCHA_ERR_INTERNAL`	Indicates that the data service application process tree has died and failed to restart.
Other values	Indicate the function failed. See `scha_calls(3HA)` for the meaning of failure codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also scha_calls(3HA), scds_fm_action(3HA), scds_initialize(3HA), attributes(5)

Name scds_fm_tcp_connect – establish a TCP connection to an application

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_fm_tcp_connect(scds_handle_t handle, int *sock, const char*hostname,
     int port, time_t timeout);
```

Description The `scds_fm_tcp_connect()` function establishes a TCP connection with a process being monitored.

Retrieve the hostname with either `scds_get_rs_hostnames(3HA)` or `scds_get_rg_hostnames(3HA)`.

Consider using `scds_fm_net_connect(3HA)` instead of this function.

Parameters The following parameters are supported:

handle — The handle returned by `scds_initialize(3HA)`.

sock — A handle to the socket established by this function. This parameter is an output argument set by this function.

hostname — Name of the host where the process is listening. If the *hostname* maps to an IPv4 address only, or to both IPv4 and IPv6 addresses, this function uses the IPv4 mapping as the address at which to connect. If the *hostname* maps to an IPv6 address only, this function uses that IPv6 mapping as the address at which to connect.

port — TCP port number.

timeout — Timeout value in seconds.

Return Values The `scds_fm_tcp_connect()` function returns the following:

`0` — The function succeeded.

nonzero — The function failed.

Errors

`SCHA_ERR_NOERR` — Indicates that the function succeeded.

`SCHA_ERR_STATE` — Indicates that an attempt to initiate a connection on a socket failed for reasons other than a timeout.

`SCHA_ERR_TIMEOUT` — Indicates that the function timed out.

Other values — Indicate the function failed. See `scha_calls(3HA)` for the meaning of failure codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Deprecated

See Also scds_fm_net_connect(3HA), scds_fm_tcp_disconnect(3HA), scds_get_rg_hostnames(3HA), scds_get_rs_hostnames(3HA), scds_initialize(3HA), scha_calls(3HA), attributes(5)

Name scds_fm_tcp_disconnect – terminate a TCP connection to an application

Synopsis
```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_fm_tcp_disconnect(scds_handle_t handle, int sock, time_t timeout);
```

Description The `scds_fm_tcp_disconnect()` function terminates a TCP connection with a process being monitored.

Parameters The following parameters are supported:

handle The handle returned by `scds_initialize`(3HA).

sock The socket number returned by a previous call to `scds_fm_tcp_connect`(3HA).

timeout Timeout value in seconds.

Return Values The following exit values are returned:

`0` The function succeeded.

nonzero The function failed.

Errors

`SCHA_ERR_NOERR` Indicates that the function succeeded.

`SCHA_ERR_TIMEOUT` Indicates that the function timed out.

Other values Indicate that the function failed. See `scha_calls`(3HA) for the meaning of failure codes.

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Deprecated

See Also `scds_fm_net_disconnect`(3HA), `scds_fm_tcp_connect`(3HA), `scds_initialize`(3HA), `scha_calls`(3HA), `attributes`(5)

Name scds_fm_tcp_read – read data using a TCP connection to an application

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_fm_tcp_read(scds_handle_t  handle, int sock, char *buffer,
     size_t *size, time_t timeout);
```

Description The `scds_fm_tcp_read()` function reads data from a TCP connection with a process being monitored.

The *size* argument is an input and argument. On input, you specify the size of the buffer, bytes. On completion, the function places the data in *buffer* and specifies the actual number of bytes read in *size*. If the buffer is not big enough for the number of bytes read, the function returns a full buffer of *size* bytes, and you can call the function again for further data.

If the function times out, it returns `SCHA_ERR_TIMEOUT`. In this case, the function might return fewer bytes than requested, indicated by the value returned in *size*.

Parameters The following parameters are supported:

handle The handle returned from `scds_initialize(3HA)`.

sock The socket number returned by a previous call to `scds_fm_tcp_connect(3HA)`.

buffer Data buffer.

size Data buffer size. On input, you specify the size of the buffer, in bytes. On output, the function returns the actual number of bytes read.

timeout Timeout value in seconds.

Return Values The `scds_fm_tcp_read()` function returns the following:

`0` The function succeeded.

nonzero The function failed.

Errors

`SCHA_ERR_NOERR` Indicates that the function succeeded.

`SCHA_ERR_TIMEOUT` Indicates that the function timed out.

Other values Indicate that the function failed. See `scha_calls(3HA)` for the meaning of failure codes.

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also

scds_fm_tcp_disconnect(3HA), scds_fm_tcp_write(3HA), scds_initialize(3HA), scha_calls(3HA), attributes(5)

Name scds_fm_tcp_write – write data using a TCP connection to an application

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t  scds_fm_tcp_write(scds_handle_t handle, int sock, char *buffer,
     size_t *size, time_t timeout);
```

Description The `scds_fm_tcp_write()` function writes data by means of a TCP connection to a process that is being monitored.

The *size* argument is an input and output argument. On input, you specify the number of bytes to be written. On output, the function returns the number of bytes actually written. If the input and output values of *size* are not equal, an error has occurred. The function returns `SCHA_ERR_TIMEOUT` if it times out before writing all the requested data.

Parameters The following parameters are supported:

handle The handle returned from `scds_initialize(3HA)`.

sock The socket number returned by a previous call to `scds_fm_tcp_connect(3HA)`.

buffer Data buffer.

size Data buffer size. On input, you specify the number of bytes to be written. On output, the function returns the number of bytes that were actually written.

timeout Timeout value in seconds.

Return Values The `scds_fm_tcp_write()` function returns the following:

`0` The function succeeded.

nonzero The function failed.

Errors

`SCHA_ERR_NOERR` Indicates that the function succeeded.

`SCHA_ERR_TIMEOUT` Indicates that the function timed out.

Other values Indicate that the function failed. See `scha_calls(3HA)` for the meaning of failure codes.

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also scds_fm_tcp_connect(3HA), scds_fm_tcp_read(3HA), scds_initialize(3HA), scha_calls(3HA), attributes(5)

Name scds_free_ext_property – free the resource extension property memory

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

void scds_free_ext_property(scha_ext_prop_value_t *property_value);
```

Description The `scds_free_ext_property()` function reclaims memory allocated during calls to `scds_get_ext_property`(3HA).

Parameters The following parameters are supported:

property_value Pointer to a property value.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_get_ext_property`(3HA), `attributes`(5)

Name scds_free_netaddr_list – free the network address memory

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

void scds_free_netaddr_list(scds_netaddr_list_t *netaddr_list);
```

Description The `scds_free_netaddr_list()` function reclaims memory allocated during calls to `scds_get_netaddr_list(3HA)`. It de-allocates the memory pointed to by *netaddr_list*.

Parameters The following parameters are supported:

netaddr_list Pointer to a list of hostname-port-protocol 3-tuples used by the resource group.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_get_netaddr_list(3HA)`, `attributes(5)`

Name scds_free_net_list – free the network resource memory

Synopsis
```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

void scds_free_net_list(scds_net_resource_list_t *net_resource_list);
```

Description The `scds_free_net_list()` function reclaims memory allocated during calls to `scds_get_rg_hostnames`(3HA) or `scds_get_rs_hostnames`(3HA). It de-allocates the memory pointed to by *netresource_list*.

Parameters The following parameters are supported:

netresource_list Pointer to a list of network resources used by the resource group

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_get_rg_hostnames`(3HA), `scds_get_rs_hostnames`(3HA), `attributes`(5)

Name scds_free_port_list – free the port list memory

Synopsis
```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

void scds_free_port_list(scds_port_list_t *port_list);
```

Description The `scds_free_port_list()` function reclaims memory allocated during calls to `scds_get_port_list`(3HA). It de-allocates the memory pointed to by *port_list*.

Parameters The following parameters are supported:

port_list Pointer to a list of port-protocol pairs used by the resource group

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_get_port_list`(3HA), `attributes`(5)

Name scds_get_current_method_name – retrieve the last element of the path name by which a data service method was called

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

const char *scds_get_current_method_name(scds_handle_t handle);
```

Description The `scds_get_current_method_name()` function returns a pointer to a character string. This character string contains the last element of the path by which a data service method was called.

See the `basename(3C)` man page for more information.

The pointer to the character string points to memory that belongs to the Data Service Development Library (DSDL). Do not modify this memory. A call to `scds_close()` invalidates this pointer.

Parameters The following parameters are supported:

handle The handle that is returned from `scds_initialize(3HA)`.

Errors `SCHA_ERR_NOERR` The function succeeded.

See `scha_calls(3HA)` for a description of other error codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_close(3HA)`, `scds_initialize(3HA)`, `scha_calls(3HA)`, `attributes(5)`

Name scds_get_ext_property – retrieve an extension property

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t  scds_get_ext_property(scds_handle_t handle, const char *property_name,
     scha_prop_type_t  property_type, scha_extprop_value_t **property_value);
```

Description The `scds_get_ext_property()` function retrieves the value of a given extension property.

The name of the property is first looked up in the list of properties specified in the method argument list (`argv[]`, which was parsed by `scds_initialize()`). If the property name is not in the method argument list, it is retrieved using the Oracle Solaris Cluster API. See `scha_calls`(3HA).

Upon successful completion, the value of the property is placed in the appropriate variable in the union in a `scha_extprop_value_t` structure and a pointer to this structure is passed back to the caller in *property_value*.

You are responsible for freeing memory by using `scds_free_ext_property()`.

You can find information about the data types `scha_prop_type_t` and `scha_extprop_value_t` in `scha_calls`(3HA) and in the `scha_types.h` header file.

DSDL provides convenience functions to retrieve the values of some of the more commonly used resource extension properties. See the `scds_property_functions`(3HA) man page.

Parameters The following parameters are supported:

handle	The handle returned from `scds_initialize`(3HA)
property_name	Name of the property being retrieved
property_type	Property value type. Valid types are defined in `scha_calls`(3HA) and `property_attributes`(5).
property_value	Pointer to a property value

Return Values The `scds_get_ext_property()` function returns the following values:

`0`	The function succeeded.
nonzero	The function failed.

Errors

`SCHA_ERR_PROP`	RTR file does not define the specified property.
`SCHA_ERR_NOERR`	The function succeeded.
Other values	Indicate that the function failed. See `scha_calls`(3HA) for the meaning of the failure codes.

Examples

EXAMPLE 1 Using `scds_get_ext_property()`

```
#include <scha_types.h>
#include <libdsdev.h>
#define INT_EXT_PROP “Int_extension_property”
...
int  retCode;
scha_extprop_value_t *intExtProp;
int retrievedValue;
...
    retCode = scds_get_ext_property(handle,
        INT_EXT_PROP, SCHA_PTYPE_INT, &intExtProp);
    if (retCode != SCHA_ERR_NOERR) {
        scds_syslog(LOG_ERR,
            "Failed to retrieve the extension property %s: %s.",
            INT_EXT_PROP, scds_error_string(retCode));
       ...
    } else {
        retrievedValue = intExtProp->val.val_int;
        ...
        scds_free_ext_property(intExtProp);
        ...
    }
   ...
```

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also

`scds_free_ext_property(3HA)`, `scds_initialize(3HA)`, `scds_property_functions(3HA)`, `scha_calls(3HA)`, `rt_reg(4)`, `attributes(5)`, `property_attributes(5)`

Notes

Only the values of extension properties that are defined in the RTR file can be retrieved by using this function. See `rt_reg(4)`.

Name scds_get_netaddr_list – get the network addresses used by a resource

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>
scha_err_t scds_get_netaddr_list(scds_handle_t handle,
     scds_netaddr_list_t **netaddr_list);
```

Description The `scds_get_netaddr_list()` function returns all hostname, port, and protocol combinations that are in use by the resource. These combinations are derived by combining the `Port_list` property settings on the resource with all the hostnames in use by the resource, as returned by the `scds_get_rs_hostnames()` function.

Use `scds_get_netaddr_list()` in a fault monitor to monitor the resource, and to derive the list of hostnames, ports, and protocols that are in use by the resource .

Values for the protocol type are defined in header file `rgm/libdsdev.h`.

Free the memory that is allocated and returned by this function with `scds_free_netaddr_list()`.

Parameters The following parameters are supported:

handle The handle that is returned by `scds_initialize()`

netaddr_list The list of hostnames, ports, and protocols that are used by the resource group

Return Values The `scds_get_netaddr_list()` function returns the following values:

`0` The function succeeded.

nonzero The function failed.

Errors `SCHA_ERR_NOERR` Indicates that the function succeeded.

Other values Indicate that the function failed. See `scha_calls(3HA)` for the meaning of failure codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

Attributes See `attributes(5)` for descriptions of the following attributes.

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Evolving

See Also scds_free_netaddr_list(3HA), scds_get_rs_hostnames(3HA), scha_calls(3HA), r_properties(5), attributes(5)

Name scds_get_port_list – retrieve the port list used by a resource

Synopsis
```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_get_port_list(scds_handle_t handle, scds_port_list_t **port_list);
```

Description The `scds_get_port_list()` function returns a list of port-protocol pairs used by the resource. Values for the protocol type are defined in the header file `netinet/in.h`.

Free the memory allocated and returned by this function with `scds_free_port_list()`.

Parameters The following parameters are supported:

handle The handle returned from `scds_initialize()`

port_list List of port-protocol pairs used by the resource group

Return Values The `scds_get_port_list()` function returns the following:

`0` The function succeeded.

nonzero The function failed.

Errors

`SCHA_ERR_NOERR` Indicates the function succeeded.

Other values Indicate the function failed. See `scha_calls(3HA)` for the meaning of failure codes.

Files

`/usr/cluster/include/scha.h`
Include file

`/usr/cluster/lib/libscha.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_free_port_list(3HA)`, `scha_calls(3HA)`, `attributes(5)`

Name scds_get_resource_group_name – retrieve the resource group name

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

 const char *scds_get_resource_group_name(scds_handle_t handle);
```

Description The `scds_get_resource_group_name()` function returns a pointer to a character string that is the name of the resource group containing the resource passed to the calling program. The pointer is to memory belonging to the DSDL. Do not modify this memory. A call to `scds_close()` invalidates the pointer.

Parameters The following parameters are supported:

handle The handle returned from `scds_initialize()`

Errors `NULL` Indicates an error condition such as not previously calling `scds_initialize(3HA)`

See `scha_calls(3HA)` for a description of other error codes.

Files `/usr/cluster/include/scha.h`
Include file

`/usr/cluster/lib/libscha.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_close(3HA)`, `scds_initialize(3HA)`, `scha_calls(3HA)`, `attributes(5)`

Name scds_get_resource_name – retrieve the resource name

Synopsis
```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

const char *scds_get_resource_name(scds_handle_t handle);
```

Description The `scds_get_resource_name()` function returns a pointer to a character string containing the name of the resource passed to the calling program. The pointer is to memory belonging to the DSDL. Do not modify this memory. A call to `scds_close()` invalidates the pointer.

Parameters The following parameters are supported:

handle The handle returned from `scds_initialize()`

Errors `NULL` Indicates an error condition such as not previously calling `scds_initialize(3HA)`

See `scha_calls(3HA)` for a description of other error codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_close(3HA)`, `scds_initialize(3HA)`, `scha_calls(3HA)`, `attributes(5)`

Name scds_get_resource_type_name – retrieve the resource type name

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

const char *scds_get_resource_type_name(scds_handle_t handle);
```

Description The `scds_get_resource_type_name()` function returns a pointer to a character string containing the name of the resource type of the resource passed to the calling program. The pointer is to memory belonging to the DSDL. Therefore, do not modify this memory. A call to `scds_close()` invalidates the pointer.

Parameters The following parameters are supported:

handle The handle returned from `scds_initialize()`

Errors `NULL` Indicates an error condition such as not previously calling `scds_initialize()`

See `scha_calls(3HA)` for a description of other error codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_close(3HA)`, `scds_initialize(3HA)`, `scha_calls(3HA)`, `attributes(5)`

Name scds_get_rg_hostnames, scds_get_rg_hostnames_zone – get the network resources used in a resource group

Synopsis

```
cc [flags...] -I /usr/cluster/include file
   -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_get_rg_hostnames(char *resourcegroup_name,
     scds_net_resource_list_t **netresource_list);

scha_err_t scds_get_rg_hostnames_zone(char *zone_name, char *resourcegroup_name,
     scds_net_resource_list_t **netresource_list);
```

Description The `scds_get_rg_hostnames()` and `scds_get_rg_hostnames_zone()` function retrieves a list of host names that are used by all the network resources in a resource group. The `scds_get_rg_hostnames_zone()` function enables you to retrieve a list from a resource group in a given zone cluster, when executed from the global zone.. This function returns a pointer to the list in *netresource_list*. A resource group can contain no network resources or can contain resources that do not use network resources, so these functions can return a *netresource_list* parameter that is set to `NULL`.

You can pass the name of any resource group name in the system to `scds_get_rg_hostnames()` and `scds_get_rg_hostnames_zone()`. Use the host names that are returned by `scds_get_rg_hostnames()` and `scds_get_rg_hostnames_zone()` to contact applications that are running in the specified resource group.

Free the memory that is allocated and returned by this function with `scds_free_net_list()`.

Parameters The following parameters are supported

resourcegroup_name	Name of the resource group for which data is to be retrieved
netresource_list	List of network resources that are used by the resource group

Return Values The `scds_get_rg_hostnames()` and `scds_get_rg_hostnames_zone()` functions return function returns the following values:

`0`	The function succeeded.
nonzero	The function failed.

Errors

`SCHA_ERR_NOERR`	Function succeeded.

See `scha_calls(3HA)` for a description of other error codes.

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also scds_free_net_list(3HA), scds_get_rs_hostnames(3HA), scha_calls(3HA), attributes(5)

Name scds_get_rs_hostnames – get the network resources used by a resource

Synopsis

```
cc [flags...] -I /usr/cluster/include file
   -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_get_rs_hostnames(scds_handle_t handle,
scds_net_resource_list_t **netresource_list);
```

Description The `scds_get_rs_hostnames()` function retrieves a list of hostnames used by the resource. If the resource property `Network_resources_used` is set, then the hostnames correspond to the network resources listed in `Network_resources_used`. Otherwise, they correspond to all the network resources in the resource group containing the resource.

This function returns a pointer to the list in *netresource_list*. It is possible for a resource group to contain no network resources or to contain resources that do not use network resources, so this function can return *netresource_list* set to `NULL`.

Free the memory allocated and returned by this function with `scds_free_net_list(3HA)`.

Parameters The following parameters are supported

handle The handle returned from `scds_initialize(3HA)`

netresource_list List of network resources used by the resource group

Return Values The `scds_get_rs_hostnames()` function returns the following:

`0` The function succeeded

`non-zero` The function failed

Errors `SCHA_ERR_NOERR` Function succeeded.

See `scha_calls(3HA)` for a description of other error codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also scds_free_net_list(3HA), scds_get_rg_hostnames(3HA), scds_initialize(3HA), scha_calls(3HA), attributes(5), r_properties(5)

Name scds_get_zone_name – retrieve the name of a zone on whose behalf a method is running

Synopsis
```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

const char *scds_get_zone_name(scds_handle_t handle);
```

Description The `scds_get_zone_name()` function returns a pointer to a character string. If the following conditions are met, this character string contains the name of the zone in which a resource group runs:

- The `scds_get_zone_name` function is called from the global zone.
- The `Global_zone` resource type property is set to `TRUE`.

  See the `rt_properties(5)` man page for information about the `Global_zone` resource type property.
- The resource is configured in a zone cluster.

In all other cases, including the following, the character string is NULL:

- Oracle Solaris Cluster software is running on an operating system that does not support zones.
- The resource group and the method are running in the global zone.
- The `Global_zone` resource type property is set to `FALSE`.

To obtain the name of the zone in which a method is actually executing, use the `zonename` command. See the `zonename(1)` man page.

The pointer to the character string points to memory that belongs to the Data Service Development Library (DSDL). Do not modify this memory. A call to `scds_close()` invalidates this pointer.

Parameters The following parameters are supported:

handle The handle that is returned from `scds_initialize(3HA)`.

Errors `SCHA_ERR_NOERR` The function succeeded.

See `scha_calls(3HA)` for a description of other error codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also zonename(1), scds_close(3HA), scds_initialize(3HA), scha_calls(3HA), attributes(5), rt_properties(5)

Name scds_hasp_check – get status information about SUNW.HAStoragePlus resources that are used by a resource

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_hasp_check(scds_handle_t handle, scds_hasp_status_t *hasp_status);
```

Description The scds_hasp_check() function retrieves status information about SUNW.HAStoragePlus(5) resources that are used by a resource. This information is obtained from the state, online or otherwise, of all SUNW.HAStoragePlus resources on which the resource depends. This state is obtained by using the Resource_dependencies or Resource_dependencies_weak system properties that are defined for the resource.

Resource type implementations can use scds_hasp_check() in VALIDATE and MONITOR_CHECK method callback implementations to determine whether checks that are specific to any file systems that are managed by SUNW.HAStoragePlus resources should be carried out.

Resource dependencies are only checked within the same cluster context in which the function is executed, either global cluster or zone cluster. Dependencies of the form *clustername*:*resourcename* (inter-cluster dependencies) are ignored. For example, if the only HAStoragePlus dependency is an inter-cluster dependency, the function returns the status code SCDS_HASP_NO_RESOURCE.

When the function succeeds, a status code is stored in *hasp_status*. This code can be one of the following values:

SCDS_HASP_NO_RESOURCE
: Indicates that the resource does not depend on a SUNW.HAStoragePlus resource.

SCDS_HASP_ERR_CONFIG
: Indicates that at least one of the SUNW.HAStoragePlus resources on which the resource depends is located in a different resource group.

SCDS_HASP_NOT_ONLINE
: Indicates that a SUNW.HAStoragePlus resource on which the resource depends is not online on any potential primary node.

SCDS_HASP_ONLINE_NOT_LOCAL
: Indicates that at least one SUNW.HAStoragePlus resource on which the resource depends is online, but on another node from which this function is called.

SCDS_HASP_ONLINE_LOCAL
: Indicates that all SUNW.HAStoragePlus resources on which the resource depends are online on the node from which this function is called.

Note – The preceding status codes have precedence over each other in the order in which they appear. For example, if a SUNW.HAStoragePlus resource is not online and another SUNW.HAStoragePlus resource is online on a different node, the status code is set to SCDS_HASP_NOT_ONLINE rather than SCDS_HASP_ONLINE_NOT_LOCAL.

The `scds_hasp_check()` function ignores all `SUNW.HAStoragePlus` resources for which the `FilesystemMountPoints` or `Zpools` property is set to an empty list, the default.

Parameters The following parameters are supported:

handle Handle that is returned from `scds_initialize`(3HA).

hasp_status Status of `SUNW.HAStoragePlus` resources that are used by the resource.

Return Values

`SCHA_ERR_NOERR` The function succeeded.

This value also indicates that the status code that is stored in `hasp_status` is valid.

`SCHA_ERR_INTERNAL` The function failed.

The value that is stored in `hasp_status` is undefined. Ignore this undefined value.

See the `scha_calls`(3HA) man page for a description of other error codes.

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_initialize`(3HA), `scha_calls`(3HA), `attributes`(5), `SUNW.HAStoragePlus`(5)

Name scds_initialize – allocate and initialize DSDL environment

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_initialize(scds_handle_t *handleint argc, char *argv[]);
```

Description The `scds_initialize()` function initializes the DSDL environment. You must call this function once at the beginning of each program or fault monitor that uses any other DSDL functions.

The `scds_initialize()` function does the following:

- Checks and processes the command line arguments (*argc* and *argv[]*) that the framework passes to the calling program and that must be passed along to `scds_initialize()`. No further processing of the command line arguments is required of the calling program. See EXAMPLES.
- Sets up internal data structures with information needed by the other functions in the DSDL. It retrieves resource, resource type, and resource group property values and stores them in these data structures. Values for any properties supplied on the command line by means of the *argv[]* argument take precedence over those retrieved from the RGM. That is, if a new value for a property has been specified in the command line arguments *(argv[])* passed to the data service method, then this new value is returned by the function that retrieves that property's value. Otherwise, the existing value retrieved from the RGM is returned.
- Initializes the data service fault monitoring information
- Initializes the logging environment. All syslog messages are prefixed with:
  `SC[`*<resourceTypeName>*`,`*<resourceGroupName>*`,`*<resourceName>*`,`*<methodName>*

  Functions that send messages to syslog use the facility returned by `scha_cluster_getlogfacility()`. These messages can be forwarded to appropriate log files and users. See `syslog.conf(4)` for more information.
- Validates fault monitor probe settings. It verifies that the `Retry_interval` is greater than or equal to (`Thorough_probe_interval` * `Retry_count`). If this is not true, it sends an appropriate message to the syslog facility. You could call `scds_initialize()` and `scds_close()` in a `VALIDATE` method for this validation of the fault monitor probe settings even if you call no other DSDL functions in the `VALIDATE` method.

If `scds_initialize()` succeeds, you must call `scds_close()` before exiting the calling program.

If `scds_initialize()` fails, you must not call `scds_close()` to clean up. When `scds_initialize()` fails, do not call any other DSDL functions. Otherwise, they return `SCHA_ERR_INVAL` or a `NULL` value. Instead, call `exit()` with a non-zero argument.

Parameters The following parameters are supported:

handle — A handle initialized by `scds_initialize()` and used by other DSDL functions.

argc — Number of arguments that is passed to the calling program.

argv — Pointer to an argument array passed to the calling program.

Errors `SCHA_ERR_NOERR` — The function succeeded.

See `scha_calls(3HA)` for a description of other error codes.

Examples **EXAMPLE 1** Using `scds_initialize()`

```
int main(int argc, char *argv[]){
 scds_handle_t handle;

 if (scds_initialize(&handle, argc, argv) !=
 SCHA_ERR_NOERR)
 exit(1);
 ...
 /* data service code */
...
 scds_close(&handle);
}
```

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_close(3HA)`, `scds_property_functions(3HA)`, `scha_calls(3HA)`, `scha_cluster_getlogfacility(3HA)`, `syslog.conf(4)`, `r_properties(5)`

Name scds_pmf_get_status – determine if a PMF-monitored process tree exists

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_pmf_get_status(scds_handle_t handle, scds_pmf_type_t program_type,
     int instance,  scds_pmf_status_t*pmf_status);
```

Description The `scds_pmf_get_status()` function determines if the specified instance is being monitored under PMF control. This function is equivalent to the `pmfadm(1M)` command with the `-q` option.

Parameters The following parameters are supported:

handle — The handle returned from `scds_initialize()`

program_type — Type of program to execute. Valid types are:

- `SCDS_PMF_TYPE_SVC` — Data service application
- `SCDS_PMF_TYPE_MON` — Fault monitor
- `SCDS_PMF_TYPE_OTHER` — Other

instance — For resources with multiple instances, this integer, starting at 0, uniquely identifies the instance. For single instance resources, use 0.

pmf_status — If PMF is monitoring the specified instance, *pmf_status* is set to `SCDS_PMF_MONITORED`. Otherwise it is set to `SCDS_PMF_NOT_MONITORED`.

Return Values The `scds_pmf_get_status()` function returns the following:

`0` — The function succeeded.

`non-zero` — The function failed.

Errors `SCHA_ERR_NOERR` — Function succeeded

See `scha_calls(3HA)` for a description of other error codes.

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Interface Stability	Evolving

See Also pmfadm(1M), scds_initialize(3HA), scha_calls(3HA), attributes(5)

Name scds_pmf_restart_fm – restart fault monitor using PMF

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_pmf_restart_fm(scds_handle_t handle, int instance);
```

Description The `scds_pmf_restart_fm()` function sends a `SIGKILL` signal to the fault monitor process tree to kill the fault monitor and then uses PMF to restart it. This function uses the `MONITOR_STOP_TIMEOUT` property as its timeout value. That is, `scds_pmf_restart_fm()` waits at most the value of the `MONITOR_STOP_TIMEOUT` property for the process tree to die.

If the `MONITOR_STOP_TIMEOUT` property is not explicitly set in the RTR file, the default timeout value is used.

One way to use this function is to call it in an `UPDATE` method to restart the monitor, possibly with new parameters.

Parameters The following parameters are supported:

handle — The handle returned from `scds_initialize()`

instance — For resources with multiple instances of the fault monitor, this integer, starting at 0, uniquely identifies the fault monitor instance. For single instance fault monitors, use 0.

Return Values The `scds_pmf_restart_fm()` function returns the following:

`0` — The function succeeded.

`non-zero` — The function failed.

Errors `SCHA_ERR_NOERR` — Function succeeded

See `scha_calls(3HA)` for a description of other error codes.

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also pmfadm(1M), scha_calls(3HA), signal(3HEAD), attributes(5) , r_properties(5)

Name scds_pmf_signal – send a signal to a process tree under PMF control

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_pmf_signal(scds_handle_t handle, scds_pmf_type_t program_type,
     int instance, int signal, time_t timeout);
```

Description The `scds_pmf_signal()` function sends the specified signal to a process tree running under PMF control. This function is equivalent to the `pmfadm(1M)` command with the `-k` option.

After sending the signal, the `scds_pmf_signal()` function waits for the specified timeout period for the process tree to die, before returning. A value of `0` for `timeout` tells the function to return immediately without waiting for any process to exit. A value of `-1` tells the function to wait indefinitely for the processes to exit.

Parameters The following parameters are supported:

handle — The handle returned from `scds_initialize()`

program_type — Type of program to execute. Valid types are:

`SCDS_PMF_TYPE_SVC`	Data service application
`SCDS_PMF_TYPE_MON`	Fault monitor
`SCDS_PMF_TYPE_OTHER`	Other

instance — For resources with multiple instances, this integer, starting at 0, uniquely identifies the instance. For single instance resources, use 0.

signal — Solaris signal to send. See `signal(3HEAD)`.

timeout — Timeout period in seconds.

Return Values The `scds_pmf_signal()` function returns the following:

`0` — The function succeeded.

nonzero — The function failed.

Errors

`SCHA_ERR_TIMEOUT` — The process tree did not exit within the specified timeout period after the signal was sent.

`SCHA_ERR_NOERR` — The function succeeded.

Other values — Indicate the function failed. See `scha_calls(3HA)` for the meaning of failure codes.

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also pmfadm(1M), scds_initialize(3HA), scha_calls(3HA), signal(3HEAD), attributes(5)

Name scds_pmf_start, scds_pmf_start_env – execute a program under PMF control

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_pmf_start(scds_handle_t handle, scds_pmf_type_t program_type,
     int instance, const char *command, int child_monitor_level)

scha_err_t scds_pmf_start_env(scds_handle_t handle, scds_pmf_type_t program_type,
     int instance, const char *command, int child_monitor_level, char ** env)
```

Description The `scds_pmf_start()` function executes a program, specified by *command*, under PMF control. This function is equivalent to the `pmfadm(1M)` command with the `-c` option.

The *command* argument contains a command line and command line arguments that are passed to the function.

When you start a data service application, monitor, or other process (program type `SCDS_PMF_TYPE_SVC`, `SCDS_PMF_TYPE_MON`, or `SCDS_PMF_TYPE_OTHER`) under PMF with `scds_pmf_start()`, you choose the level of child processes to monitor by using the `child_monitor_level` argument. The `child_monitor_level` argument specifies that children up to and including level `child_monitor_level` is monitored. The original process is executed at level 0, its children at level 1, their children at level 2, and so on. Any new fork operation produces a new level of children. Specify `-1` to monitor all levels of children.

For example, if the command to start is a daemon, the appropriate `child_monitor_level` is `0`. If the command to start is a script that starts a daemon, the appropriate value for `child_monitor_level` is `1`.

If the underlying application process is already running, `scds_pmf_start()` prints a `syslog()` error and returns `SCHA_ERR_INTERNAL` because the RGM guarantees that two calls to a `START` function on a node must have an intervening `STOP` function.

Parameters The following parameters are supported:

handle — The handle returned from `scds_initialize(3HA)`

program_type — Type of program to execute. Valid types are:

`SCDS_PMF_TYPE_SVC`	Data service application
`SCDS_PMF_TYPE_MON`	Fault monitor
`SCDS_PMF_TYPE_OTHER`	Other

instance — For resources with multiple instances, this integer, starting at 0, uniquely identifies the instance. For single instance resources, use 0.

command — Command, including command line arguments, to execute under PMF control.

child_monitor_level Specifies the level of child processes to be monitored (equivalent to the `-C` option to `pmfadm`). Use `-1` to specify all levels of child processes.

env Specifies an array of character pointers to environment strings, which are described in the `execve(2)` man page. When the program that the *command* parameter specifies is executed, this environment is passed to this program.

Return Values The `scds_pmf_start()` function returns the following:

`0` The function succeeded.

nonzero The function failed.

Errors `SCHA_ERR_INTERNAL` The underlying application process is already running.

`SCHA_ERR_NOERR` The function succeeded.

Other values The function failed. See `scha_calls(3HA)` for a description of other error codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `pmfadm(1M)`, `scds_initialize(3HA)`, `scds_pmf_stop(3HA)`, `scds_svc_wait(3HA)`, `scha_calls(3HA)`, `execve(2)`, `attributes(5)`

Name scds_pmf_stop – terminate a process that is running under PMF control

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t  scds_pmf_stop(scds_handle_t handle, scds_pmf_type_t program_type,
     int instance, int signal, time_t timeout);
```

Description The `scds_pmf_stop()` function stops a program that is running under PMF control. It is equivalent to the `pmfadm(1M)` command with the `-s` option.

If the requested instance is not running, `scds_pmf_stop()` returns with value `SCHA_ERR_NOERR`.

If the requested instance is running, then the specified signal is sent to the instance. If the instance fails to die within a period of time equal to 80 percent of the timeout value, `SIGKILL` is sent to the instance. If the instance then fails to die within a period of time equal to 15 percent of the timeout value, the function is considered to have failed and returns `SCHA_ERR_TIMEOUT`. The remaining 5 percent of the timeout argument is presumed to have been absorbed by this function's overhead.

Parameters The following parameters are supported:

handle — The handle returned from `scds_initialize(3HA)`

program_type — Type of program to execute. Valid types are:

`SCDS_PMF_TYPE_SVC`	Data service application
`SCDS_PMF_TYPE_MON`	Fault monitor
`SCDS_PMF_TYPE_OTHER`	Other

instance — For resources with multiple instances, this integer, starting at 0, uniquely identifies the instance. For single instance resources, use 0.

signal — Solaris signal to send kill the instance. See `signal(3HEAD)`. Use `SIGKILL` if the specified signal fails to kill the instance.

timeout — Timeout period measured in seconds.

Return Values The `scds_pmf_stop()` function returns the following:

`0` — The function succeeded.

`non-zero` — The function failed.

Errors

`SCHA_ERR_TIMEOUT`	The function timed out.
`SCHA_ERR_NOERR`	The function succeeded.
Other values	Indicate the function failed. See `scha_calls(3HA)` for a description of other error codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `pmfadm`(1M), `scds_initialize`(3HA), `scds_pmf_start`(3HA), `scha_calls`(3HA), `signal`(3HEAD), `attributes`(5)

Name scds_pmf_stop_monitoring – stop monitoring a process that is running under PMF control

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t  scds_pmf_stop_monitoring(scds_handle_t handle,
     scds_pmf_type_t program_type,
     int instance);
```

Description The `scds_pmf_stop_monitoring()` function stops the monitoring of a process tree that is running under PMF control. PMF does not send a signal to stop the process. Rather, PMF makes no future attempts to restart the process.

If the requested process is not under PMF control, `scds_pmf_stop_monitoring()` returns, with value `SCHA_ERR_NOERR`.

Parameters The following parameters are supported:

handle — The handle returned from `scds_initialize(3HA)`

program_type — Type of program to execute. Valid types are:

`SCDS_PMF_TYPE_SVC`	Data service application
`SCDS_PMF_TYPE_MON`	Fault monitor
`SCDS_PMF_TYPE_OTHER`	Other

instance — For resources with multiple instances, this integer, starting at 0, uniquely identifies the instance. For single instance resources, use 0.

Return Values The `scds_pmf_stop_monitoring()` function returns the following:

`0` — The function succeeded.

nonzero — The function failed.

Errors `SCHA_ERR_NOERR` — The function succeeded.

See `scha_calls(3HA)` for a description of other error codes.

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Interface Stability	Evolving

See Also pmfadm(1M), scds_initialize(3HA), scds_pmf_start(3HA), scds_pmf_stop(3HA), scha_calls(3HA), attributes(5)

Name scds_print_netaddr_list – print the contents of a list of hostname-port-protocol 3-tuples used by a resource group

Synopsis
```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

void scds_print_netaddr_list(scds_handle_t handle, int debug_level,
     constscds_netaddr_list_t *netaddr_list);
```

Description The `scds_print_netaddr_list()` function writes the contents of a list of hostname-port-protocol 3-tuples, pointed to by *netaddr_list*, to the system log, at the debugging level specified by *debug_level*. If the specified debugging level is greater than the debugging level currently being used, no information is written.

Parameters The following parameters are supported:

handle The handle returned from `scds_initialize(3HA)`

debug_level The debugging level at which the data is to be written

netaddr_list Pointer to a list of hostname-port-protocol 3-tuples used by the resource group, retrieved with `scds_get_netaddr_list(3HA)`

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_get_netaddr_list(3HA)`, `scds_initialize(3HA)`, `scds_syslog_debug(3HA)`, `attributes(5)`

Name scds_print_net_list – print the contents of a network resource list

Synopsis

```
cc [flags...] -I /usr/cluster/include file
   -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

void scds_print_net_list(scds_handle_t handle,
int debug_level,
constscds_net_resource_list_t *netresource_list);
```

Description The `scds_print_net_list()` function writes the contents of the network resource list, pointed to by *netresource_list*, to the system log, at the debugging level specified by *debug_level*. If the specified debugging level is greater than the debugging level currently being used, no information is written.

Parameters The following parameters are supported:

handle — The handle returned from `scds_initialize(3HA)`

debug_level — Debugging level at which the data is to be written

netresource_list — Pointer to an initialized network resource list, retrieved with either `scds_get_rg_hostnames(3HA)` or `scds_get_rs_hostnames(3HA)`

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_get_rg_hostnames(3HA)`, `scds_get_rs_hostnames(3HA)`, `scds_initialize(3HA)`, `scds_syslog_debug(3HA)`, `attributes(5)`

Name scds_print_port_list – print the contents of a port list

Synopsis

```
cc [flags...] -I /usr/cluster/include file
   -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

void scds_print_port_list(scds_handle_t handle,
int debug_level, constscds_port_list_t *port_list);
```

Description The `scds_print_port_list()` function writes the contents of a port list, pointed to by *port_list*, to the system log, at the debugging level specified by *debug_level*. If the specified debugging level is greater than the debugging level currently being used, no information is written.

Parameters The following parameters are supported:

handle The handle returned from `scds_initialize(3HA)`

debug_level Debugging level at which the data is to be written

port_list Pointer to a list of port-protocol pairs used by the resource group, retrieved with `scds_get_port_list()`.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scds_get_port_list(3HA)`, `scds_initialize(3HA)`, `scds_syslog_debug(3HA)`, `attributes(5)`

Name scds_property_functions – A set of convenience functions to retrieve values of commonly used resource properties, resource group properties, resource type properties, and extension properties

Synopsis
```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>
```

return-value-type scds-get-property-name(`scds_handle_t` *handle*);

Description The Data Service Development Library (DSDL) provides a set of convenience functions to retrieve values of commonly used resource properties, resource group properties, resource type properties, and extension properties. Retrieve user-defined extension properties with `scds_get_ext_property`(3HA).

All convenience functions use the following conventions:

- The functions take only the *handle* argument. The *handle* argument to be passed to the property retrieval function is returned by a prior call to `scds_initialize`(3HA).
- Each function corresponds to a particular property.
- The return value type of the function matches the type of the property value that the function retrieves.
- These functions do not return errors because the return values have been precomputed in `scds_initialize`(3HA). For functions that return pointers, a `NULL` value is returned when an error condition is encountered, for example, when `scds_initialize()` was not previously called.
- If a new value for a property has been specified in the command-line arguments that are passed to the calling program (*argv[]*), this new value is returned (in the case of the implementation of a Validate method). By this means, you can validate prospective new property values before they are actually set. Otherwise, these functions return the value that is retrieved from the RGM.
- Some of these convenience functions return a pointer to memory belonging to the DSDL. Do not modify this memory. A call to `scds_close`(3HA) invalidates this pointer.

See the `r_properties`(5), `rg_properties`(5), and `rt_properties`(5) man pages for descriptions of standard properties. See the individual data service man pages for descriptions of extension properties.

See the `scha_calls`(3HA) man page and the `scha_types.h`header file for information about the data types used by these functions, such as `scha_prop_type_t`, `scha_extprop_value_t`, `scha_initnodes_flag_t`, `scha_str_array_t`, `scha_failover_mode_t`, `scha_switch_t`, and `scha_rsstatus_t`.

These functions use the following naming conventions:

Resource property
  `scds_get_rs_`*property-name*

Resource group property
`scds_get_rg_`*property-name*

Resource type property
`scds_get_rt_`*property-name*

Commonly used extension property
`scds_get_ext_`*property-name*

Note – Property names are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify property names.

Resource-Specific Functions

The function returns the value of a specific resource property. Some of the properties' values are explicitly set either in the RTR file or by a `clresource(1CL)` command. Others are determined dynamically by the RGM. The functions return data types that correspond to the requested property.

Each of the following resource dependencies query functions has a corresponding "Q" or "qualified" version:

`scds_get_rs_resource_dependencies`
`scds_get_rs_resource_dependencies_Q`

`scds_get_rs_resource_dependencies_offline_restart`
`scds_get_rs_resource_dependencies_Q_offline_restart`

`scds_get_rs_resource_dependencies_restart`
`scds_get_rs_resource_dependencies_Q_restart`

`scds_get_rs_resource_dependencies_weak`
`scds_get_rs_resource_dependencies_Q_weak`

The qualified version returns the scope, or qualifier, if any, that was declared for each resource dependency. The `{LOCAL_NODE}`, `{ANY_NODE}`, and `{FROM_RG_AFFINITIES}` qualifiers are described in the `r_properties(5)` man page.

`Cheap_probe_interval`
`int scds_get_rs_cheap_probe_interval(scds_handle_t handle)`

`Failover_mode`
`scha_failover_mode_t scds_get_rs_failover_mode(scds_handle_t handle)`

`Monitor_stop_timeout`
`int scds_get_rs_monitor_stop_timeout(scds_handle_t handle)`

`Monitored_switch`
`scha_switch_t scds_get_rs_monitored_switch(scds_handle_t handle)`

`Network_resources_used`
`scha_str_array_t * scds_get_rs_network_resources_used(scds_handle_t handle)`

`On_off_switch`
`scha_switch_t scds_get_rs_on_off_switch(scds_handle_t handle)`

`Resource_dependencies`
`const scha_str_array_t * scds_get_rs_resource_dependencies(scds_handle_t handle)`

`Resource_dependencies_Q` (qualified)
`const scha_str_array_t * scds_get_rs_resource_dependencies_Q(scds_handle_t handle)`

`Resource_dependencies_offline_restart`
`const scha_str_array_t * scds_get_rs_resource_dependencies_offline_restart(scds_handle_t handle)`

`Resource_dependencies_Q_offline_restart` (qualified)
`const scha_str_array_t * scds_get_rs_resource_dependencies_Q_offline_restart(scds_handle_t handle)`

`Resource_dependencies_restart`
`const scha_str_array_t * scds_get_rs_resource_dependencies_restart(scds_handle_t handle)`

`Resource_dependencies_Q_restart` (qualified)
`const scha_str_array_t * scds_get_rs_resource_dependencies_Q_restart(scds_handle_t handle)`

`Resource_dependencies_weak`
`const scha_str_array_t * scds_get_rs_resource_dependencies_weak(scds_handle_t handle)`

`Resource_dependencies_Q_weak` (qualified)
`const scha_str_array_t * scds_get_rs_resource_dependencies_Q_weak(scds_handle_t handle)`

`Resource_project_name`
`const char * scds_get_rs_resource_project_name(scds_handle_t handle)`

`Retry_count`
`int scds_get_rs_retry_count(scds_handle_t handle)`

`Retry_interval`
`int scds_get_rs_retry_interval(scds_handle_t handle)`

`Scalable`
`boolean scds_get_rs_scalable(scds_handle_t handle)`

`Start_timeout`
`int scds_get_rs_start_timeout(scds_handle_t handle)`

`Stop_timeout`
`int scds_get_rs_stop_timeout(scds_handle_t handle)`

`Thorough_probe_interval`
    `int scds_get_rs_thorough_probe_interval(scds_handle_t handle)`

Resource Group-Specific Functions

The function returns the value of a specific resource group property. Some of the properties' values are explicitly set by a `clresourcegroup(1CL)` command. Others are determined dynamically by the RGM. The functions return data types appropriate for the requested property.

`Desired_primaries`
    `int scds_get_rg_desired_primaries(scds_handle_t handle)`

`Global_resources_used`
    `const scha_str_array_t * scds_get_rg_global_resources_used(scds_handle_t handle)`

`Implicit_network_dependencies`
    `boolean_t scds_get_rg_implicit_network_dependencies(scds_handle_t handle)`

`Maximum_primaries`
    `int scds_get_rg_maximum_primaries(scds_handle_t handle)`

`Nodelist`
    `const scha_str_array_t * scds_get_rg_nodelist (scds_handle_t handle)`

`Pathprefix`
    `const char * scds_get_rg_pathprefix(scds_handle_t handle)`

`Pingpong_interval`
    `int scds_get_rg_pingpong_interval(scds_handle_t handle)`

`Resource_list`
    `const scha_str_array_t * scds_get_rg_resource_list(scds_handle_t handle)`

`RG_affinities`
    `const scha_str_array_t * scds_get_rg_rg_affinities(scds_handle_t handle)`

`RG_mode`
    `scha_rgmode_t scds_get_rg_rg_mode(scds_handle_t handle)`

`RG_project_name`
    `const char * scds_get_rg_rg_project_name(scds_handle_t handle)`

`RG_slm_cpu_shares`
    `int scds_get_rg_rg_slm_cpu_shares(scds_handle_t handle)`

`RG_slm_pset_min`
    `int scds_get_rg_rg_slm_pset_min(scds_handle_t handle)`

`RG_slm_pset_type`
    `const char * scds_get_rg_rg_slm_pset_type(scds_handle_t handle)`

RG_slm_type

```
const char * scds_get_rg_rg_slm_type(scds_handle_t handle)
```

Resource Type-Specific Functions

The function returns the value of a specific resource type property. Some of the properties' values are explicitly set either in the RTR file or by a clresourcetype(1CL) command. Others are determined dynamically by the RGM. The functions return data types appropriate for the requested property.

API_version

```
int scds_get_rt_api_version(scds_handle_t handle)
```

Failover

```
boolean_t scds_get_rt_failover(scds_handle_t handle)
```

Init_nodes

```
scha_initnodes_flag_t scds_get_rt_init_nodes(scds_handle_t handle)
```

Installed_nodes

```
const scha_str_array_t * scds_get_rt_installed_nodes(scds_handle_t handle)
```

RT_basedir

```
const char * scds_get_rt_rt_basedir(scds_handle_t handle)
```

RT_version

```
const char * scds_get_rt_rt_version(scds_handle_t handle)
```

Single_instance

```
boolean_t scds_get_rt_single_instance(scds_handle_t handle)
```

Start_method

```
const char * scds_get_rt_start_method(scds_handle_t handle)
```

Stop_method

```
const char * scds_get_rt_stop_method(scds_handle_t handle)
```

Extension Property-Specific Functions

The function returns the value of a specific resource extension property. The properties' values are explicitly set either in the RTR file or by a clresource(1CL) command. The functions return data types appropriate for the requested property.

A resource type can define extension properties beyond the four listed here, but these four properties have convenience functions defined for them. You retrieve these properties with these convenience functions or with the scds_get_ext_property(3HA) function. You must use scds_get_ext_property() to retrieve extension properties other than these four.

Confdir_list

```
scha_str_array_t * scds_get_ext_confdir_list(scds_handle_t handle)
```

Monitor_retry_count

```
int scds_get_ext_monitor_retry_count(scds_handle_t handle)
```

`Monitor_retry_interval`
`int scds_get_ext_monitor_retry_interval(scds_handle_t handle)`

`Probe_timeout`
`int scds_get_ext_probe_timeout(scds_handle_t handle)`

Parameters The following parameter is supported for all the convenience functions:

handle The handle that is returned from `scds_initialize`(3HA).

Return Values The return value type of the function matches the type of the property value that the function retrieves.

These functions do not return errors because the return values have been precomputed in `scds_initialize`(3HA). For functions that return pointers, a `NULL` value is returned when an error condition is encountered, for example, when `scds_initialize()` was not previously called.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `clresource`(1CL), `clresourcegroup`(1CL), `clresourcetype`(1CL), `scds_close`(3HA), `scds_get_ext_property`(3HA), `scds_get_port_list`(3HA), `scds_get_resource_group_name`(3HA), `scds_get_resource_name`(3HA), `scds_get_resource_type_name`(3HA), `scds_initialize`(3HA), `scha_calls`(3HA), `attributes`(5), `r_properties`(5), `rg_properties`(5), and `rt_properties`(5)

Name scds_restart_resource – restart a resource

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_restart_resource(scds_handle_t handle);
```

Description The `scds_restart_resource()` function calls the `scha_control(3HA)` function with the `SCHA_RESOURCE_RESTART` *tag* argument to request a restart of the resource. Call this function from the fault monitor.

Parameters The following parameters are supported:

handle — The handle returned from `scds_initialize(3HA)`

Return Values The `scha_restart_resource()` function returns the following:

`0` — The function succeeded.

nonzero — The function failed.

Errors `SCHA_ERR_NOERR` — Function succeeded.

See `scha_calls(3HA)` for a description of other error codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `rt_callbacks(1HA)`, `scds_restart_rg(3HA)`, `scha_calls(3HA)`, `scha_control(3HA)`, `attributes(5)`

Name scds_restart_rg – restart a resource group

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_restart_rg(scds_handle_t handle);
```

Description The `scds_restart_rg()` function performs an `scha_control(3HA)` `SCHA_RESTART` operation on the resource group containing the resource passed to the calling program. Call this function from the fault monitor.

When this function succeeds, it does not return. Therefore, treat this function as the last piece of code to be executed in the calling program.

Parameters The following parameters are supported:

handle The handle returned from `scds_initialize(3HA)`

Return Values The `scds_restart_rg()` function returns the following:

`0` The function succeeded.

nonzero The function failed.

Errors `SCHA_ERR_NOERR` Function succeeded.

See `scha_calls(3HA)` for a description of other error codes.

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `scha_calls(3HA)`, `scha_control(3HA)`, `scds_initialize(3HA)`, `scds_restart_resource(3HA)`, `attributes(5)`

Name scds_simple_net_probe – probe by establishing and terminating a TCP connection to an application

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_simple_net_probe(scds_handle_t handle, scds_netaddr_t addr,
     time_t timeout, scds_fmsock_status_t *status, int count);
```

Description The `scds_simple_net_probe()` function is a wrapper function around `scds_fm_net_connect(3HA)` and `scds_fm_net_disconnect(3HA)`. For hosts that have multiple mappings, `scds_simple_net_probe()` handles both IPv4 and IPv6 addresses for the supplied `hostname`.

You can retrieve a list of network addresses for the resource by using `scds_get_netaddr_list(3HA)`.

The status for a connect to, or disconnect from, an IPv4 target is stored in the first member of the `scds_fmsock_status_t` array. The second member contains the status for an IPv6 target. If the `hostname` that is supplied to this function does not contain an IPv4 or IPv6 mapping, the corresponding status is set to `SCDS_FMSOCK_NA`.

Parameters The following parameters are supported:

handle — The handle returned by `scds_initialize(3HA)`.

addr — The `hostname`, TCP port number, and protocol identifier that specify where the process is listening.

timeout — The timeout value in seconds to wait for a successful connection. Each socket (IPv4 or IPv6) gets the same timeout period, and timeouts proceed in parallel.

status — Array of `SCDS_MAX_IPADDR_TYPES` members of type `scds_fmsock_status_t`. Each member in the array holds a status. This parameter is an output argument that is set by this function.

count — The number of members in the *socklist* array. Set this parameter to `SCDS_MAX_IPADDR_TYPES`.

Return Values The `scds_simple_net_probe()` function returns the following values:

`0` — The function succeeded.

`SCHA_ERR_INVAL` — The function was called with invalid paramaters.

Other nonzero values — At least one connect operation failed due to a timeout, a refused connection, or some other error. Inspect the `err` field of all members of the `socklist` array that are set to `SCDS_FMSOCK_ERR` to determine the exact error.

nonzero At least one connect or disconnect operation failed. You can inspect the `scds_fmsock_status_t` array to determine if the failure was in an IPv4 target, an IPv6 target, or both.

Errors

`SCHA_ERR_NOERR` Indicates that the function succeeded.

`SCHA_ERR_INTERNAL` Indicates that an internal error occurred while the function was executing.

`SCHA_ERR_STATE` Indicates that the connection request was refused by the server.

`SCHA_ERR_TIMEOUT` Indicates that the connection request timed out.

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Evolving

See Also

`scds_fm_net_connect(3HA)`, `scds_fm_net_disconnect(3HA)`, `scds_get_netaddr_list(3HA)`, `scds_initialize(3HA)`, `scds_simple_probe(3HA)`, `scha_calls(3HA)`, `attributes(5)`

Name scds_simple_probe – probe by establishing and terminating a TCP connection to an application

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_simple_probe(scds_handle_t handle, const char *hostname,
     int port, time_t timeout);
```

Description The `scds_simple_probe()` function is a wrapper function around `connect`(3SOCKET) and `close`(2) to run under a timeout.

Retrieve the *hostname* with either `scds_get_rg_hostnames`(3HA) or `scds_get_rs_hostnames`(3HA).

Consider using `scds_simple_net_probe`(3HA) instead of this function.

Parameters The following parameters are supported:

handle The handle returned by `scds_initialize`(3HA).

hostname Internet hostname of the machine to which to connect.

port Port number with which to make the connection.

timeout Timeout value in seconds (to wait for a successful connection).

Return Values The `scds_simple_probe()` function returns the following:

`0` The function succeeded.

nonzero The function failed.

Errors `SCHA_ERR_NOERR` Indicates that the function succeeded.

`SCHA_ERR_TIMEOUT` Indicates that the function timed out.

See `scha_calls`(3HA) for a description of other error codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Deprecated

See Also close(2), connect(3SOCKET), scds_fm_net_connect(3HA), scds_fm_net_disconnect(3HA), scds_get_rg_hostnames(3HA), scds_get_rs_hostnames(3HA), scds_initialize(3HA), scds_simple_net_probe(3HA), scha_calls(3HA), attributes(5)

Name scds_svc_wait – wait for the specified timeout period for a monitored process to die

Synopsis
```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_svc_wait(scds_handle_t handle, time_t timeout);
```

Description The `scds_svc_wait()` function waits for the specified timeout period for a monitored process group to die. It waits upon all process groups started by `scds_pmf_start`(3HA) for the resource passed to the calling `START` method. The `scds_svc_wait()` function uses the `Retry_interval` and `Retry_count` properties of the resource to limit the number of process deaths to wait on. If the number of process deaths during `Retry_interval` reaches the value of `Retry_count`, `scds_svc_wait()` returns with `SCHA_ERR_FAIL`.

If the number of process failures is below the value of `Retry_count`, the process is restarted and `scds_svc_wait()` waits the full timeout period for further process deaths. The counting of process failures spans successive calls to `scds_svc_wait()`.

Parameters The following parameters are supported:

handle The handle returned from `scds_initialize`(3HA)

timeout Timeout period measured in seconds

Return Values The `scds_svc_wait()` function returns the following:

`0` The function succeeded.

nonzero The function failed.

Errors

`SCHA_ERR_TIMEOUT` The function timed out.

`SCHA_ERR_NOERR` No process deaths occurred, or a process was successfully restarted.

`SCHA_ERR_FAIL` The number of failures reached the value of the `Retry_count` property.

`SCHA_ERR_STATE` A system error or an otherwise unexpected error occurred.

See `scha_calls`(3HA) for a description of other error codes.

Examples **EXAMPLE 1** Using `scds_svc_wait()` in a START Method

The following example shows how you could use `scds_svc_wait` in a `START` method to return early if the service fails to start. After starting an application process with `scds_pmf_start()`, a `START` method must wait for the application to fully initialize itself and become available before returning success. If the application fails to start, the `START` method must wait the entire `Start_timeout` period before returning with failure. Using `scds_svc_wait()`, as in the following example, allows `START` methods to restart applications up to `Retry_count` times and return early with failure from the `START` method if the service is unable to start up.

EXAMPLE 1 Using `scds_svc_wait()` in a START Method *(Continued)*

```
/*
 * scds_svc_wait is a subroutine in a START method to
 * check that the service is fully available before returning.
 * Calls svc_probe() to check service availability.
 */
int
svc_wait(scds_handle_t handle)
{
    while (1) {
        /* Wait for 5 seconds */
        if (scds_svc_wait(handle, 5) != SCHA_ERR_NOERR) {
            scds_syslog(LOG_ERR, "Service failed to start.");
            return (1);        /* Start Failure */
        }
        /* Check if service is fully up every 5 seconds */
        if (svc_probe(handle) == 0) {
            scds_syslog(LOG_INFO, "Service started successfully.");
            return (0);
        }
    }
    return (0);
}
```

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also

`scds_initialize(3HA)`, `scds_pmf_start(3HA)`, `scha_calls(3HA)`, `attributes(5)`, `r_properties(5)`

Notes

- If the START method exceeds the `Start_timeout` setting on the resource, the Resource Group Manager (RGM) kills the START method even if the START method is currently waiting for `scds_svc_wait()` to return.
- If `Retry_interval` on the resource is larger then `Start_timeout`, the START method could be timed out by the RGM even if the number of failures is below `Retry_count`.

- If a `START` method starts multiple process groups with multiple calls to `scds_pmf_start()`, `scds_svc_wait()` starts process groups as they die. It does not enforce any dependencies between process groups. Do not use `scds_svc_wait()` if there is a dependency between process groups such that failure of one process group requires a restart of other process groups. Instead, use `sleep()` to wait between health checks of the process groups.

Name scds_syslog – write a message to the system log

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

void scds_syslog(int priority, const char*format...
```

Description The `scds_syslog()` function writes a message to the system log. It uses the facility returned by the`scha_cluster_getlogfacility(3HA)` function. You can forward these messages to appropriate log files and users. See `syslog.conf(4)` for more information.

All syslog messages are prefixed with:
`SC[`*<resourceTypeName>*`,`*<resourceGroupName>*`,`*<resourceName>*`,`*<methodName>*

Caution – Messages written to the system log are not internationalized. Do not use `gettext()` or other message translation functions in conjunction with this function.

Parameters The following parameters are supported:

priority Message priority, as specified by `syslog(3C)`

format Message format string, as specified by `printf(3C)`

... Variables, indicated by the *format* parameter, as specified by `printf()`

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `printf(3C)`, `scds_syslog_debug(3HA)`, `scha_cluster_getlogfacility(3HA)`, `syslog(3C)`, `syslog.conf(4)`, `attributes(5)`

Name scds_syslog_debug – write a debugging message to the system log

Synopsis
```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

void  scds_syslog_debug(int debug_level, constchar *format...
```

Description The `scds_syslog_debug()` function writes a debugging message to the system log. It uses the facility returned by the `scha_cluster_getlogfacility(3HA)` function.

All syslog messages are prefixed with:
`SC[`<*resourceTypeName*>`,`<*resourceGroupName*>`,`<*resourceName*>`,`<*methodName*>

If you specify a *debug_level* greater than the current debugging level being used, no information is written.

The DSDL defines the maximum debugging level, `SCDS_MAX_DEBUG_LEVEL`, as `9`. The `scds_initialize(3HA)` function, which the calling program must call before `scds_syslog_debug()`, retrieves the current debugging level from the file: `/var/cluster/rgm/rt/`<*resourceTypeName*>`/loglevel`.

Caution – Messages written to the system log are not internationalized. Do not use `gettext()` or other message translation functions in conjunction with this function.

Parameters The following parameters are supported:

debug_level Debugging level at which this message is to be written. Valid debugging levels are between 1 and `SCDS_MAX_DEBUG_LEVEL`, which is defined as 9 by the DSDL. If the specified debugging level is greater than the debugging level set by the calling program, the message is not written to the system log.

format Message format string, as specified by `printf(3C)`

... Variables, indicated by the *format* parameter, as specified by `printf(3C)`

Examples **EXAMPLE 1** Display All Debugging Messages

To see all debugging messages for resource type `SUNW.iws`, issue the following command on all nodes of your cluster

```
echo 9 > /var/cluster/rgm/rt/SUNW.iws/loglevel
```

EXAMPLE 2 Suppress Debugging Messages

To suppress debugging messages for resource type `SUNW.iws`, issue the following command on all nodes of your cluster

```
echo 0 > /var/cluster/rgm/rt/SUNW.iws/loglevel
```

Files

`/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also

printf(3C), scds_syslog(3HA), scha_cluster_getlogfacility(3HA), syslog(3C), syslog.conf(4), attributes(5)

Name scds_timerun – execute a given command in a given amount of time

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  dsdev
#include <rgm/libdsdev.h>

scha_err_t scds_timerun(scds_handle_t handle, const char *command,
     time_t timeout, int signal, int *cmd_exit_code);
```

Description The `scds_timerun()` function executes a specified command using `hatimerun(1M)`. If the command does not complete within the allotted time period, which is specified by the *timeout* argument, `scds_timerun()` sends a signal, specified by the *signal* argument, to kill it.

The *command* argument does not support I/O redirection. However, you can write a script to perform redirection and then identify this script in the *command* argument as the command for `scds_timerun()` to execute.

Parameters The following parameters are supported:

handle	The handle returned from `scds_initialize(3HA)`
command	String that contains the command to run
timeout	Time, in seconds, allotted to run the command
signal	Signal to kill the command if it is still running when the timeout expires. If `signal = -1`, then `SIGKILL` is used. See `signal(3HEAD)`.
cmd_exit_code	Return code from execution of the command

Return Values The `scds_timerun()` function returns the following:

`0`	The function succeeded.
nonzero	The function failed.

Errors

`SCHA_ERR_NOERR`	The command executed and `cmd_exit_code` contains the child program's exit status.
`SCHA_ERR_INTERNAL`	The timeout did not occur, but some other error was detected by `scds_timerun()` that was not an error detected by the child program. Or `hatimerun(1M)` caught the signal `SIGTERM`.
`SCHA_ERR_INVAL`	There was an invalid input argument.
`SCHA_ERR_TIMEOUT`	The timeout occurred before the command specified by the *command* argument finished executing.

See `scha_calls(3HA)` for a description of other error codes.

Files `/usr/cluster/include/rgm/libdsdev.h`
Include file

`/usr/cluster/lib/libdsdev.so`
Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also hatimerun(1M), scds_initialize(3HA), scha_calls(3HA), signal(3HEAD), attributes(5)

Name scha_calls – Oracle Solaris Cluster library functions used in the implementation of callback methods and monitors of resource types

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  scha
#include <scha.h>

scha_err_t scha_get_function(handle, const char *tag...);

scha_err_t scha_control(const char *tag...
```

Description The Oracle Solaris Cluster library functions scha_resource_get(3HA), scha_resourcetype_get(3HA), scha_resourcegroup_get(3HA), scha_cluster_get(3HA), scha_control(3HA), scha_strerror(3HA), and scha_resource_setstatus(3HA) provide an interface to be used in the implementation of callback methods and monitors of resource types. The resource types represent services that are controlled by the cluster's Resource Group Manager (RGM) facility.

The "get" functions access cluster configuration information. All these functions have the same general signature. These functions take a *handle* argument that is returned from a previous call to an "open" function. This *handle* indicates the object in the cluster configuration that is to be accessed. A *tag* argument indicates the property of the object that is to be accessed. The value of *tag* determines whether additional arguments are needed and the type of a final "out" argument through which the requested information is returned. You can make repeated "get" calls with the same handle until a "close" call, which invalidates the handle and frees memory that is allocated for values that are returned from the "get" calls.

Memory, if needed to return a value, is allocated for each "get" call. Space allocated to return a value in one call will not be overwritten and reused by subsequent calls.

The scha_control(3HA) function also has a *tag* argument that indicates a control operation, but does not return information in an output argument.

The scha_resource_setstatus(1HA) command sets the `Status` and `Status_msg` properties of a resource that is managed by the RGM.

The man pages for the individual functions should be referred to for the macro values accepted as *tag* argument values for each function, and variable argument types for each *tag*. The types of output arguments are described in the next section.

There is one set of `scha_err_t` enum-type return values for the `scha` functions. The enum symbols, integer values, and meaning of the exit codes are described in RETURN VALUES.

The scha_strerror(3HA) function converts an `scha_err_t` code returned by an `scha` function to the appropriate error message.

Output Argument Data Types

`uint_t`

An unsigned integer type. This type is defined in the system header file `sys/types.h`.

`boolean_t`

This type is defined in the system header file `sys/types.h`.

```
typedef enum { B_FALSE, B_TRUE } boolean_t;
```

`scha_switch_t`

An `enum` type that indicates an `On_Off_switch` or `Monitored_switch` resource property value.

```
typedef enum scha_switch {
    SCHA_SWITCH_DISABLED = 0,
    SCHA_SWITCH_ENABLED
} scha_switch_t;
```

`scha_rg_preemption_mode_t`

An `enum` type that indicates a value for the `Preemption_mode` resource group property.

```
typedef enum scha_rg_preemption_mode {
    SCHA_HAS_PREEMPTION_COST = 0,
    SCHA_NO_PREEMPTION_COST,
    SCHA_NEVER_PREEMPT_RG
} scha_rg_preemption_mode_t;
```

`scha_rsstate_t`

An `enum` type that indicates a resource state.

```
typedef enum scha_rsstate {
    SCHA_RSSTATE_ONLINE = 0,
    SCHA_RSSTATE_OFFLINE,
    SCHA_RSSTATE_START_FAILED,
    SCHA_RSSTATE_STOP_FAILED,
    SCHA_RSSTATE_MONITOR_FAILED,
    SCHA_RSSTATE_ONLINE_NOT_MONITORED,
    SCHA_RSSTATE_STARTING,
    SCHA_RSSTATE_STOPPING
} scha_rsstate_t;
```

`scha_rgstate_t`

An `enum` type that indicates a resource group state.

```
typedef enum scha_rgstate {
    SCHA_RGSTATE_UNMANAGED = 0,
    SCHA_RGSTATE_ONLINE,
    SCHA_RGSTATE_OFFLINE,
    SCHA_RGSTATE_PENDING_ONLINE,
    SCHA_RGSTATE_PENDING_OFFLINE,
    SCHA_RGSTATE_ERROR_STOP_FAILED
    SCHA_RGSTATE_ONLINE_FAULTED,
```

```
    SCHA_RGSTATE_PENDING_ONLINE_BLOCKED
} scha_rgstate_t;
```

`scha_rgmode_t`
An `enum` type that indicates if the mode of a resource group is failover or scalable.

```
typedef enum scha_rgmode {
    RGMODE_NONE = 0,
    RGMODE_FAILOVER,
    RGMODE_SCALABLE
} scha_rgmode_t;
```

`scha_failover_mode_t`
An `enum` type that indicates a value for the `Failover_Mode` resource property.

```
typedef enum scha_failover_mode {
    SCHA_FOMODE_NONE = 0,
    SCHA_FOMODE_HARD,
    SCHA_FOMODE_SOFT,
    SCHA_FOMODE_RESTART_ONLY,
    SCHA_FOMODE_LOG_ONLY
} scha_failover_mode_t;
```

`scha_initnodes_flag_t`
An `enum` type that indicates a value for the `Init_nodes` resource type property.

```
typedef enum scha_initnodes_flag {
    SCHA_INFLAG_RG_PRIMARIES = 0,
    SCHA_INFLAG_RT_INSTALLED_NODES
} scha_initnodes_flag_t;
```

`scha_node_state_t`
An `enum` type that indicates whether a node is up or down.

```
typedef enum scha_node_state {
    SCHA_NODE_UP = 0,
    SCHA_NODE_DOWN
} scha_node_state_t;
```

`scha_str_array_t`
A structure that holds the value of a list of strings.

```
typedef struct scha_str_array {
    uint_t       array_cnt;
    boolean_t    is_ALL_value;
    char         **str_array;
} scha_str_array_t;
```

`array_cnt` Gives the number elements in the list.

`is_ALL_value`	If a property is set to the "all" value, also known as the wild card or asterisk (*) character, `is_ALL_value` is set to `B_TRUE` and `str_array` is `NULL`. As a result, `str_array` is ignored.
`str_array`	A pointer to an array of `array_cnt` `strings`.

`scha_uint_array_t`

A structure that holds the value of a list of unsigned integers.

```
typedef struct scha_uint_array {
    uint_t    array_cnt;
    uint_t    *int_array;
} scha_uint_array_t;
```

`array_cnt`	The number of elements in the list.
`int_array`	A pointer to an array of `array_cnt` unsigned integers.

`scha_status_value_t`

The structure for returning the status and status message of a resource.

```
typedef struct scha_status_value {
    scha_rsstatus_t       status;
    char                  *status_msg;
} scha_status_value_t;

typedef enum scha_rsstatus {
    SCHA_RSSTATUS_ONLINE = 0,
    SCHA_RSSTATUS_OFFLINE,
    SCHA_RSSTATUS_FAULTED,
    SCHA_RSSTATUS_DEGRADED,
    SCHA_RSSTATUS_UNKNOWN
} scha_rsstatus_t;
```

`status`	Holds an `enum` value that indicates the resource status as set by the resource monitor.

`scha_extprop_value_t`

The structure that is used for returning the value of an extension property.

The `prop_type` structure member indicates the type of the extension property and determines which element of the union is used for the `prop_type` field and the return values:

```
SCHA_PTYPE_STRING       val_str
SCHA_PTYPE_INT          val_int
SCHA_PTYPE_ENUM         val_enum
SCHA_PTYPE_BOOLEAN      val_boolean
SCHA_PTYPE_STRINGARRAY  val_strarray
```

```
typedef struct scha_extprop_value {
    scha_prop_type_t        prop_type;
    union {
          char              *val_str;
          int               val_int;
          char              *val_enum;
          boolean_t         val_boolean;
          scha_str_array_t  *val_strarray;
          } val;
} scha_extprop_value_t;
```

Return Values The following is a list of the `scha_err_t` error numbers and the error codes returned by `scha_strerror(3HA)`.

`0 SCHA_ERR_NOERR`	No error was found.
`1 SCHA_ERR_NOMEM`	Not enough swap.
`2 SCHA_ERR_HANDLE`	Invalid resource management handle.
`3 SCHA_ERR_INVAL`	Invalid input argument.
`4 SCHA_ERR_TAG`	Invalid API tag.
`5 SCHA_ERR_RECONF`	Cluster is reconfiguring.
`6 SCHA_ERR_ACCESS`	Permission denied.
`7 SCHA_ERR_SEQID`	Resource, resource group, or resource type has been updated since last `scha_*_open` call.
`8 SCHA_ERR_DEPEND`	Object dependency problem.
`9 SCHA_ERR_STATE`	Object is in wrong state.
`10 SCHA_ERR_METHOD`	Invalid method.
`11 SCHA_ERR_NODE`	Invalid node.
`12 SCHA_ERR_RG`	Invalid resource group.
`13 SCHA_ERR_RT`	Invalid resource type.
`14 SCHA_ERR_RSRC`	Invalid resource.
`15 SCHA_ERR_PROP`	Invalid property.
`16 SCHA_ERR_CHECKS`	Sanity checks failed.
`17 SCHA_ERR_RSTATUS`	Bad resource status.
`18 SCHA_ERR_INTERNAL`	Internal error was encountered.
`19 SCHA_ERR_CLUSTER`	Unable to communicate with the other cluster.

20 SCHA_ERR_ZONE_CLUSTER	Invalid zone cluster.
21 SCHA_ERR_ZC_DOWN	Zone cluster not in a “Running” state.
22 SCHA_ERR_LOADLIMIT	Invalid load limit.
31 SCHA_ERR_TIMEOUT	Operation timed out.
32 SCHA_ERR_FAIL	Failover attempt failed.

Files

/usr/cluster/include/scha.h	Include file
/usr/cluster/lib/libscha.so	Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also scha_cmds(1HA), scha_resource_setstatus(1HA)scha_cluster_get(3HA), scha_control(3HA), scha_resource_get(3HA), scha_resourcegroup_get(3HA), scha_resource_setstatus(3HA), scha_resourcetype_get(3HA), scha_strerror(3HA), attributes(5)

Name scha_cluster_getlogfacility – cluster log facility access

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  scha
#include <scha.h>

 scha_err_t scha_cluster_getlogfacility(int *logfacility);
```

Description The `scha_cluster_getlogfacility()` function returns the system log facility number that is being used as the cluster log. The value is intended to be used with the Solaris `syslog`(3C) function by resource type implementations to record events and status messages to the cluster log.

The function returns an error status, and if successful, the facility number in the location pointed to by the *logfacility* argument.

Return Values The `scha_cluster_getlogfacility()` function returns the following:

`0`	The function succeeded.
nonzero	The function failed.

Errors

`SCHA_ERR_NOERR`	The function succeeded.

See `scha_calls`(3HA) for a description of other error codes.

Examples **EXAMPLE 1** Using the `scha_cluster_getlogfacility()` Function

```
main()
{
    scha_err_t    err_code;
    int logfacility;

    err_code = scha_cluster_getlogfacility(&logfacility);

    if (err_code == SCHA_ERR_NOERR) {
        openlog("test resource", LOG_CONS, logfacility);
        syslog(LOG_INFO, "Access function call succeeded.");
    }
}
```

Files

`/usr/cluster/include/scha.h`	Include file
`/usr/cluster/lib/libscha.so`	Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Interface Stability	Evolving

See Also syslog(3C), scha_calls(3HA), scha_cluster_get(3HA), scha_strerror(3HA), attributes(5)

Name scha_cluster_getnodename – return name of local cluster node

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  scha
#include <scha.h>

 scha_err_t scha_cluster_getnodename(char **nodename);
```

Description The `scha_cluster_getnodename()` function returns the name of the cluster node on which the function is called. The node name is not necessarily the same as the Solaris system name. The function returns an error status, and if successful, a string that contains the node name in the location that is pointed to by the *nodename* argument.

If the call fails, the *nodename* is set to `NULL`. The caller of `scha_cluster_getnodename()` is responsible for freeing the memory that is allocated for the returned string by using the standard C library function `free`(3C). Freeing the memory is required only if the function succeeds.

Return Values The `scha_cluster_getnodename()` function returns the following values:

`0` The function succeeded.

nonzero The function failed.

Errors `SCHA_ERR_NOERR` Function succeeded.

See `scha_calls`(3HA) for a description of other error codes.

Examples **EXAMPLE 1** Using the `scha_cluster_getnodename()` Function

```
scha_err_t  err_code;
char *nodename;
err_code = scha_cluster_getnodename(&nodename);
...
if (nodename != NULL) free(nodename);
```

Files `/usr/cluster/include/scha.h` Include file

`/usr/cluster/lib/libscha.so` Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `free`(3C), `scha_calls`(3HA), `scha_cluster_get`(3HA), `scha_cluster_getzone`(3HA), `scha_strerror`(3HA), `attributes`(5)

Name scha_cluster_getzone – return name of zone

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  scha
#include <scha.h>

 scha_err_t scha_cluster_getzone(char **zonename);
```

Description The `scha_cluster_getzone()` function returns a string that identifies the zone from which the function is called. If you call this function in a non-global zone, the zone name and the node name are returned, in the format `nodename:zonename`. If you call this function in the global zone, only the node name is returned. The node name is not necessarily the same as the Solaris system name. The function returns an error status. If successful, the function also returns a string that contains the node name and the zone name in the location that is pointed to by the *zonename* argument.

If the call fails, the *zonename* argument is set to `NULL`. The caller of `scha_cluster_getzone()` is responsible for freeing the memory that is allocated for the returned string by using the standard C library function `free(3C)`. Freeing the memory is required only if the function succeeds.

Return Values The `scha_cluster_getzone()` function returns the following values:

`0`	The function succeeded.
nonzero	The function failed.

Errors

`SCHA_ERR_NOERR`	The function succeeded.

See `scha_calls(3HA)` for a description of other error codes.

Examples **EXAMPLE 1** Using the `scha_cluster_getzone()` Function

```
scha_err_t  err_code;
char *zonename;
err_code = scha_cluster_getzone(&zonename);
...
if (zonename != NULL) free(zonename);
```

Files

`/usr/cluster/include/scha.h`	Include file
`/usr/cluster/lib/libscha.so`	Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also free(3C), scha_calls(3HA), scha_cluster_get(3HA), scha_cluster_getnodename(3HA), scha_strerror(3HA), attributes(5)

Name scha_cluster_open, scha_cluster_open_zone, scha_cluster_get, scha_cluster_get_zone, scha_cluster_close – access and obtain information about a cluster

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  scha
#include <scha.h>

scha_err_t scha_cluster_open(scha_cluster_t *handle);

scha_err_t scha_cluster_open_zone(const char *cluster, scha_cluster_t *handlep);

scha_err_t scha_cluster_get(scha_cluster_t handle, const char **tag, ...);

scha_err_t scha_cluster_get_zone(const char *cluster, scha_cluster_t handlep,
     const char *cluster_tag, ...);

scha_err_t scha_cluster_close(scha_cluster_t handle);
```

Description The `scha_cluster_open()`, `scha_cluster_get()`, and `scha_cluster_close()` functions are used together to obtain information about a cluster.

`scha_cluster_open()` initializes cluster access and returns an access handle to be used by `scha_cluster_get()`. The *handle* argument is the address of a variable to hold the value that is returned by the function call.

`scha_cluster_get()` accesses cluster information as indicated by the *tag* argument. The *handle* argument is a value that is returned from a prior call to `scha_cluster_open()`. The *tag* argument is a string value that is defined by a macro in the `scha_tags.h` header file. The arguments that follow the tag depend on the value of the *tag* argument.

You might need to provide an additional argument after the *tag* argument to indicate a cluster node from which the information is to be retrieved. The last argument in the argument list is to be of a type that is suitable to hold the information that is indicated by the *tag* argument. This argument is the output argument for the cluster information. No value is returned for the output argument if the function fails. Memory that is allocated to hold information that is returned by the `scha_cluster_get()` function remains intact until `scha_cluster_close()` is called on the handle that is used for the `scha_cluster_get()` function.

`scha_cluster_close()` takes a `handle` argument that is returned from a previous call to the `scha_cluster_get()` function. This function invalidates the handle and frees memory that is allocated to return values to `scha_cluster_get()` calls that were made with the handle. Note that memory, if needed to return a value, is allocated for each `get` call. Space allocated to return a value in one call is not overwritten and reused by subsequent calls.

The `scha_cluster_open_zone()` and `scha_cluster_get_zone()` functions serve the same purpose as `scha_cluster_open()` and `scha_cluster_get()` respectively, with an additional `cluster` argument specifying the name of a zone cluster in which the resource groups exist and on which you want to operate. These functions are useful when code is executed in the global zone but needs to operate on a specified zone cluster. They cannot be used within a zone cluster to access a different zone cluster.

If the `cluster` argument to `scha_cluster_open_zone()` or `scha_cluster_get_zone()` is NULL, the query is performed on the cluster within which the call is executed; in other words, the call with NULL argument is equivalent to `scha_cluster_open()` or `scha_cluster_get()`, respectively.

To close the handle returned by `scha_cluster_open_zone()`, use `scha_cluster_close()`. No `cluster` argument is required.

Macros That You Can Use for *tag* Arguments

Macros that are defined in `scha_tags.h` that you can use as *tag* arguments follow. The type of the output argument and any additional arguments are indicated. Structure and `enum` types are described in `scha_calls(3HA)`.

`SCHA_ALL_LOADLIMITS`
The output argument type is `scha_str_array_t**`.

This macro returns all the `loadlimit` names defined in the cluster.

`SCHA_ALL_NODEIDS`
The output argument type is `scha_uint_array_t**`.

This macro returns numeric node identifiers of all the nodes in the cluster.

`SCHA_ALL_NODENAMES`
The output argument type is `scha_str_array_t**`.

This macro returns the names of all nodes in the cluster.

`SCHA_ALL_PRIVATELINK_HOSTNAMES`
The output argument type is `scha_str_array_t**`.

This macro returns the host names for all cluster nodes by which the nodes are addressed on the cluster interconnect.

`SCHA_ALL_PSTRINGS`
The output argument type is `scha_str_array_t**`.

This macro returns the names of all private strings that are defined in the cluster. For more information about private strings, see the `clpstring(1CL)` man page.

`SCHA_ALL_RESOURCEGROUPS`
The output argument type is `scha_str_array_t**`.

This macro returns the names of all the resource groups that are being managed on the cluster.

`SCHA_ALL_RESOURCETYPES`
The output argument type is `scha_str_array_t**`.

This macro returns the names of all the resource types that are registered on the cluster.

`SCHA_CLUSTERNAME`
The output argument is type `char**`.

This macro returns the name of the cluster.

`SCHA_HARD_LOADLIMIT`
The output argument type is `scha_str_array_t**`.

This macro returns the hard load limit values for all nodes in the cluster, for a specified limit name. It requires an additional argument of the type `char *` that is a load limit name string.

Each element of the string array output is of the format `"%s=%d"`, where the left-side string is a *nodename*, and the right-side integer is the hard load limit value for the specified limit name on that node. If no hard limit is specified, the value of `-1` is displayed for the hard limit.

`SCHA_LOADLIMIT_PROPS`
The output argument type is `scha_str_array_t**`.

This macro returns the hard and soft load limit values (delimited by `/`) for all nodes in the cluster, for a specified limit name. It requires an additional argument of the type `char *` that is a load limit name string.

Each element of the string array output is a string of the format `"%s=%d/%d"`, where the left-side string is a *nodename*, the first integer is the soft limit, and the second integer is the hard limit. If no hard limit is specified, the value of `-1` is displayed for the hard limit. If no soft limit is specified, the value `0` is displayed for the soft limit.

`SCHA_LOADLIMITS_NODE`
The output argument type is `scha_str_array_t**`.

This macro returns the load limits (delimited by `/`) and limit names for a specific node. It requires an additional argument of the type `char *` that is a *nodename*.

Each element of the string array output is a string of the format `"%s=%d/%d"`, where the string is a limitname defined on the specified node, the first, integer is the soft limit value, and the second integer is the hard limit value. If no hard limit is specified, the value of `-1` is displayed for the hard limit. If no soft limit is specified, the value `0` is displayed for the soft limit.

`SCHA_NODEID_LOCAL`
The output argument type is `uint_t*`.

This macro returns the numeric node identifier for the node where the command is executed.

`SCHA_NODEID_NODENAME`
The output argument type is `uint_t*`. An additional argument is of type `char *`. The macro requires an additional argument that is a name of a cluster node.

This macro returns the numeric node identifier of the node indicated by the name.

SCHA_NODENAME_LOCAL
The output argument type is char**.

This macro returns the name of the cluster node where the function is executed.

SCHA_NODENAME_NODEID
The output argument type is char**. An additional argument is of type uint_t. The additional argument is a numeric cluster node identifier.

This macro returns the name of the node indicated by the numeric identifier.

SCHA_NODESTATE_LOCAL
The output argument type is scha_node_state_t*.

This macro returns SCHA_NODE_UP or SCHA_NODE_DOWN, depending on the state of the node where the command is executed.

SCHA_NODESTATE_NODE
The output argument type is scha_node_state_t*. An additional argument is type char*. The macro requires an additional unflagged argument that is the name of a cluster node.

This macro returns SCHA_NODE_UP or SCHA_NODE_DOWN, depending on the state of the named node.

SCHA_PRIVATELINK_HOSTNAME_LOCAL
The output argument type is char**.

This macro returns the host name by which the node on which the command is run is addressed on the cluster interconnect.

SCHA_PRIVATELINK_HOSTNAME_NODE
The output argument type is char**. An additional argument is of type char *. This macro requires an additional unflagged argument that is the name of a cluster node.

This macro returns the host name by which the named node is addressed on the cluster interconnect.

SCHA_PSTRING
The output argument type is char**.

This macro returns the clear text value of a private string. It requires an additional argument of type char* that provides the name of a private string. Users other than superuser require solaris.cluster.modify role-based access control (RBAC) authorization to use this query tag. For more information about private strings, see the clpstring(1CL) man page.

SCHA_RESOURCE_SECURITY
The output argument type is char**.

This macro returns the current setting of the `resource_security` cluster property.

`SCHA_SOFT_LOADLIMIT`
The output argument type is `scha_str_array_t**`.

This macro returns the soft load limits for all nodes in the cluster, for a specified limit name. It requires an additional argument of the type `char *` that is a load limit name string.

Each element of the string array output is of the format `"%s=%d"`, where the left-side string is a *nodename*, and the right-side integer is the soft load limit value for the specified limit name on that node. If no soft limit is specified, the value `0` is displayed for the soft limit.

`SCHA_SYSLOG_FACILITY`
The output argument type is `int*`.

This macro returns the number of the `syslog(3C)` facility that the RGM uses for log messages. The value that is returned is 24, which corresponds to the `LOG_DAEMON` facility value.

Errors `SCHA_ERR_NOERR` The function succeeded.

See `scha_calls(3HA)` for a description of other error codes.

Examples **EXAMPLE 1** Using the `scha_cluster_get()` Function

The following example uses the `scha_cluster_get()` function to get the names of all cluster nodes. The function also determines whether the node is up or down.

The code example also prints the soft and hard load limit settings that are configured for the `limitname` called **`mylimit`** for every cluster node where that limit was configured. The load limit values for each node are printed in the format: *nodename=softlimit/*[*hardlimit*], where the *hardlimit* value is unlimited (-1) if there is no hard limit set.

```
#include <scha.h>
#include <stdio.h>
#include <stdlib.h>

main()
{
        scha_err_t              err;
        scha_node_state_t       node_state;
        scha_str_array_t        *all_nodenames;
        scha_cluster_t          handle;
        int                     ix;
        const char              *str;
        scha_str_array_t        *load_limits;

        err = scha_cluster_open(&handle);
        if (err != SCHA_ERR_NOERR) {
```

EXAMPLE 1 Using the `scha_cluster_get()` Function *(Continued)*

```
                fprintf(stderr, "FAILED: scha_cluster_open()0);
                exit(err);
        }

        err = scha_cluster_get(handle, SCHA_ALL_NODENAMES, &all_nodenames);
        if (err != SCHA_ERR_NOERR) {
                fprintf(stderr, "FAILED: scha_cluster_get()0);
                exit(err);
        }

        for (ix = 0; ix < all_nodenames->array_cnt; ix++) {
                err = scha_cluster_get(handle, SCHA_NODESTATE_NODE,
                    all_nodenames->str_array[ix], &node_state);
                if (err != SCHA_ERR_NOERR) {
                        fprintf(stderr, "FAILED: scha_cluster_get()"
                            "SCHA_NODESTATE_NODE0);
                        exit(err);
                }

                switch (node_state) {
                case SCHA_NODE_UP:
                        str = "UP";
                        break;
                case SCHA_NODE_DOWN:
                        str = "DOWN";
                        break;
                }

                printf("State of node: %s value: %s\
",
                    all_nodenames->str_array[ix], str);
        }
        err = scha_cluster_get(handle, SCHA_LOADLIMIT_PROPS, "mylimit",
            &load_limits);

        printf("\
\
Load limits settings for limitname 'mylimit':\
\
");

        for (ix = 0; ix < load_limits->array_cnt; ix++) {
            printf("%s\
", load_limits->str_array[ix]);
        }
```

EXAMPLE 1 Using the `scha_cluster_get()` Function *(Continued)*

```
}
```

Files

`/usr/cluster/include/scha.h`	Include file
`/usr/cluster/lib/libscha.so`	Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Evolving

See Also `scha_cluster_get(1HA)`, `scha_calls(3HA)`, `scha_cluster_getlogfacility(3HA)`, `scha_cluster_getnodename(3HA)`, `scha_strerror(3HA)`, `syslog(3C)`, `attributes(5)`, `rg_properties(5)`

Name scha_control, scha_control_zone – resource and resource group control request functions

Synopsis

```
cc [flags...] -I/usr/cluster/include file -L/usr/cluster/lib  -l  scha
#include <scha.h>

scha_err_t scha_control(const char *tag, const char *rgname, const char *rname);

scha_err_t scha_control_zone(const char *tag, const char *rgname,
    const char *rname, const char *zonename);
```

Description The `scha_control()` and `scha_control_zone()` functions each provide an interface to request the restart or relocation of a resource or a resource group that is under the control of the Resource Group Manager (RGM). Use these functions in resource monitors.

Use the `scha_control_zone()` function only for resource types whose `Global_zone` property is set to `TRUE`. This function is not needed if the `Global_zone` property is set to `FALSE`. For more information, see the `rt_properties(5)` man page. The `scha_control_zone()` function is called in the global zone. The `zonename` argument specifies the name of the zone cluster in which the resource group is configured.

The setting of the `Failover_mode` property of the indicated resource might suppress the requested `scha_control()` or `scha_control_zone()` action. If `Failover_mode` is `RESTART_ONLY`, only `SCHA_RESOURCE_RESTART` is permitted. Other requests, including `SCHA_GIVEOVER`, `SCHA_CHECK_GIVEOVER`, `SCHA_RESTART`, and `SCHA_CHECK_RESTART`, return the `SCHA_ERR_CHECKS` exit code and the requested giveover or restart action is not executed, producing only a `syslog` message. If the `Retry_count` and `Retry_interval` properties are set on the resource, the number of resource restarts is limited to `Retry_count` attempts within the `Retry_interval`. If `Failover_mode` is `LOG_ONLY`, any `scha_control()` or `scha_control_zone()` giveover, restart, or disable request returns the `SCHA_ERR_CHECKS` exit code and the requested giveover or restart action is not executed, producing only a `syslog` message.

***tag* Arguments** The *tag* argument indicates whether the request is to restart or relocate the resource or resource group. This argument should be a string value that is defined by one of the following macros, which are defined in `scha_tags.h`:

`SCHA_CHANGE_STATE_OFFLINE`

Requests that the proxy resource that is named by the `rname` argument be brought offline on the local node. A *proxy resource* is an Oracle Solaris Cluster resource that imports the state of a resource from another cluster such as Oracle Clusterware. Oracle Clusterware is a platform-independent set of system services for cluster environments. This change in state reflects, in the context of the Oracle Solaris Cluster software, the change in state of the external resource.

When you change the state of a proxy resource with this *tag* argument, methods of the proxy resource are not executed.

If a fault occurs on a “depended-on” resource on a node, and the resource cannot recover, the monitor brings that resource on that node offline. The monitor brings the resource offline by calling the `scha_control()` or `scha_control_zone()` function with the `SCHA_RESOURCE_DISABLE` request. The monitor also brings all of the depended-on resource's offline-restart dependents offline by triggering a restart on them. When the cluster administrator resolves the fault and re-enables the depended-on resource, the monitor brings the depended-on resource's offline-restart dependents back online as well.

`SCHA_CHANGE_STATE_ONLINE`
Requests that the proxy resource that is named by the `rname` argument be brought online on the local node. A *proxy resource* is an Oracle Solaris Cluster resource that imports the state of a resource from another cluster such as Oracle Clusterware. This change in state reflects, in the context of the Oracle Solaris Cluster software, the change in state of the external resource.

When you change the state of a proxy resource with this *tag* argument, methods of the proxy resource are not executed.

`SCHA_CHECK_GIVEOVER`
Performs all the same validity checks that would be done for a `SCHA_GIVEOVER` of the resource group named by the *rgname* argument, but does not actually relocate the resource group.

`SCHA_CHECK_RESTART`
Performs all the same validity checks that would be done for a `SCHA_RESTART` request of the resource group named by the *rgname* argument, but does not actually restart the resource group.

The `SCHA_CHECK_GIVEOVER` and `SCHA_CHECK_RESTART` requests are intended to be used by resource monitors that take direct action upon resources, for example, killing and restarting processes, rather than invoking the `scha_control()` or `scha_control_zone()` function to perform a giveover or restart. If the check fails, the monitor should sleep and restart its probes rather than invoke its failover actions. See ERRORS.

The *rgname* argument is the name of the resource group that is to be restarted or relocated. If the group is not online on the node where the request is made, the request is rejected.

The *rname* argument is the name of a resource in the resource group. Presumably this is the resource whose monitor is making the `scha_control()` or `scha_control_zone()` request. If the named resource is not in the resource group, the request is rejected.

The exit code of the command indicates whether the requested action was rejected. If the request is accepted, the function does not return until the resource group or resource has completed going offline and back online. The fault monitor that called the `scha_control()` or `scha_control_zone()` function might be stopped as a result of the resource group's going offline and so might never receive the return status of a successful request.

`SCHA_GIVEOVER`

Requests that the resource group named by the *rgname* argument be brought offline on the local node, and online again on a different node of the RGM's choosing. Note that, if the resource group is currently online on two or more nodes and there are no additional available nodes on which to bring the resource group online, it can be taken offline on the local node without being brought online elsewhere. The request might be rejected depending on the result of various checks. For example, a node might be rejected as a host because the group was brought offline due to a `SCHA_GIVEOVER` request on that node within the interval specified by the `Pingpong_interval` property.

If the cluster administrator configures the `RG_affinities` properties of one or more resource groups and if you issue a **`scha_control GIVEOVER`** request on one resource group, more than one resource group might be relocated. The `RG_affinities` property is described in `rg_properties(5)`.

The `MONITOR_CHECK` method is called before the resource group that contains the resource is relocated to a new node as the result of a call to the `scha_control()` or `scha_control_zone()` function or the issuing of the `scha_control` or `scha_control_zone()` command from a fault monitor. See the `scha_control(1HA)` man page.

The `MONITOR_CHECK` method may be called on any node that is a potential new master for the resource group. The `MONITOR_CHECK` method is intended to assess whether a node is running well enough to run a resource. The `MONITOR_CHECK` method must be implemented in such a way that it does not conflict with the running of another method concurrently.

Failure of the `MONITOR_CHECK` method vetoes the relocation of the resource group to the node where the callback was invoked.

`SCHA_IGNORE_FAILED_START`

Requests that failure of the currently executing `Prenet_start` or `Start` method should not cause a failover of the resource group, despite the setting of the `Failover_mode` property.

In other words, this request overrides the recovery action that is normally taken for a resource for which the `Failover_Mode` property is set to `SOFT` or `HARD` when that resource fails to start. Normally, the resource group fails over to a different node. Instead, the resource behaves as if `Failover_Mode` is set to `NONE`. The resource enters the `START_FAILED` state, and the resource group ends up in the `ONLINE_FAULTED` state, if no other errors occur.

This request is meaningful only when it is called from a `Start` or `Prenet_start` method that subsequently exits with a nonzero status or times out. This request is valid only for the current invocation of the `Start` or `Prenet_start` method. The `scha_control()` or `scha_control_zone()` function should be called with this request in a situation in which the `Start` method has determined that the resource cannot start successfully on another node. If this request is called by any other method, the error `SCHA_ERR_INVAL` is returned.

This request prevents the "ping pong" failover of the resource group that would otherwise occur. See the scha_calls(3HA) man page for a description of the SCHA_ERR_INVAL error code.

SCHA_RESOURCE_DISABLE
Disables the resource that is named by the rname argument on the node on which the scha_control() or scha_control_zone() function is called.

If a fault occurs on a "depended-on" resource on a node and if the resource cannot recover, the monitor brings that resource on that node offline. The monitor brings the resource offline by calling the scha_control() or scha_control_zone() function with the SCHA_RESOURCE_DISABLE request. The monitor also brings all of the depended-on resource's offline-restart dependents offline by triggering a restart on them. When the cluster administrator resolves the fault and re-enables the depended-on resource, the monitor brings the depended-on resource's offline-restart dependents back online as well.

SCHA_RESOURCE_IS_RESTARTED
Requests that the resource restart counter for the resource named by the rname argument be incremented on the local node, without actually restarting the resource.

A resource monitor that restarts a resource directly without calling the scha_control() or scha_control_zone() function with the SCHA_RESOURCE_RESTART request (for example, using the pmfadm(1M) command) can use this request to notify the RGM that the resource has been restarted. This fact is reflected in subsequent calls to the scha_resource_get() function with NUM_RESOURCE_RESTARTS queries.

If the resource's type fails to declare the Retry_interval standard property, the SCHA_RESOURCE_IS_RESTARTED request of the scha_control() or scha_control_zone() function is not permitted and the scha_control() or scha_control_zone() function returns error code 13 (SCHA_ERR_RT).

SCHA_RESOURCE_RESTART
Requests that the resource named by the rname argument be brought offline and online again on the local node, without stopping any other resources in the resource group. The resource is stopped and started by applying the following sequence of methods to it on the local node:

```
MONITOR_STOP
STOP
START
MONITOR_START
```

If the resource type does not declare a STOP and START method, the resource is restarted using POSTNET_STOP and PRENET_START instead:

```
MONITOR_STOP
POSTNET_STOP
PRENET_START
MONITOR_START
```

If the resource's type does not declare a MONITOR_STOP and MONITOR_START method, only the STOP and START methods or the POSTNET_STOP and PRENET_START methods are invoked to perform the restart. The resource's type must declare a START and STOP method. See the scha_calls(3HA) man page for a description of the SCHA_ERR_RT error code.

If a method invocation fails while restarting the resource, the RGM might set an error state, or relocate the resource group, or reboot the node, depending on the setting of the Failover_mode property of the resource. For additional information, see the Failover_mode property in r_properties(5).

A resource monitor using this request to restart a resource can use the NUM_RESOURCE_RESTARTS query of scha_resource_get() to keep count of recent restart attempts.

Resource types that have PRENET_START or POSTNET_STOP methods need to use the SCHA_RESOURCE_RESTART request with care. Only the MONITOR_STOP, STOP, START, and MONITOR_START methods are applied to the resource. Network address resources on which this resource depends are not restarted and remain online.

If a fault occurs on a "depended-on" resource on a node, and the resource cannot recover, the monitor brings that resource on that node offline. The monitor brings the resource offline by calling the scha_control() or scha_control_zone() function with the SCHA_RESOURCE_DISABLE request. The monitor also brings all of the depended-on resource's offline-restart dependents offline by triggering a restart on them. When the cluster administrator resolves the fault and re-enables the depended-on resource, the monitor brings the depended-on resource's offline-restart dependents back online as well.

SCHA_RESTART
Requests that the resource group named by the *rgname* argument be brought offline, then online again, without forcing relocation to a different node. The request may ultimately result in relocating the resource group if a resource in the group fails to restart. A resource monitor using this request to restart a resource group can use the NUM_RG_RESTARTS query of scha_resource_get() to keep count of recent restart attempts.

Return Values These functions return the following values:

0	The function succeeded.
nonzero	The function failed.

Errors

SCHA_ERR_NOERR	The function succeeded.
SCHA_ERR_CHECKS	The request was rejected. The checks on relocation failed.

See the scha_calls(3HA) man page for a description of other error codes.

Normally, a fault monitor that receives an error code from the scha_control() or the scha_control_zone() function should sleep for awhile and then restart its probes. These functions must do so because some error conditions resolve themselves after awhile. An example of such an error condition is the failover of a global device service, which causes disk resources to become temporarily unavailable. After the error condition has resolved, the resource itself might become healthy again. If not, a subsequent `scha_control()` or `scha_control_zone()` request might succeed.

Files

`/usr/cluster/include/scha.h`	Include file
`/usr/cluster/lib/libscha.so`	Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/developer/api`
Interface Stability	Evolving

See Also `rt_callbacks(1HA)`, `scha_control(1HA)`, `pmfadm(1M)`, `scha_calls(3HA)`, `scha_resource_open(3HA)`, `scha_strerror(3HA)`, `attributes(5)`, `r_properties(5)`, `rg_properties(5)`, `rt_properties(5)`

Name scha_resourcegroup_open, scha_resourcegroup_open_zone, scha_resourcegroup_get, scha_resourcegroup_get_zone, scha_resourcegroup_close – resource information access functions

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  scha
#include <scha.h>

scha_err_t scha_resourcegroup_open(const char *rgname, scha_resourcegroup_t *handle);

scha_err_t scha_resourcegroup_open_zone(const char *cluster, const char *rg_name,
     scha_resourcegroup_t *handlep);

scha_err_t scha_resourcegroup_close(scha_resourcegroup_t  handle);

scha_err_t scha_resourcegroup_get(scha_resourcegroup_t handle, const char *tag...);

scha_err_t scha_resourcegroup_get_zone(const char *cluster, scha_resourcegroup_t
     handlep, const char *rg_tag, ...);
```

Description The `scha_resourcegroup_open()`, `scha_resourcegroup_get()`, and `scha_resourcegroup_close()` functions are used together to access information about a resource group that is managed by the Resource Group Manager (RGM) cluster facility.

`scha_resourcegroup_open()` initializes access of the resource group and returns a handle to be used by `scha_resourcegroup_get()`.

The *rgname* argument names the resource group to be accessed.

The *handle* argument is the address of a variable to hold the value that is returned by the function.

`scha_resourcegroup_get()` accesses resource group information as indicated by the *tag* argument. The *tag* should be a string value that is defined by a macro in the `scha_tags.h` header file. Arguments following the tag depend on the value of *tag*. An additional argument following the tag might be needed to indicate a cluster node from which the information is to be retrieved.

The last argument in the argument list is to be of a type suitable to hold the information indicated by *tag*. This parameter is the output argument for the resource group information that is to be retrieved. No value is returned for the output argument if the function fails. Memory that is allocated to hold information that is returned by `scha_resourcegroup_get()` remains intact until `scha_resourcegroup_close()` is called on the handle that is used for `scha_resourcegroup_get()`.

`scha_resourcegroup_close()` takes a *handle* argument that is returned from a previous call to `scha_resourcegroup_open()`. It invalidates the handle and frees memory that is allocated to return values to `scha_resourcegroup_get()` calls that were made with the handle. Note that memory, if needed to return a value, is allocated for each `get` call. Space that is allocated to return a value in one call is not overwritten or reused by subsequent calls.

The scha_resourcegroup_open_zone() and scha_resourcegroup_get_zone() functions serve the same purpose as scha_resourcegroup_open() and scha_resourcegroup_get() respectively, with an additional cluster argument specifying the name of a zone cluster in which the resource groups exist and on which you want to operate. These functions are useful when code is executed in the global zone but needs to operate on a specified zone cluster. They cannot be used within a zone cluster to access a different zone cluster.

If the cluster argument to scha_resourcegroup_open_zone() or scha_resourcegroup_get_zone() is NULL, the query is performed on the cluster within which the call is executed; in other words, the call with NULL argument is equivalent to scha_resourcegroup_open() or scha_resourcegroup_get(), respectively.

To close the handle returned by scha_resourcegroup_open_zone(), use scha_resourcegroup_close(). No cluster argument is required.

Macros That You Can Use for *tag* Arguments

You can use the following macros that are defined in scha_tags.h as *tag* arguments to the scha_resourcegroup_get() function. These macros name resource group properties. The value of the property of the resource group is generated. The RG_STATE property refers to the value on the node where the function is called.

The type of the output argument and any additional arguments are indicated. Structure and enum types are described in the scha_calls(3HA) man page.

SCHA_ALL_LOAD_FACTORS
    The output argument type is scha_str_array_t**.

SCHA_ALL_LOAD_FACTOR_NAMES
    The output argument type is scha_str_array_t**.

SCHA_DESIRED_PRIMARIES
    The output argument type is int*.

SCHA_FAILBACK
    The output argument type is boolean_t*.

SCHA_LOAD_FACTOR
    The output argument type is int*.

SCHA_GLOBAL_RESOURCES_USED
    The output argument type is scha_str_array_t**.

SCHA_IMPL_NET_DEPEND
    The output argument type is boolean_t*.

SCHA_MAXIMUM_PRIMARIES
    The output argument type is int*.

SCHA_NODELIST
    The output argument type is scha_str_array_t**.

SCHA_PATHPREFIX
The output argument type is char**.

SCHA_PINGPONG_INTERVAL
The output argument type is int*.

SCHA_PREEMPTION_MODE
The output argument type is scha_rg_preemption_mode_t*.

SCHA_PRIORITY
The output argument type is int*.

SCHA_RESOURCE_LIST
The output argument type is scha_str_array_t**.

SCHA_RG_AFFINITIES
The output argument type is char**.

SCHA_RG_AUTO_START
The output argument type is boolean_t*.

SCHA_RG_DEPENDENCIES
The output argument type is scha_str_array_t**.

SCHA_RG_DESCRIPTION
The output argument type is char**.

SCHA_RG_IS_FROZEN
The output argument type is boolean_t*.

SCHA_RG_MODE
The output argument type is scha_rgmode_t*.

SCHA_RG_PROJECT_NAME
The output argument type is char**.

SCHA_RG_SLM_CPU
The output argument type is char**.

SCHA_RG_SLM_CPU_MIN
The output argument type is char**.

SCHA_RG_SLM_PSET_TYPE
The output argument type is char**.

SCHA_RG_SLM_TYPE
The output argument type is char**.

SCHA_RG_STATE
The output argument type is scha_rgstate_t*.

SCHA_RG_STATE_NODE
The output argument type is `scha_rgstate_t*`. An additional argument type is `char*`. The additional argument names a cluster node and returns the state of the resource group on that node.

SCHA_RG_SUSP_AUTO_RECOVERY
The output argument type is `boolean_t*`.

SCHA_RG_SYSTEM
The output argument type is `boolean_t*`.

Return Values These functions return the following:

0	The function succeeded.
nonzero	The function failed.

Errors

SCHA_ERR_NOERR	The function succeeded.

See scha_calls(3HA) for a description of other error codes.

Examples **EXAMPLE 1** Using the `scha_resourcegroup_get()` Function

The following example uses `scha_resourcegroup_get()` to get the list of resources in the resource group `example_RG`.

```
main() {
   #include <scha.h>

   scha_err_t err;
   scha_str_array_t *resource_list;
   scha_resourcegroup_t handle;
   int ix;

   char * rgname = "example_RG";

   err = scha_resourcegroup_open(rgname, &handle);

   err = scha_resourcegroup_get(handle, SCHA_RESOURCE_LIST, \
         &resource_list);

   if (err == SCHA_ERR_NOERR) {
    for (ix = 0; ix < resource_list->array_cnt; ix++) {
        printf("Group: %s contains resource %s\
", rgname,
                resource_list->str_array[ix]);
        }
    }

/* resource_list memory freed */
```

EXAMPLE 1 Using the `scha_resourcegroup_get()` Function *(Continued)*

```
 err = scha_resourcegroup_close(handle);
}
```

Files

`/usr/cluster/include/scha.h`	Include file
`/usr/cluster/lib/libscha.so`	Library

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also

`clnode(1CL)`, `scha_resourcegroup_get(1HA)`, `scha_calls(3HA)`, `attributes(5)`

Name scha_resource_open, scha_resource_open_zone, scha_resource_get, scha_resource_get_zone, scha_resource_close – resource information access functions

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  scha
#include <scha.h>

scha_err_t scha_resource_open(const char *rname, const char *rgname,
     scha_resource_t *handle);

scha_err_t scha_resource_open_zone(const char *cluster, const char *rs_name,
     const char *rg_name, scha_resource_t *handlep);

scha_err_t scha_resource_get(scha_resource_t handle, const char *tag,...);

scha_err_t scha_resource_get_zone(const char *cluster, scha_resource_t handlep,
     const char *rs_tag, ...);

scha_err_t scha_resource_close(scha_resource_t handle);
```

Description The `scha_resource_open()`, `scha_resource_get()`, and `scha_resource_close()` functions are used together to access information about a resource that is managed by the Resource Group Manager (RGM) cluster facility.

`scha_resource_open()` initializes access of the resource and returns a handle to be used by `scha_resource_get()`.

The *rname* argument of `scha_resource_open()` names the resource to be accessed. The *rgname* argument is the name of the resource group in which the resource is configured. The *rgname* argument may be `NULL` if the group name is not known. However, the execution of the function is more efficient if it is provided. The *handle* argument is the address of a variable to hold the value returned from the function call.

`scha_resource_get()` accesses resource information as indicated by the *tag* argument. The *tag* argument should be a string value defined by a macro in the `scha_tags.h` header file. Arguments following the tag depend on the value of *tag*. An additional argument following the tag might be needed to indicate a cluster node from which the information is to be retrieved, or other information that is specific to the tag. The last argument in the argument list is to be of a type that is suitable to hold the information that is indicated by *tag*. This argument is the output argument for the resource information. No value is returned for the output argument if the function fails.

Memory that is allocated to hold information returned by `scha_resource_get()` remains intact until `scha_resource_close()` is called on the handle used for the `scha_resource_get()`. Note that repeated calls to `scha_resource_get()` with the same handle and tag cause new memory to be allocated. Space allocated to return a value in one call will not be overwritten and reused by subsequent calls.

The `scha_resource_close()` function takes a *handle* argument that is returned from a previous call to `scha_resource_open()`. It invalidates the handle and frees memory allocated to return values to `scha_resource_get()` calls that were made with the handle.

Macros defined in scha_tags.h that might be used as *tag* arguments to scha_resource_get() follow.

The type of the output argument and any additional arguments are indicated. Structure and enum types are described in scha_calls(3HA).

The scha_resource_open_zone() and scha_resource_get_zone() functions serve the same purpose as scha_resource_open() and scha_resource_get() respectively, with an additional cluster argument specifying the name of a zone cluster in which the resource groups exist and on which you want to operate. These functions are useful when code is executed in the global zone but needs to operate on a specified zone cluster. They cannot be used within a zone cluster to access a different zone cluster.

If the cluster argument to scha_resource_open_zone() or scha_resource_get_zone() is NULL, the query is performed on the cluster within which the call is executed; in other words, the call with NULL argument is equivalent to scha_resource_open() or scha_resource_get(), respectively.

To close the handle returned by scha_resource_open_zone(), use scha_resource_close(). No cluster argument is required.

Tag Arguments

Macros that name resource properties are listed below. The value of the property of the resource is output. The SCHA_RESOURCE_STATE, SCHA_STATUS, SCHA_NUM_RG_RESTARTS, and SCHA_NUM_RESOURCE_RESTARTS properties refer to the value on the node where the command is executed (see r_properties(5)).

The type of output argument and any additional arguments are indicated.

Extension properties
: These properties are declared in the Resource Type Registration (RTR) file of the resource's type. The implementation of the resource type defines these properties.

SCHA_AFFINITY_TIMEOUT
: The output argument type is int*.

SCHA_ALL_EXTENSIONS
: The output argument type is scha_str_array_t**. Returns the names of all extension properties of the resource.

SCHA_APPLICATION_USER
: The output argument type is char**.

SCHA_BOOT_TIMEOUT
: The output argument type is int*.

SCHA_CHEAP_PROBE_INTERVAL
: The output argument type is int*.

SCHA_EXTENSION
The output argument type is scha_extprop_value_t**. Requires an additional argument of type char*, which provides the name of an extension property. Returns the type of property and its value for the local node.

When a user requests the value of this property on a node for which an explicit value has not been assigned, the default value that is declared in the RTR file is returned. See the rt_reg(4) man page.

SCHA_EXTENSION_NODE
The output argument type is scha_extprop_value_t**. Requires two additional arguments of type char*. The first argument provides the name of the extension property and the second argument names a cluster node. Returns the type of property and its value for the named node.

When a user requests the value of this property on a node for which an explicit value has not been assigned, the default value that is declared in the RTR file is returned. See the rt_reg(4) man page.

SCHA_FAILOVER_MODE
The output argument type is scha_failover_mode_t*.

SCHA_FINI_TIMEOUT
The output argument type is int*.

SCHA_GLOBAL_ZONE_OVERRIDE
The output argument type is boolean_t*.

SCHA_GROUP
The output argument type is char**. Returns the name of the resource group in which the resource is configured.

SCHA_INIT_TIMEOUT
The output argument type is int*.

SCHA_LOAD_BALANCING_POLICY
The output argument type is char**.

SCHA_LOAD_BALANCING_WEIGHTS
The output argument type is scha_str_array_t**.

SCHA_MONITOR_CHECK_TIMEOUT
The output argument type is int*.

SCHA_MONITOR_START_TIMEOUT
The output argument type is int*.

SCHA_MONITOR_STOP_TIMEOUT
The output argument type is int*.

SCHA_MONITORED_SWITCH
The output argument type is scha_switch_t*. The return value indicates if the resource is monitored on the local node.

SCHA_MONITORED_SWITCH_NODE
The output argument type is scha_switch_t*. Requires an additional argument of type char*, which names a cluster node. The return value indicates if the resource is monitored on the specified node.

SCHA_NETWORK_RESOURCES_USED
The output argument type is scha_str_array_t**.

SCHA_NUM_RESOURCE_RESTARTS
The output argument type is int*. Returns the number of resource restart requests that have occurred for this resource in the zone in which the query is executed. For further details, see the r_properties(5) man page.

SCHA_NUM_RG_RESTARTS
The output argument type is int*. Returns the number of resource group restart requests that have occurred for this resource in the zone in which the query is executed. For further details, see the r_properties(5) man page.

SCHA_ON_OFF_SWITCH
The output argument type is scha_switch_t*. The return value indicates if the resource is enabled on the local node.

SCHA_ON_OFF_SWITCH_NODE
The output argument type is scha_switch_t*. Requires an additional argument of type char*, which names a cluster node. The return value indicates if the resource is enabled on the specified node.

SCHA_PORT_LIST
The output argument type is scha_str_array_t**.

SCHA_POSTNET_STOP_TIMEOUT
The output argument type is int*.

SCHA_PRENET_START_TIMEOUT
The output argument type is int*.

SCHA_R_DESCRIPTION
The output argument type is char**.

SCHA_RESOURCE_DEPENDENCIES
The output argument type is scha_str_array_t**. The return value lists the dependencies that are applicable on the local node.

SCHA_RESOURCE_DEPENDENCIES_NODE
The output argument type is scha_str_array_t**. Requires an additional argument of type char*, which names a cluster node. The return value lists the dependencies that are applicable on the specified node.

SCHA_RESOURCE_DEPENDENCIES_OFFLINE_RESTART
The output argument type is scha_str_array_t**. The return value lists the dependencies that are applicable on the local node.

SCHA_RESOURCE_DEPENDENCIES_OFFLINE_RESTART_NODE
The output argument type is scha_str_array_t**. Requires an additional argument of type char*, which names a cluster node. The return value lists the dependencies that are applicable on the specified node.

SCHA_RESOURCE_DEPENDENCIES_Q
The output argument type is scha_str_array_t**.

The "Q" version of the SCHA_RESOURCE_DEPENDENCIES tag also returns the scope, or qualifier, if any, that was declared for the resource dependency. The {LOCAL_NODE}, {ANY_NODE}, {FROM_RG_AFFINITIES}, and @*node* qualifiers are described in the r_properties(5) man page.

SCHA_RESOURCE_DEPENDENCIES_Q_OFFLINE_RESTART
The output argument type is scha_str_array_t**.

The "Q" version of the SCHA_RESOURCE_DEPENDENCIES_OFFLINE_RESTART tag also returns the scope, or qualifier, if any, that was declared for the resource dependency. The {LOCAL_NODE}, {ANY_NODE}, {FROM_RG_AFFINITIES}, and @*node* qualifiers are described in the r_properties(5) man page.

SCHA_RESOURCE_DEPENDENCIES_Q_RESTART
The output argument type is scha_str_array_t**.

The "Q" version of the SCHA_RESOURCE_DEPENDENCIES_RESTART tag also returns the scope, or qualifier, if any, that was declared for the resource dependency. The {LOCAL_NODE}, {ANY_NODE}, {FROM_RG_AFFINITIES}, and @*node* qualifiers are described in the r_properties(5) man page.

SCHA_RESOURCE_DEPENDENCIES_Q_WEAK
The output argument type is scha_str_array_t**.

The "Q" version of the SCHA_RESOURCE_DEPENDENCIES_WEAK tag also returns the scope, or qualifier, if any, that was declared for the resource dependency. The {LOCAL_NODE}, {ANY_NODE}, {FROM_RG_AFFINITIES}, and @*node* qualifiers are described in the r_properties(5) man page.

SCHA_RESOURCE_DEPENDENCIES_RESTART
The output argument type is scha_str_array_t**. The return value lists the dependencies that are applicable on the local node.

SCHA_RESOURCE_DEPENDENCIES_RESTART_NODE
The output argument type is scha_str_array_t**. Requires an additional argument of type char*, which names a cluster node. The return value lists the dependencies that are applicable on the specified node.

SCHA_RESOURCE_DEPENDENCIES_WEAK
The output argument type is scha_str_array_t**. The return value lists the dependencies that are applicable on the local node.

SCHA_RESOURCE_DEPENDENCIES_WEAK_NODE
The output argument type is scha_str_array_t**. Requires an additional argument of type char*, which names a cluster node. The return value lists the dependencies that are applicable on the specified node.

SCHA_RESOURCE_PROJECT_NAME
The output argument type is char**.

SCHA_RESOURCE_STATE
The output argument type is scha_rsstate_t*. Returns the value of the resource's RESOURCE_STATE property for the local node.

SCHA_RESOURCE_STATE_NODE
The output argument type is scha_rsstate_t*. Requires an additional argument of type char*, which names a cluster node. Returns the value of the resource's RESOURCE_STATE property for the named node.

SCHA_RETRY_COUNT
The output argument type is int*.

SCHA_RETRY_INTERVAL
The output argument type is int*.

SCHA_SCALABLE
The output argument type is boolean_t*.

SCHA_START_TIMEOUT
The output argument type is int*.

SCHA_STATUS
The output argument type is scha_status_value_t**. Returns the value of the resource's STATUS property for the local node.

SCHA_STATUS_NODE
The output argument type is scha_status_value_t**. Requires an additional argument of type char*, which names a cluster node. Returns the value of the resource's STATUS property for the named node.

SCHA_STOP_TIMEOUT
The output argument type is int*.

SCHA_THOROUGH_PROBE_INTERVAL
The output argument type is int*.

SCHA_TYPE
The output argument type is char**.

SCHA_TYPE_VERSION
The output argument type is `char**`.

SCHA_UDP_AFFINITY
The output argument type is `boolean_t*`.

SCHA_UPDATE_TIMEOUT
The output argument type is `int*`.

SCHA_VALIDATE_TIMEOUT
The output argument type is `int*`.

SCHA_WEAK_AFFINITY
The output argument type is `boolean_t*`.

Macros that name resource type properties are listed below. The value of the property of the resource's type is output. For descriptions of resource type properties, see `rt_properties(5)`.

SCHA_API_VERSION
The output argument type is `int*`.

SCHA_BOOT
The output argument type is `char**`.

SCHA_FAILOVER
The output argument type is `boolean_t*`.

SCHA_FINI
The output argument type is `char**`.

SCHA_GLOBAL_ZONE
The output argument type is `boolean_t*`.

SCHA_INIT
The output argument type is `char**`.

SCHA_INIT_NODES
The output argument type is `scha_initnodes_flag_t*`.

SCHA_INSTALLED_NODES
The output argument type is `scha_str_array_t**`.

SCHA_MONITOR_CHECK
The output argument type is `char**`.

SCHA_MONITOR_START
The output argument type is `char**`.

SCHA_MONITOR_STOP
The output argument type is `char**`.

SCHA_PKGLIST
The output argument type is `scha_str_array_t**`.

SCHA_POSTNET_STOP
The output argument type is char**.

SCHA_PRENET_START
The output argument type is char**.

SCHA_PROXY
The output argument type is boolean_t*.

SCHA_RT_BASEDIR
The output argument type is char**.

SCHA_RT_DESCRIPTION
The output argument type is char**.

SCHA_RT_SYSTEM
The output argument type is boolean_t*.

SCHA_RT_VERSION
The output argument type is char**.

SCHA_SINGLE_INSTANCE
The output argument type is boolean_t*.

SCHA_START
The output argument type is char**.

SCHA_STOP
The output argument type is char**.

SCHA_UPDATE
The output argument type is char**.

SCHA_VALIDATE
The output argument type is char**.

If this resource's type declares the GLOBAL_ZONE_OVERRIDE resource property, the value that is retrieved by the SCHA_GLOBAL_ZONE *optag* is the current value of the GLOBAL_ZONE_OVERRIDE property, rather than the value of the GLOBAL_ZONE property. For more information, see the description of the Global_zone property in the rt_properties(5) man page and the Global_zone_override property in the r_properties(5) man page.

Return Values These functions return the following values:

0	The function succeeded.
nonzero	The function failed.

Errors

SCHA_ERR_NOERR	The function succeeded.

scha_calls(3HA) for a description of other error codes.

Examples

EXAMPLE 1 Using the `scha_resource_get()` Function

The following example uses `scha_resource_get()` to get the value of the `Retry_count` property of a resource, and the value of the extension property named `Loglevel`.

```
main() {
  #include <scha.h>

  scha_err_t err;
  int retry_count_out;
  scha_extprop_value_t *loglevel_out;
  scha_resource_t handle;

/* a configured resource */
  char * resource_name = "example_R";
/* resource group containing example_R */
  char * group_name = "example_RG";

  err = scha_resource_open(resource_name, group_name, &handle);

  err = scha_resource_get(handle, SCHA_RETRY_COUNT, &retry_count_out);

/* Given extension property must be defined in resourcetype RTR file. */
  err = scha_resource_get(handle, SCHA_EXTENSION, "LogLevel", &loglevel_out);

  err = scha_resource_close(handle);

  printf("The retry count for resource %s is %d\n", resource_name,
         retry_count_out);

  printf("The log level for resource %s is %d\n", resource_name,
         loglevel_out->val.val_int);
}
```

Files

`/usr/cluster/include/scha.h`	Include file
`/usr/cluster/lib/libscha.so`	Library

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also

scha_resource_get(1HA), scha_calls(3HA), scha_strerror(3HA), attributes(5), r_properties(5), rt_properties(5), rt_reg(4)

Name scha_resource_setstatus, scha_resource_setstatus_zone – set resource status functions

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  scha
#include <scha.h>

scha_err_t scha_resource_setstatus(const char *rname, const char *rgname,
     scha_rsstatus_t status, const char *status_msg);

scha_err_t scha_resource_setstatus_zone(const char *rname, const char *rgname,
     const char *zonename, scha_rsstatus_t status, const char *status_msg);
```

Description The `scha_resource_setstatus()` and `scha_resource_setstatus_zone()` functions set the `Status` and `Status_msg` properties of a resource that is managed by the Resource Group Manager (RGM). A resource's monitor uses these functions to indicate the resource's state as perceived by the monitor.

Use the `scha_resource_setstatus_zone()` function only for resource types whose `Global_zone` property is set to `TRUE`. This function is not needed if the `Global_zone` property is set to `FALSE`. For more information, see the `rt_properties(5)` man page.

The *rname* argument names the resource whose status is to be set.

The *rgname* argument is the name of the resource group that contains the resource.

The *zonename* argument is the name of the zone cluster in which the resource group is configured to run. If the `Global_zone` property is set to `TRUE`, methods execute in the global zone even if the resource group that contains the resource runs in a zone cluster.

The *status* argument is an `enum` value of type `scha_rsstatus_t`: `SCHA_RSSTATUS_OK`, `SCHA_RSSTATUS_OFFLINE`, `SCHA_RSSTATUS_FAULTED`, `SCHA_RSSTATUS_DEGRADED`, or `SCHA_RSSTATUS_UNKNOWN`.

The *status-msg* argument is the new value for the `Status_msg` property. The *status-msg* argument can be `NULL`.

A successful call to the `scha_resource_setstatus()` or `scha_resource_setstatus_zone()` function causes the `Status` and `Status_msg` properties of the resource to be updated with the supplied values. The update of the resource status is logged in the cluster system log and is accessible by cluster administration tools.

Return Values The `scha_resource_setstatus()` and `scha_resource_setstatus_zone()` functions return the following values:

`0`	The function succeeded.
nonzero	The function failed.

Errors

`SCHA_ERR_NOERR`	The function succeeded.

See `scha_calls(3HA)` for a description of other error codes.

Examples

EXAMPLE 1 Using the `scha_resource_setstatus()` Function

```
#include <scha.h>

scha_err_t err_code;
const char *rname = "example_R";
const char *rgname = "example_RG";

err_code = scha_resource_setstatus(rname, rgname,
           SCHA_RSSTATUS_OK, "No problems");
```

Files

`/usr/cluster/include/scha.h`	Include file
`/usr/cluster/lib/libscha.so`	Library

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also

`scha_resource_setstatus(1HA)`, `scha_calls(3HA)`, `scha_strerror(3HA)`, `attributes(5)`, `rt_properties(5)`

Name scha_resourcetype_open, scha_resourcetype_open_zone, scha_resourcetype_get, scha_resourcetype_get_zone, scha_resourcetype_close – resource type information access functions.

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  scha
#include <scha.h>

scha_err_t scha_resourcetype_open(const char *rtname, scha_resourcetype_t *handle);

scha_err_t scha_resourcetype_open_zone(const char *cluster, const char *rt_name,
     scha_resourcetype_t *handlep);

scha_err_t scha_resourcetype_close(scha_resourcetype_t  handle);

scha_err_t scha_resourcetype_get(scha_resourcetype_t handle, const char *tag...);

scha_err_t scha_resourcetype_get_zone(const char *cluster, scha_resourcetype_t
     handlep,const char *rt_tag, ...);
```

Description You use the `scha_resourcetype_open()`, `scha_resourcetype_get()`, and `scha_resourcetype_close()` functions to access information about a resource type that is used by the Resource Group Manager (RGM) cluster facility.

`scha_resourcetype_open()` initializes access of the resource type and returns a handle to be used by `scha_resourcetype_get()`.

The *rtname* argument of `scha_resourcetype_open()` names the resource type to be accessed.

The *handle* argument is the address of a variable to hold the value returned from the function call.

`scha_resourcetype_get()` accesses resource type information as indicated by the *tag* argument. The *tag* argument should be a string value defined by a macro in the `scha_tags.h` header file. Arguments following the tag depend on the value of *tag*.

An additional argument following the tag may be needed to indicate a cluster node from which the information is to be retrieved, or other information specific to the tag. The last argument in the argument list is to be of a type suitable type to hold the information indicated by *tag*. This is the "out" argument for the resource type information. No value is returned for the “out” parameter if the function fails. Memory that is allocated to hold information returned by `scha_resourcetype_get()` remains intact until `scha_resourcetype_close()` is called on the handle that is used for `scha_resourcetype_get()`.

`scha_resourcetype_close()` takes a *handle* argument that is returned from a previous call to `scha_resourcetype_open()`. This function invalidates the handle and frees memory allocated to return values to `scha_resourcetype_get()` calls that were made with the handle. Note that memory, if needed to return a value, is allocated for each "get" call. Space allocated to return a value in one call is not overwritten and reused by subsequent calls.

Macros defined in `scha_tags.h` that might be used as *tag* arguments to `scha_resourcetype_get()` follow. The type of the output argument and any additional arguments are indicated. Structure and `enum` types are described in `scha_calls(3HA)`.

The `scha_resourcetype_open_zone()` and `scha_resourcetype_get_zone()` functions serve the same purpose as `scha_resourcetype_open()` and `scha_resourcetype_get()` respectively, with an additional `cluster` argument specifying the name of a zone cluster in which the resource groups exist and on which you want to operate. These functions are useful when code is executed in the global zone but needs to operate on a specified zone cluster. They cannot be used within a zone cluster to access a different zone cluster.

If the `cluster` argument to `scha_resourcetype_open_zone()` or `scha_resourcetype_get_zone()` is NULL, the query is performed on the cluster within which the call is executed; in other words, the call with NULL argument is equivalent to `scha_resourcetype_open()` or `scha_resourcetype_get()`, respectively.

To close the handle returned by `scha_resourcetype_open_zone()`, use `scha_resourcetype_close()`. No `cluster` argument is required.

optag Arguments

The following macros name resource type properties. The value of the named property of the resource's type is output.

Note – *optag* arguments, such as `SCHA_API_VERSION` and `SCHA_BOOT`, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify *optag* arguments.

`SCHA_API_VERSION`
The output argument is of type `int*`.

`SCHA_BOOT`
The output argument is of type `char **`.

`SCHA_FAILOVER`
The output argument is of type `boolean_t *`.

`SCHA_FINI`
The output argument is of type `char **`.

`SCHA_GLOBALZONE`
The output argument is of type `boolean_t *`.

`SCHA_INIT`
The output argument is of type `char **`.

`SCHA_INIT_NODES`
The output argument is of type `scha_initnodes_flag_t *`.

`SCHA_INSTALLED_NODES`
The output argument is of type `scha_str_array_t **`.

SCHA_IS_LOGICAL_HOSTNAME
The output argument is of type `boolean_t *`.

SCHA_IS_SHARED_ADDRESS
The output argument is of type `boolean_t *`.

SCHA_MONITOR_CHECK
The output argument is of type `char **`.

SCHA_MONITOR_START
The output argument is of type `char **`.

SCHA_MONITOR_STOP
The output argument is of type `char **`.

SCHA_PER_NODE
The output argument is of type `boolean_t *`.

SCHA_PKGLIST
The output argument is of type `scha_str_array_t **`.

SCHA_POSTNET_STOP
The output argument is of type `char **`.

SCHA_PRENET_START
The output argument is of type `char **`.

SCHA_PROXY
The output argument is of type `boolean_t *`.

SCHA_RESOURCE_LIST
The output argument is of type `scha_str_array_t**`.

SCHA_RT_BASEDIR
The output argument is of type `char **`.

SCHA_RT_DESCRIPTION
The output argument is of type `char **`.

SCHA_RT_SYSTEM
The output argument is of type `boolean_t *`.

SCHA_RT_VERSION
The output argument is of type `char **`.

SCHA_SINGLE_INSTANCE
The output argument is of type `boolean_t *`.

SCHA_START
The output argument is of type `char **`.

SCHA_STOP
The output argument is of type `char **`.

SCHA_UPDATE
The output argument is of type char **.

SCHA_VALIDATE
The output argument is of type char **.

Return Values

These functions return the following values:

0	The function succeeded.
nonzero	The function failed.

Errors

SCHA_ERR_NOERR	The function succeeded.

See the scha_calls(3HA) man page for a description of other error codes.

Files

/usr/cluster/include/scha.h	Include file
/usr/cluster/lib/libscha.so	Library

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also

scha_resource_get(1HA), scha_calls(3HA), scha_strerror(3HA), scha_strerror_i18n(3HA), attributes(5), rt_properties(5)

Name scha_strerror, scha_strerror_i18n – generate error message from error code

Synopsis

```
cc [flags...] -I /usr/cluster/include file -L /usr/cluster/lib  -l  scha
#include <scha.h>

char *scha_strerror(scha_err_t error_code);

char *scha_strerror_i18n(scha_err_t error_code);
```

Description The `scha_strerror()` and `scha_strerror_i18n()` functions generate a short string that describes the error from the given `scha_err_t` error code. Strings that are returned by `scha_strerror()` are displayed in English. Strings that are returned by `scha_strerror_i18n()` are displayed in the native language that is specified by the `LC_MESSAGES` locale category. See `setlocale(3C)`.

Parameters The following parameters are supported:

error_code Error code from which the short string that describes the error is generated.

Examples **EXAMPLE 1** Using the `scha_strerror_i18n()` Function

```
sample()
{
      scha_err_t  err;

      /* resource group containing example_R */
      char * resource_group = "example_RG";

      /* a configured resource */
      char * resource_name = "example_R";

      err = scha_control(SCHA_GIVEOVER, resource_group, resource_name);

      if (err != SCHA_ERR_NOERR) {
          syslog(LOG_ERR, "scha_control GIVEOVER failed: %s",
             scha_strerror_i18n(err));
      }
}
```

Files

`/usr/cluster/include/scha.h`	Include file
`/usr/cluster/lib/libscha.so`	Library

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Interface Stability	Evolving

See Also scha_calls(3HA), setlocale(3C), syslog(3C), attributes(5)

REFERENCE

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Name clusters – cluster names database

Synopsis `/etc/clusters`

Description The `clusters` file contains information regarding the known clusters in the local naming domain. For each cluster a single line should be present with the following information:

```
clustername        whitespace-delimited list of hosts
```

Expansion is recursive if a name on the right hand side is tagged with the expansion marker: “*".

Items are separated by any number of blanks and/or TAB characters. A ‘#' indicates the beginning of a comment. Characters up to the end of the line are not interpreted by routines which search the file.

Cluster names may contain any printable character other than an upper case character, a field delimiter, NEWLINE, or comment character. The maximum length of a cluster name is 32 characters.

This information is used by Oracle Solaris Cluster system administration tools, like the `pconsole` command, to specify a group of nodes to administer. The names used in this database must be host names, as used in the hosts database.

The database is available from either NIS or NIS+ maps or a local file. Lookup order can be specified in the `/etc/nsswitch.conf` file. The default order is nis files.

Examples **EXAMPLE 1** A Sample `/etc/clusters` File

Here is a typical `/etc/clusters` file:

```
bothclusters        *planets *wine
planets            mercury venus
wine                zinfandel merlot chardonnay riesling
```

Here is a typical `/etc/nsswitch.conf` entry:

```
clusters: nis files
```

Files `/etc/clusters`

`/etc/nsswitch.conf`

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also serialports(4), nsswitch.conf(4), attributes(5)

Name commandlog – command log file

Synopsis `/var/cluster/logs/commandlog`

Description The `commandlog` ASCII text file contains records of selected Oracle Solaris Cluster commands that are executed in a cluster. The logging of commands starts automatically when you set up the cluster and ends when you shut down the cluster.

Commands that are not logged in this file include those that display the configuration and current state of the cluster. Commands that are logged in this file include those that configure and change the current state of the cluster, as follows:

- `claccess`
- `cldevice`
- `cldevicegroup`
- `clinterconnect`
- `clnasdevice`
- `clnode`
- `clquorum`
- `clreslogicalhostname`
- `clresource`
- `clresourcegroup`
- `clresourcetype`
- `clressharedaddress`
- `clsnmphost`
- `clsnmpmib`
- `clsnmpuser`
- `cltelemetryattribute`
- `cluster`
- `clzonecluster`
- `scconf`
- `scdidadm`
- `scdpm`
- `scgdevs`
- `scrgadm`
- `scshutdown`
- `scswitch`

Each record in the `commandlog` file contains the following information:

- Date and timestamp
- Host name from the which the command was executed
- Process ID of the command
- ID of the user who executed the command
- Command that the user executed, including all options and operands

Note – Command options are quoted in the `commandlog` file to enable you to copy, paste, and execute them in the shell.

- Exit status or signal of the executed command

By default, the `commandlog` file is regularly archived at the end of every week. Oracle Solaris Cluster maintains up to eight previously archived `commandlog` files on each cluster node at any given time.

Examples

EXAMPLE 1 `/var/cluster/logs/commandlog` File

The following example shows the contents of a typical `/var/cluster/logs/commandlog` file:

```
11/11/2011 09:43:36 phys-schost-1 5758 root START - clrg add "app-sa-1"
11/11/2011 09:43:36 phys-schost-1 5758 root END 0
11/11/2011 09:43:36 phys-schost-1 5760 root START - clrg set -y
"RG_description=Department Shared Address RG" "app-sa-1"
11/11/2011 09:43:37 phys-schost-1 5760 root END 0
11/11/2011 09:44:15 phys-schost-1 5810 root START - clrg online "app-sa-1"
11/11/2011 09:44:15 phys-schost-1 5810 root END 0
11/11/2011 09:44:19 phys-schost-1 5222 root END -20988320
12/02/2011 14:37:21 phys-schost-1 5542 jbloggs START - clrg -c -g "app-sa-1"
-y "RG_description=Joe Bloggs Shared Address RG"
12/02/2011 14:37:22 phys-schost-1 5542 jbloggs END 0
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core
Interface Stability	Evolving

See Also

`scha_control(1HA)`, `scha_resource_setstatus(1HA)`, `scconf(1M)`, `scdidadm(1M)`, `scdpm(1M)`, `scgdevs(1M)`, `scrgadm(1M)`, `scshutdown(1M)`, `scswitch(1M)`, `attributes(5)`

Name rt_reg – resource type registration (RTR) file

Description The resource type registration (RTR) file describes a resource type. Resource types represent highly-available or scalable services that run under the control of the Resource Group Manager (RGM) cluster facility. The file is part of a resource type implementation and is used as an input file for the `scrgadm(1M)` command to register the resource type in a cluster configuration. Registering the resource type is a prerequisite to creating resources of that type to run in the cluster. By convention, the RTR file resides in the `/opt/cluster/lib/rgm/rtreg` directory.

A RTR file declares the resource type properties and resource properties of a resource type. The file is divided into two parts, the declaration of resource type properties, and of resource properties. Note that recognition of property names is not case sensitive.

The resource type property declarations provide the information on the resource type implementation, such as paths to the callback methods that are to be invoked by the RGM to control resources of the type. Most resource type properties have fixed values set in the `rt_reg` file. These properties are inherited by all resources of the type.

A resource type implementor can also customize and extend the administrative view of resource properties. There are two kinds of resource properties that can have entries in the second part of an `rt_reg` file: system defined properties and extension properties.

System-defined resource properties have predetermined types and semantics. The `rt_reg` file can be used to set attributes such as default, minimum and maximum values for system defined resource properties. The `rt_reg` file can also be used to declare extension properties that are defined entirely by the resource type implementation. Extension properties provide a way for a resource type to add information to the configuration data for a resource that is maintained and managed by the cluster system.

The `rt_reg` file can set default values for resource properties, but the actual values are set in individual resources. The properties in the `rt_reg` file can be variables that can be set to different values and adjusted by the cluster administrator.

Resource Type Property Declarations The resource type property declarations consist of a number of property value assignments.

```
PROPERTY_NAME = "Value";
```

See the `rt_properties(5)` man page for a list of the resource type properties you can declare in the `rt_reg` file. Since most properties have default values or are optional, the only declarations that are essential in a RTR file are the type name, the paths to the `START` and `STOP` callback methods, and RT_version.

Note that the first property in the file must be the `Resource_type` property.

A resource type name is of the form *vendor-id.RT-name:version*.

The three components of the resource type name are properties specified in the RTR file as *vendor-id*, *resource-type*, and *RT-version*. The `scrgadm` command inserts the period and colon delimiters. Although optional, the *vendor-id* prefix is recommended to distinguish between two registration files of the same name provided by different vendors. To ensure that the *vendor-id* is unique, use the stock symbol for the company that is creating the resource type.

Resource Property Declarations

Resource property declarations consist of a number of entries, each entry being a bracketed list of attribute value assignments. The first attribute in the entry must be the resource property name.

System-defined properties have predetermined type and description attributes and so these attributes cannot be re-declared in the `rt_reg` file. Range restrictions, a default value, and constraints on when the value can be set by the administrator can be declared for system defined properties.

Attributes that can be set for system-defined properties are listed in the `property_attributes(5)` man page. Attributes not available for system-defined properties are noted as such in the table.

System-defined properties that can have entries in the `rt_reg` file are listed in the `r_properties(5)` man page. The following is a sample entry for the system defined `RETRY_COUNT` resource property.

```
{
  PROPERTY = RETRY_COUNT;
  MIN=0;
  MAX=10;
  DEFAULT=2;
  TUNABLE = ANYTIME;
}
```

Entries for extension properties must indicate a type for the property. Attributes that can be set for extension properties are listed in the `property_attributes(5)` man page.

The following is a sample entry for an extension property named "`ConfigDir`" that is of string type. The `TUNABLE` attribute indicates that the cluster administrator can set the value of the property when a resource is created.

```
{
  PROPERTY = ConfigDir;
  EXTENSION;
  STRING;
  DEFAULT="/";
  TUNABLE = AT_CREATION;
}
```

Usage

An `rt_reg` file is an ASCII text file. It can include comments describing the contents of the file. The contents are the two parts described above, with the resource type property list preceding the resource property declarations.

White space can be blanks, tabs, newlines, or comments. White space can exist before or after tokens. Blanks and the pound sign (`#`) are not considered to be white space when found in quoted value tokens. White space separates tokens but is otherwise ignored.

Comments begin with # and end with the first newline encountered, inclusively.

Directives begin with #$ and end with the first newline encountered, inclusively. Directives must appear in the RTR file between the resource type property declaration section and the resource property declaration section. Directives inserted in any other location in the RTR file will produce parser errors. The only valid directives are `#$upgrade` and `#$upgrade_from`. Any other directive will produce parser errors.

Tokens are property names, property values, and the following:

`{ }`	Encloses parameter table properties
`;`	Terminates properties and attributes
`=`	Separates property names and property values or attribute names and attribute values
`,`	Separates values in a value list

The recognition of property-name keywords in the file is case insensitive.

Properties and attributes have one of three formats.

property-name `=` *property-value*`;`
property-name`;`
property-name `=` *property-value* `[,` *property-value*`];`

In the format above, the square brackets, `[ ]`, enclose optional items. That is, the property value can be a single *property-value* or a list of two or more *property-value*s separated by commas.

The first property in the property list must be the simple resource type name.

Boolean properties and attributes have the following syntax:

boolean-property-name`;`
boolean-property-name `= TRUE;`
boolean-property-name `= FALSE;`

The first and second forms both set the *boolean-property-name* to `TRUE`.

Resource type property names are listed in the `rt_properties(5)` man page. System-defined properties are listed in the `r_properties(5)` man page.

Resource declarations consist of any number of entries, each being a bracketed list of resource property attributes.

{*attribute-value-list*}

Each attribute-value-list consists of attribute values for a resource property, in the same syntax used for property values, with the addition of the two type-attribute formats.

type-attribute-value;
enum-type-attribute { *enum-value* [, *enum-value*] };

The *type-attribute-value* syntax declares the data type of the extension property to have the value *type-attribute-value*. It differs from the first format of the *boolean-property-name*, which defines the property named by *boolean-property-name* to have the value `TRUE`.

For example, the `TUNABLE` attribute can have one of the following values: `FALSE` or `NONE`, `AT_CREATION`, `TRUE` or `ANYTIME`, and `WHEN_DISABLED`. When the `TUNABLE` attribute uses the syntax:

`TUNABLE;`

it gets the value of `ANYTIME`.

Grammar

The following is a description of the syntax of the `rt_reg` file with a BNF-like grammar. Non-terminals are in lower case, and terminal keywords are in upper case, although the actual recognition of keywords in the `rt_reg` file is case insensitive. The colon (`:`) following a non-terminal at the beginning of a lines indicates a grammar production. Alternative right-hand-sides of a grammar production are indicated on lines starting with a vertical bar (`|`). Variable terminal tokens are indicated in angled brackets and comments are parenthesized. Other punctuation in the right-hand side of a grammar production, such as semi-colon (`;`), equals sign (=), and angled brackets (`{}`) are literals.

A comment has the form:

`COMMENT    : #` *anything but NEWLINE* `NEWLINE`

Comments may appear after any token. Comments are treated as white-space.

```
rt_reg_file    :  Resource_type = value ; proplist upgradesect paramtable

proplist    :  (NONE: empty)
| proplist rtproperty

rtproperty    : rtboolean_prop ;
| rtvalue_prop ;
```

```
rtboolean_prop    : SINGLE_INSTANCE
| FAILOVER | RT_SYSTEM

rtvalue_prop    : rtprop = value
| PKGLIST = valuelist

rtprop    : RT_BASEDIR
| RT_VERSION
| API_VERSION
| INIT_NODES
| START
| STOP
| VALIDATE
| UPDATE
| INIT
| FINI
| BOOT
| MONITOR_START
| MONITOR_STOP
| MONITOR_CHECK
| PRENET_START
| POSTNET_STOP
| RT_DESCRIPTION
| VENDOR_ID
| rtboolean_prop (booleans may have explicit assignments.)

value    : contiguous-non-ws-non-;-characters
| "anything but quote"
| TRUE
| FALSE
| ANYTIME
| WHEN_DISABLED
| AT_CREATION
| RG_PRIMARIES
| RT_INSTALLED_NODES
|  (NONE: Empty value)

valuelist    : value
| valuelist , value

upgradesect : (empty)
| #$UPGRADE upgradelist

upgradelist :  (empty)
| upgradelist #$UPGRADE_FROM rt_version upgtunability
```

```
upgtunability : ANYTIME
| AT_CREATION
| WHEN_DISABLED
| WHEN_OFFLINE
| WHEN_UNMANAGED
| WHEN_UNMONITORED

paramtable    :  (empty)
| paramtable parameter

parameter    :  { pproplist }

pproplist    : PROPERTY = value ;  (property name must come first)
| pproplist pproperty

pproperty    : pboolean_prop ;
| pvalue_prop ;
| typespec ;

pvalue_prop    : tunable_prop
| pprop = value
| pprop =  (NONE: no value setting)
| DEFAULT = valuelist

pprop    : DESCRIPTION
| MIN
| MAX
| MINLENGTH
| MAXLENGTH
| ARRAY_MINSIZE
| ARRAY_MAXSIZE
| pboolean_prop

tunable_prop    : TUNABLE
| TUNABLE = AT_CREATION
| TUNABLE = ANYTIME
| TUNABLE = WHEN_DISABLED
| TUNABLE = TRUE
| TUNABLE = FALSE
| TUNABLE = NONE

typespec    : INT
| BOOLEAN
| STRING
| STRINGARRAY
| ENUM { valuelist }
```

Examples

EXAMPLE 1 A Sample Registration File

The following is the registration file for a simple example resource type.

```
#
# Registration information for example resource type
#

Resource_type = example_RT;
Vendor_id = SUNW;
RT_Version = 2.0
RT_Basedir= /opt/SUNWxxx;
START = bin/example_service_start;
STOP  = bin/example_service_stop;

#$upgrade
#$upgrade_from "1.0" when_unmonitored

#
# Set range and defaults for method timeouts and Retry_count.
#
{ Property = START_TIMEOUT;  Tunable; MIN=60; DEFAULT=300; }
{ Property = STOP_TIMEOUT;  Tunable; MIN=60; DEFAULT=300; }
{ Property = Retry_count;  Tunable; MIN=1; MAX=20; DEFAULT=10; }

#
# An extension property that can be set at resource creation
#
{ Property = LogLevel;
  Extension;
  enum { OFF, TERSE, VERBOSE };
  Default = TERSE;
  Tunable = AT_CREATION;
  Description = "Controls the detail of example_service logging";
}
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also

scrgadm(1M), attributes(5), rt_properties(5), r_properties(5), property_attributes(5)

Oracle Solaris Cluster Data Services Developer's Guide

Name scdpmd.conf – Disk-path-monitoring daemon configuration file

Synopsis `/etc/cluster/scdpm/scdpmd.conf`

Description The `scdpmd` daemon monitors the disk paths and takes appropriate action upon path failures. You can tune this daemon by creating or modifying the configuration file `/etc/cluster/scdpm/scdpmd.conf` with tunable properties and send a `SIGHUP` signal to the `scdpmd` daemon to read the configuration file.

```
# pkill -HUP scdpmd
```

You can tune the following properties in the `scdpmd.conf` file:

Ping_interval

Description
: Interval, in seconds, between disk-path status checks

Default
: 600

Minimum
: 60

Maximum
: 3600

Ping_retry

Description
: Number of retries to query the disk-path status on failure

Default
: 3

Minimum
: 2

Maximum
: 10

Ping_timeout

Description
: Timeout, in seconds, to query any disk-path status

Default
: 30

Minimum
: 1

Maximum
: 1800

Examples The following is an example of a valid `scdpmd.conf` file:

```
Ping_interval = 120
Ping_retry = 5
Ping_timeout = 10
```

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Interface Stability	Evolving

See Also cldevice(1CL), clnode(1CL)

Name serialports – name to serial port database

Synopsis

```
/etc/serialports
serialports NIS or NIS+ maps
```

Description The `serialports` database maps a name to a server name and TCP port number that represents the serial port connected to the specified terminal server host. The database is typically used to map host names to their consoles, but may also be used to provide access to printers, modems, and the like. The mapping is used when the service is being provided by a network based terminal concentrator. For each name a single line should be present with the following information:

```
host-name    concentrator-hostname tcp-port-number
```

Items are separated by any number of blanks or TAB characters. A pound sign (#) indicates the beginning of a comment. Characters between the pound sign and the end of the line are not interpreted by routines that search the file.

You can use the Parallel Console Access (`pconsole`) utility from the command line to log into the cluster remotely. The `pconsole` utility is part of the Oracle Solaris `terminal/pconsole` package. Install the package by executing `pkg install terminal/pconsole`. The `pconsole` utility creates a host terminal window for each remote host that you specify on the command line. The utility also opens a central, or master, console window that propagates what you input there to each of the connections that you open.

Files `/etc/serialports`

`/etc/nsswitch.conf`

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/developer/api
Interface Stability	Evolving

See Also `clusters(4)`, `nsswitch.conf(4)`, `attributes(5)`

R E F E R E N C E

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Name property_attributes – resource property attributes

Description The list below describes the resource property attributes that you can use to change system-defined properties or create extension properties.

You cannot specify `NULL` or the empty string (`""`) as the default value for `Boolean`, `Enum`, or `Int` types.

`Array_maxsize`
: For `Stringarray` type, the maximum number of array elements permitted.

`Array_minsize`
: For `Stringarray` type, the minimum number of array elements that is permitted.

`Default`
: Indicates a default value for the property.

`Description`
: A string annotation intended to be a brief description of the property. The description attribute cannot be set in the RTR file for system-defined properties.

`Enumlist`
: For an `Enum` type, a set of string values permitted for the property.

`Extension`
: If used, indicates that the RTR file entry declares an extension property defined by the resource type implementation. Otherwise, the entry is a system-defined property.

`Max`
: For an `Int` type, the maximum value permitted for the property. Note that you cannot specify a maximum value for a method timeout.

`Maxlength`
: For `String` and `Stringarray` types, the maximum string length that is permitted.

`Min`
: For an `Int` type, the minimal value permitted for the property. Note that you cannot specify `Min=0` for a method timeout.

`Minlength`
: For `String` and `Stringarray` types, the minimum string length permitted.

`Per_node`
: If used, indicates that the extension property can be set on a per-node basis.

  If you specify the `Per_node` property attribute in a type definition, you must specify a default value with the `Default` property attribute as well. Specifying a default value ensures that a value is returned when a user requests a per-node property value on a node to which an explicit value has not been assigned.

`Property`
The name of the resource property.

Property Type
Allowed types are: `String`, `Boolean`, `Int`, `Enum`, and `Stringarray`. You cannot set the type attribute in an RTR file entry for system-defined properties. The type determines acceptable property values and the type-specific attributes that are allowed in the RTR file entry. An `Enum` type is a set of string values.

`Tunable`
Indicates when the cluster administrator can set the value of this property in a resource. Can be set to `None` or `False` to prevent the administrator from setting the property. Values that allow administrator tuning are: `True` or `Anytime` (at any time), `At_creation` (only when the resource is created), or `When_disabled` (when the resource is offline).

The default is `True` (`Anytime`).

Examples

EXAMPLE 1 An Int Type Definition

An `Int` type definition might look like this:

```
{
        Property = Probe_timeout;
        Extension;
        Int;
        Default = 30;
        Tunable = Anytime;
        Description = "Time out value for the probe (seconds)";
}
```

EXAMPLE 2 A Per_node Type Definition

A `Per_node` type definition might look like this:

```
{
        Property = LogLevel;
        Extension;
        Enum { Off, Terse, Verbose };
        Default = Terse;
        Per_node;
        Tunable = At_creation;
        Description ="Controls the level of detail for logging";
}
```

If you specify the `PER_NODE` property attribute in a type definition, you must specify a default value with the `DEFAULT` property attribute as well.

See Also clresource(1CL), clresourcegroup(1CL), clresourcetype(1CL), r_properties(5) rg_properties(5), rt_properties(5)

Name rg_properties – resource group properties

Description The following information describes the resource group properties that are defined by Oracle Solaris Cluster.

Resource Group Properties and Descriptions

Note – Resource group property names, such as `Auto_start_on_new_cluster` and `Desired_primaries`, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify resource group property names.

`Auto_start_on_new_cluster` (`boolean`)
This property controls whether the Resource Group Manager (RGM) starts the resource group automatically when a new cluster is forming. The default is `TRUE`.

If set to `TRUE`, the RGM attempts to start the resource group automatically to achieve `Desired_primaries` when all the nodes in the cluster are simultaneously rebooted.

If set to `FALSE`, the resource group does not start automatically when the cluster is rebooted. The resource group remains offline until the first time that the resource group is manually switched online by using the `clresourcegroup`(1CL) command or the equivalent graphical user interface command. After that, the resource group resumes normal failover behavior.

Default	`TRUE`
Tunable	Any time

`Desired_primaries` (`integer`)
The desired number of nodes on which the resource group can run simultaneously.

The default is 1. The value of the `Desired_primaries` property must be less than or equal to the value of the `Maximum_primaries` property.

Default	1, see above
Tunable	Any time

`Failback` (`boolean`)
A Boolean value that indicates whether to recalculate the set of nodes where the resource group is online when the cluster membership changes. A recalculation can cause the RGM to bring the group offline on less preferred nodes and online on more preferred nodes.

Default	`FALSE`
Tunable	Any time

`Global_resources_used` (`string_array`)
Indicates whether cluster file systems are used by any resource in this resource group. Legal values that the administrator can specify are an asterisk (*) to indicate all global resources, and the empty string (“”) to indicate no global resources.

Default	All global resources

Tunable Any time

`Implicit_network_dependencies` (`boolean`)

A Boolean value that indicates, when `TRUE`, that the RGM should enforce implicit strong dependencies of non-network-address resources on network-address resources within the group. This means that the RGM starts all network-address resources before all other resources and stops network address resources after all other resources within the group. Network-address resources include the logical host name and shared address resource types.

In a scalable resource group, this property has no effect because a scalable resource group does not contain any network-address resources.

Default `TRUE`

Tunable Any time

`Load_factors`

Determines how much of the load limit a resource group consumes.

You can configure load limits for each node, and a resource group is assigned a set of load factors that correspond to the nodes' defined load limits. As the RGM brings resource groups online, the load factors of the resource groups on each node are added up to provide a total load that is compared against that node's load limits. The load distribution policy for resource groups is also influenced by the setting of the `Priority` and `Preemption_mode` properties. See the `Preemption_mode` and `Priority` properties for more information.

You can use the `clresourcegroup set -p` option to set the value of the `load_factors` property. The `load_factors` property has a composite value consisting of a comma-separated list of zero or more elements of the form `limitname@value`, where `limitname` is an identifier string and `value` is a nonnegative integer. The default value for each load factor is *0*, and the maximum permitted value is *1000*. On any node in the resource group's node list, if a `limitname` is not defined as a `loadlimit`, it is considered unlimited on that node.

If a set of resource groups use a common load factor, then those resource groups will be distributed across nodes, even if the corresponding load limit is unspecified (that is, unlimited) on those nodes. The existence of a nonzero load factor causes the RGM to distribute load. If you want to avoid load-based resource group distribution, remove the load factors or set them to zero.

Note – When load factors or load limits are changed, some resource groups that are currently offline might automatically be brought online. You can execute the `clresourcegroup suspend` command on a resource group to prevent it from coming online automatically.

You can use this subcommand in the global cluster or in a zone cluster.

See the `clresourcegroup(1CL)` and `clnode(1CL)` man pages for more information.

Users other than superuser require solaris.cluster.admin RBAC authorization to use this subcommand. See the rbac(5) man page.

Maximum_primaries (integer)
The maximum number of nodes where the resource group might be online at the same time.

If the RG_mode property is Failover, the value of this property must be no greater than 1. If the RG_mode property is Scalable, a value greater than 1 is allowed.

Default	1, see above
Tunable	Any time

Nodelist (string_array)
A list of nodes where the group can be brought online in order of preference. These nodes are known as the potential primaries or masters of the resource group.

Default	The list of all cluster nodes in arbitrary order
Tunable	Any time

Pathprefix (string)
A directory in the cluster file system in which resources in the group can write essential administrative files. Some resources might require this property. Make Pathprefix unique for each resource group.

Default	The empty string
Tunable	Any time

Pingpong_interval (integer)
A non-negative integer value (in seconds) used by the RGM to determine where to bring the resource group online in the event of a reconfiguration or as the result of an scha_control giveover command or function being executed.

In the event of a reconfiguration, if the resource group fails more than once to come online within the past Pingpong_interval seconds on a particular node (because the resource's Start or Prenet_start method exited nonzero or timed out), that node is considered ineligible to host the resource group and the RGM looks for another master.

If a scha_control(1HA) command or scha_control(3HA) giveover is executed on a given node by a resource, thereby causing its resource group to fail over to another node, the first node (on which scha_control was invoked) cannot be the destination of another scha_control giveover by the same resource until Pingpong_interval seconds have elapsed.

Default	3600 (one hour)
Tunable	Any time

`Preemption_mode`

Determines the likelihood that a resource group will be preempted from a node by a higher-priority resource group because of node overload.

You can use the `clresourcegroup set -p` option to set the enum value of the `preemption_mode` property. The default setting for the `preemption_mode` property is `HAS_COST`.

The resource group's `preemption_mode` property can have one of the following values:

- `HAS_COST` – To satisfy load limits, this resource group can be displaced from its current master by a higher-priority resource group. Preempting this resource group has a cost associated with it, so the RGM will try to avoid it, if possible, by choosing a different node to master the higher-priority resource group.
- `NO_COST` – To satisfy load limits, this resource group can be displaced from a current master by a higher-priority resource group. The cost of preempting this resource group is zero.
- `NEVER` – This resource group cannot be displaced from its current master to satisfy load limits.

See the `clresourcegroup`(1CL) and `clnode`(1CL) man pages for more information.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac`(5) man page.

`Priority`

Determines the order in which resource groups are assigned to master nodes. A higher priority indicates a more important service.

You can use the `clresourcegroup set -p` option to set the unsigned-integer value of the `priority` property. A resource group with a higher priority value than another group takes precedence and is more likely to be mastered by its preferred node and is less likely to be displaced from that node. The default value for the `priority` property is *500*.

If two resource groups have equal priorities and are related by `RG_dependencies` or strong `RG_affinities`, the resource group that does not specify the dependency or affinity will receive its node assignment before the dependent resource group. If two resource groups have equal priority and are unrelated by dependencies or strong affinities, they are assigned their primaries in arbitrary order.

See the `clresourcegroup`(1CL) and `clnode`(1CL) man pages for more information.

Users other than superuser require `solaris.cluster.admin` RBAC authorization to use this subcommand. See the `rbac`(5) man page.

`Resource_list` (string_array)

The list of resources that are contained in the group. The administrator does not set this property directly. Rather, the RGM updates this property as the administrator adds or removes resources from the resource group.

Default	No default
Tunable	Never

`RG_affinities` (string)

The RGM is to try (1) to locate a resource group on a machine that is a current master of another given resource group (positive affinity) or (2) to locate a resource group on a machine that is not a current master of a given resource group (negative affinity).

You can set `RG_affinities` to the following strings:

- +, or weak positive affinity
- ++, or strong positive affinity
- +++, or strong positive affinity with failover delegation
- -, or weak negative affinity
- --, or strong negative affinity

For example, `RG_affinities=+RG2,--RG3` indicates that this resource group has a weak positive affinity for RG2 and a strong negative affinity for RG3.

Using `RG_affinities` is described in Chapter 2, "Administering Data Service Resources," in *Oracle Solaris Cluster Data Services Planning and Administration Guide*.

Default	The empty string
Tunable	Any time

Sometimes a single-machine cluster is configured for prototyping purposes. If resource groups are configured to run on multiple nodes on such a cluster, then `RG_affinities` are interpreted at the node level rather than at the machine level. For example, a strong positive affinity requires that both resource groups run in the same node, not just on the same machine. Note that all nodes on a single machine cluster are zones on the same machine.

`RG_dependencies` (string_array)

Optional list of resource groups that indicate a preferred ordering for bringing other groups online or offline on the same node. The graph of all strong `RG_affinities` (positive and negative) together with `RG_dependencies` is not allowed to contain cycles.

For example, suppose that resource group RG2 is listed in the `RG_dependencies` list of resource group RG1. In other words, suppose that RG1 has a resource group dependency on RG2. The following list summarizes the effects of this resource group dependency:

- When a node joins the cluster, `Boot` methods on that node are not run on resources in RG1 until all `Boot` methods on that node have completed on resources in RG2.

- If RG1 and RG2 are both in the Pending_online state on the same node at the same time, the start methods (Prenet_start or Start) are not run on any resources in RG1 until all the resources in RG2 have completed their start methods.
- If RG1 and RG2 are both in the Pending_offline state on the same node at the same time, the stop methods (Stop or Postnet_stop) are not run on any resources in RG2 until all the resources in RG1 have completed their stop methods.
- An attempt to switch the primaries of RG1 or RG2 fails if switching the primaries would leave RG1 online on any node and RG2 offline on all nodes.
- Setting the Desired_primaries property to a value that is greater than zero on RG1 is not permitted if Desired_primaries is set to zero on RG2.
- Setting the Auto_start_on_new_cluster property to TRUE on RG1 is not permitted if Auto_start_on_new_cluster is set to FALSE on RG2.

Default	The empty list
Tunable	Any time

RG_description (string)
A brief description of the resource group.

Default	The empty string
Tunable	Any time

RG_is_frozen (boolean)
A Boolean value that indicates whether a global device on which a resource group depends is being switched over. If this property is set to TRUE, the global device is being switched over. If this property is set to FALSE, no global device is being switched over. A resource group depends on global devices as indicated by its Global_resources_used property.

You do not set the RG_is_frozen property directly. The RGM updates the RG_is_frozen property when the status of the global devices changes.

Default	No default
Tunable	Never

RG_mode (enum)
Indicates whether the resource group is a failover or a scalable group. If the value is Failover, the RGM sets the Maximum_primaries property of the group to 1 and restricts the resource group to being mastered by a single node.

If the value of this property is Scalable, the RGM allows the Maximum_primaries property to be set to a value that is greater than 1. As a result, the group can be mastered by multiple nodes simultaneously. The RGM does not allow a resource whose Failover property is TRUE to be added to a resource group whose RG_mode is Scalable.

If `Maximum_primaries` is 1, the default is `Failover`. If `Maximum_primaries` is greater than 1, the default is `Scalable`.

Default	Depends on the value of `Maximum_primaries`
Tunable	At creation

`RG_project_name`(string)

The Solaris project name (see `projects(1)`) that is associated with the resource group. Use this property to apply Solaris resource management features, such as CPU shares and resource pools, to cluster data services. When the RGM brings resource groups online, it launches the related processes under this project name for resources that do not have the `Resource_project_name` property set (see `r_properties(5)`). The specified project name must exist in the projects database (see `projects(1)` and *Oracle Solaris 11.1 Administration: Oracle Solaris Zones, Oracle Solaris 10 Zones, and Resource Management*).

Note – Changes to this property take affect the next time that the resource is started.

Default	The text string "`default`"
Tunable	Any time
Valid value	Any valid Solaris project name

`RG_SLM_CPU_SHARES` (integer)

The number of CPU shares associated with the resource group.

Note – You can only set the `RG_SLM_CPU_SHARES` property if `RG_SLM_TYPE` is set to `automated`. For more information, see the `RG_SLM_TYPE` property.

The maximum value for `RG_SLM_CPU_SHARES` is `65535`. Zero is not an acceptable value for `RG_SLM_CPU_SHARES` because setting a share value to zero can lead to processes not being scheduled when the CPU is heavily loaded. Changes made to `RG_SLM_CPU_SHARES` while the resource group is online are taken into account dynamically.

Because `RG_SLM_TYPE` is set to `automated`, Oracle Solaris Cluster creates a `project(4)` named `SCSLM_`*resourcegroup-name*, where *resourcegroup-name* is the name you give to the resource group. Each method of a resource that belongs to the resource group is executed in this project. These projects are created in the resource group's zone, which can be a global zone.

The project `SCSLM_`*resourcegroup-name* has a `project.cpu-shares` value set to the `RG_SLM_CPU_SHARES` value. If the `RG_SLM_CPU_SHARES` property is not set, this project is created with a `project.cpu-shares` value of `1`.

When the `RG_SLM_PSET_TYPE` property is set to strong or weak, the value of `RG_SLM_CPU_SHARES` property is also used to compute the size of `pset` created (by convention, 100 shares are equivalent to one CPU). For more information, see the `RG_SLM_PSET_TYPE` property.

For information about processor sets, see *Oracle Solaris 11.1 Administration: Oracle Solaris Zones, Oracle Solaris 10 Zones, and Resource Management*.

Default	1
Tunable	Any time

RG_SLM_PSET_MIN (integer)
The minimum number of processors in the processor set in which the resource group executes. You can only use this property if the following are true:

- The operating system used is Solaris 11.
- RG_SLM_TYPE is set to automated.
- RG_SLM_PSET_TYPE is set to strong or weak. (See the RG_SLM_PSET_TYPE property.)
- The value of RG_SLM_PSET_MIN must be lower or equal to the value of the RG_SLM_CPU_SHARES divided by 100.

The maximum number of for RG_SLM_PSET_MIN is 655. The value of the RG_SLM_PSET_MIN property is used by Oracle Solaris Cluster to computer the minimum size of processor sets.

Changes made to RG_SLM_CPU_SHARES and RG_SLM_PSET_MIN while the resource group is online are taken into account dynamically. However, if RG_SLM_PSET_TYPE is set to strong, and if there are not enough CPUs available to accommodate the change, the change requested for RG_SLM_PSET_MIN is not applied. In this case, a warning message is displayed. On next switchover, errors due to lack of CPUs can occur if there are not enough CPUs available to respect the values you configured for RG_SLM_PSET_MIN.

For information about processor sets, see *Oracle Solaris 11.1 Administration: Oracle Solaris Zones, Oracle Solaris 10 Zones, and Resource Management*.

Default	0
Tunable	Any time

RG_SLM_PSET_TYPE (string)
Enables the creation of a dedicated processor set.

Possible values for RG_SLM_PSET_TYPE are default, strong, and weak.

You can set RG_SLM_PSET_TYPE to strong or weak if all of the following criteria are true:

- The operating system used is Solaris 11.
- The resource group is configured to execute only in a non-global zone.
- RG_SLM_TYPE is set to automated.

Possible values for RG_SLM_PSET_TYPE are default, strong, and weak.

For a resource group to execute as strong or weak, the resource group must be configured so there are only non-global zones in its node list.

The non-global zone must not be configured for a pool other than the default pool (`pool_default`). For information about zone configuration, see `zonecfg`(1M). This non-global zone must not be dynamically bound to a pool other than the default pool. For more information on pool binding, see `poolbind`(1M). These two pool conditions are verified only when the methods of the resources in the resource group are started.

The values `strong` and `weak` are mutually exclusive for resource groups that have the same zone in their node list. You cannot configure resource groups in the same zone so that some have `RG_SLM_PSET_TYPE` set to `strong` and others set to `weak`.

If `RG_SLM_PSET_TYPE` is set to `strong` or `weak` and the actions listed for `RG_SLM_TYPE` are set to `automated`, when the resource group is brought online, Oracle Solaris Cluster does the following:

- Creates a pool and dynamically binds this pool to the non-global zone in which the resource group starts.
- Creates a processor set with a size between a minimum and maximum value.
  - The minimum value is the sum of `RG_SLM_PSET_MIN` values of all the resource groups online in the zone this resource group starts in, or 1 if that sum equals zero.
  - The maximum value is the sum of `RG_SLM_SPU_SHARES` values of all resource groups online in that zone, divided by 100, and rounded up to the immediate upper integer, or 1 if the result of the computation is zero.
- Associates the processor set to the pool.
- Sets `zone.cpu-shares` to the sum of `RG_SLM_CPU_SHARES` in all of the resource groups running in the zone.

If `RG_SLM_PSET_TYPE` is set to `strong` or `weak`, then the resource group is brought offline (more precisely when the `STOP` or `POSTNET_STOP` method of the resource group's first resource is executed), Oracle Solaris Cluster destroys the processor set if there are no longer any resource groups online in the zone, destroys the pool, and binds the zone to the default pool (pool_default).

If `RG_SLM_PSET_TYPE` is set to `strong`, the resource group behaves the same as if `RG_SLM_PSET_TYPE` was set to `strong`. However, if there are not enough processors available to create the processor set, the pool is associated with the default processor set.

If `RG_SLM_PSET_TYPE` is set to `strong` and there are not enough processors available to create the processor set, an error is returned to the Resource Group Monitor (RGM), and the resource group is not started on that node or zone.

The order of priority for CPU allocation is `defaultpsetmin` minimum size has priority over `strong`, which has priority over `weak`. (For information about the `defaultpsetmin` property, see `clnode`(1CL).) However, this priority is not maintained when you try to increase the size of the default processor set by using the `clnode` command and there are not enough processors available.

If you assign a minimum number of CPUs to the default processor set by using the `clnode` command, the operation is done dynamically. If the number of CPUs that you specify is not available, Oracle Solaris Cluster periodically retries to assign this number of CPUs, and subsequently smaller numbers of CPUs, to the default processor set until the minimum number of CPUs has been assigned. This action might destroy some `weak` processor sets, but does not destroy `strong` processor sets.

When a resource group with `RG_SLM_PSET_TYPE` configured as `strong` starts, it might destroy the processor sets associated with the `weak` processor sets if there are not enough CPU available on the node for both processor sets. In that case, the processes of the resource group running in the `weak` processor sets are associated with the default processor set.

To change a processor set from `weak` to `strong` or from `strong` to `weak`, you must first change the processor set to have `RG_SLM_PSET_TYPE` set to `default`.

If you set `RG_SLM_PSET_TYPE` to default, Oracle Solaris Cluster creates a pool, `SCSLM_pool_`*zone-name*, but does not create a processor set. In this case, `SCSLM_pool_`*zone-name* is associated with the default processor set. The shares that are assigned to the zone are determined by the sum of the values that are set for `RG_SLM_CPU_SHARES` for all of the resource groups that are running in the zone.

If there are no longer any online resource groups configured for CPU control in a non-global zone, the CPU share value for the non-global zone takes the value of `zone.cpu-shares` found in the zone configuration. This parameter has a value of `1` by default. For more information about zone configuration, see `zonecfg`(1M).

For information about resource pools and processor sets, see *Oracle Solaris 11.1 Administration: Oracle Solaris Zones, Oracle Solaris 10 Zones, and Resource Management*.

Default	The text string "`default`"
Tunable	Any time

`RG_SLM_TYPE` (`string`)

Enables you to control system resource usage, and automates some steps to configure the Oracle Solaris OS for system resource management. Possible values for `RG_SLM_TYPE` are `automated` and `manual`.

If `RG_SLM_TYPE` is set to `automated`, when the resource group is brought online, Oracle Solaris Cluster does the following:

- Creates a project named `SCSLM_`*resourcegroup-name*. All methods in the resources in this resource group execute in this project. This project is created the first time a method of a resource in this resource group is executed on the node or zone.
- Sets the value of `project.cpu_shares` that is associated with the project to the value of `RG_SLM_CPU_SHARES`. The value of `project.cpu_shares` is 1 by default.

- Sets zone.cpu-shares to the sum of RG_SLM_CPU_SHARES of all the resource groups with RG_SLM_TYPE set to automated for the zone. The zone can be global. For information about dedicated processor sets, see the RG_SLM_PSET_TYPE property.

When RG_SLM_TYPE is set to automated, any action taken results in a message being logged.

If RG_SLM_TYPE is set to manual, the resource group executes in the project specified by the RG_project_name property.

For information about resource pools and processor sets, see *Oracle Solaris 11.1 Administration: Oracle Solaris Zones, Oracle Solaris 10 Zones, and Resource Management*.

Note –

- Do not specify resource group names that exceed 58 characters. If a resource group name contains more than 58 characters, you cannot configure CPU control, that is, you cannot set the RG_SLM_TYPE property to automated.
- Refrain from including dashes (-) in resource group names. The Oracle Solaris Cluster software replaces all dashes in resource group names with underscores (_) when it creates a project. For example, Oracle Solaris Cluster creates the project named SCSLM_rg_dev for a resource group named rg-dev. If a resource group named rg_dev already exists, a conflict arises when Oracle Solaris Cluster attempts to create the project for the resource group rg-dev.

Default	manual
Tunable	Any time

RG_state on each cluster node (enum)
Set by the RGM to Unmanaged, Online, Offline, Pending_online, Pending_offline, Error_stop_failed, Online_faulted, or Pending_online_blocked to describe the state of the resource group on each cluster node.

You cannot configure this property. However, you can indirectly set this property by using clresourcegroup(1CL) or by using the equivalent Oracle Solaris Cluster graphical user interface command. A resource group can exist in an Unmanaged state when that group is not under the control of the RGM.

The following descriptions summarize each state.

Note – States apply to individual nodes only, except the Unmanaged state, which applies across all nodes. For example, a resource group might be Offline on node A, but Pending_online on node B.

Error_stop_failed	One or more resources within the resource group failed to stop successfully and are in the Stop_failed resource state. Other resources in the group might remain online

or offline. This resource group is not permitted to start on any node until the `Error_stop_failed` state is cleared.

You must use an administrative command, such as `clresourcegroup clear`, to manually kill the `Stop_failed` resource and reset its state to `Offline`.

`Offline` — The resource group has been stopped on the node. In other words, the stop methods (`Monitor_stop`, `Stop`, and `Postnet_stop`, as applicable to each resource) have executed successfully on all enabled resources in the group. This state also applies before a resource group has started for the first time on the node.

`Online` — The resource group has been started on the node. In other words, the start methods (`Prenet_start`, `Start`, and `Monitor_start`, as applicable to each resource) have executed successfully on all enabled resources in the group.

`Online_faulted` — The resource group was `Pending_online` and has finished starting on this node. However, one or more resources ended up in the `Start_failed` resource state or with `Faulted` status.

`Pending_offline` — The resource group is stopping on the node. The stop methods (`Monitor_stop`, `Stop`, and `Postnet_stop`, as applicable to each resource) are being executed on enabled resources in the group.

`Pending_online` — The resource group is starting on the node. The start methods (`Prenet_start`, `Start`, and `Monitor_start`, as applicable to each resource) are being executed on enabled resources in the group.

`Pending_online_blocked` — The resource group failed to start fully because one or more resources within that resource group have an unsatisfied strong resource dependency on a resource in a different resource group. Such resources remain Offline. When the resource dependencies are satisfied, the resource group automatically moves back to the Pending_online state.

Unmanaged

The initial state of a newly created resource group, or the state of a previously managed resource group. Either Init methods have not yet been run on resources in the group, or Fini methods have been run on resources in the group.

The group is not managed by the RGM.

Default — No default

Tunable — Never

RG_system (boolean)

If the RG_system property is TRUE for a resource group, particular operations are restricted for the resource group and for the resources that the resource group contains. This restriction is intended to help prevent accidental modification or deletion of critical resource groups and resources. Only the clresource(1CL) and clresourcegroup(1CL) commands are affected by this property. Operations for scha_control(1HA) and scha_control(3HA) are not affected.

Before performing a restricted operation on a resource group (or a resource group's resources), you must first set the RG_system property of the resource group to FALSE. Use care when you modify or delete a resource group that supports cluster services, or when you modify or delete the resources that such a resource group contains.

The following table shows the operations that are restricted for a resource group when RG_system is set to TRUE.

Operation	Example
Delete a resource group	**clresourcegroup delete RG1**
Edit a resource group property (except for RG_system)	**clresourcegroup set -p RG_description=... +**
Add a resource to a resource group	**clresource create -g RG1 –t SUNW.nfs R1** The resource is created in the enabled state and with resource monitoring turned on.
Delete a resource from a resource group	**clresource delete R1**

Operation	Example
Edit a property of a resource that belongs to a resource group	**clresource set -g RG1 –t SUNW.nfs -p r_description="HA-NFS res" R1**
Switch a resource group offline	**clresourcegroup offline RG1**
Manage a resource group	**clresourcegroup manage RG1**
Unmanage a resource group	**clresourcegroup unmanage RG1**
Enable a resource	**clresource enable R1**
Enable monitoring for a resource	**clresource monitor R1**
Disable a resource	**clresource disable R1**
Disable monitoring for a resource	**clresource unmonitor R1**

If the `RG_system` property is `TRUE` for a resource group, the only property of the resource group that you can edit is the `RG_system` property itself. In other words, editing the `RG_system` property is never restricted.

Default `FALSE`

Tunable Any time

`Suspend_automatic_recovery` (`boolean`)

A Boolean value that indicates whether the automatic recovery of a resource group is suspended. A suspended resource group is *not* automatically restarted or failed over until the cluster administrator explicitly issues the command that resumes automatic recovery. Whether online or offline, suspended data services remain in their current state.

While the resource group is suspended, you can manually switch the resource group or its resources to a different state on specific nodes by using the `clresourcegroup`(1CL) or `clresource`(1CL) commands with sub commands such as `switch`, `online`, `offline`, `disable`, or `enable`. Rather than directly operating on the resource such as killing the application processes or running application specific commands, use `clresourcegroup`(1CL) or `clresource`(1CL) commands. This allows the cluster framework to maintain an accurate picture of the current status of the resources and resource groups, so that availability can be properly restored when the `resume` subcommand is executed.

If the `Suspend_automatic_recovery` property is set to `TRUE`, automatic recovery of the resource group is suspended. If this property is set to `FALSE`, automatic recovery of the resource group is resumed and active.

The cluster administrator does not set this property directly. The RGM changes the value of the `Suspend_automatic_recovery` property when the cluster administrator suspends or resumes automatic recovery of the resource group. The cluster administrator suspends automatic recovery with the `clresourcegroup suspend` command. The cluster administrator resumes automatic recovery with the `clresourcegroup resume` command. The resource group can be suspended or resumed regardless of the setting of its `RG_system` property.

Default	`FALSE`
Tunable	Never

See Also `projects`(1), `clnode`(1CL), `clresource`(1CL), `clresourcegroup`(1CL), `scha_control`(1HA), `poolbind`(1M), `scha_control`(3HA), `project`(4), `property_attributes`(5), `r_properties`(5), `rt_properties`(5), `scha_resourcegroup_get`(1HA), and `scha_resourcegroup_get`(3HA).

Oracle Solaris Cluster Concepts Guide, *Oracle Solaris Cluster Data Services Planning and Administration Guide*, *Oracle Solaris 11.1 Administration: Oracle Solaris Zones, Oracle Solaris 10 Zones, and Resource Management*.

Name r_properties – resource properties

Description The following information describes the resource properties that are defined by Oracle Solaris Cluster software. These descriptions have been developed for data service developers. For more information about a particular data service, see the man page for that data service.

Note – A resource must have the Scalable resource property set to TRUE before it can use the network load balancing features of Oracle Solaris Cluster software. Scalable resources can use the `Affinity_timeout`, `Generic_affinity`, `Load_balancing_policy`, `Load_balancing_weights`, `Conn_threshold`, `Round_robin`, `Port_list`, `UDP_affinity`, and `Weak_affinity` properties.

Some resource types can run on multiple nodes without using network load balancing. The `Scalable` property for such a resource is set to `False`, and such a resource does not use the preceding additional properties.

Resource Property Values

Required	The cluster administrator must specify a value when creating a resource with an administrative utility.
Optional	If the cluster administrator does not specify a value when creating a resource group, the system supplies a default value.
Conditional	The Resource Group Manager (RGM) creates the property only if the property is declared in the Resource Type Registration (RTR) file. Otherwise, the property does not exist and is not available to the cluster administrator. A conditional property that is declared in the RTR file is optional or required, depending on whether a default value is specified in the RTR file. For details, see the description of each conditional property.
Query-only	Cannot be set directly by an administrative tool.

The cluster administrator can edit all tunable properties by using the following command:

clresource set -p *property*=*new-value resource*

Resource Properties and Descriptions

Note – Property names, such as `Affinity_timeout` and `Cheap_probe_interval`, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify property names.

`Affinity_timeout` (integer)

Length of time, in seconds, during which connections from a given client IP address for any service in the resource are sent to the same server node.

If you set this property to `-1`, all connections are sent to the same node. If you set this property to `0`, all open connections are sent to the same node. If you set this property to *n*, for *n* number of seconds after the last connection has closed, all new connections are sent to the same node as the last connection.

In all cases, if the server node leaves the cluster as a result of a failure, a new server node is selected.

This property is relevant only when Load_balancing_policy is either Lb_sticky or Lb_sticky_wild. In addition, Weak_affinity must be set to False (the default value).

This property is used only for scalable services.

Category	Conditional/Optional
Default	0
Tunable	Any time

Application_user (string)

A Solaris user name to be used for execution of application programs related to the resource.

Application programs that are executed by resource methods or monitors might execute as root or as a non-root user (the "application user"), depending on how the particular agent is implemented. The application_user resource property does not exist for all resource types; only those resource types that declare this property allow it to be set.

A resource type that declares the application_user resource property is typically an agent that uses the scha_check_app_user(1HA) interface to perform additional checks on the executable file ownership and permissions of application programs. If the application program executable is not owned by root but is to be executed by root, or if the executable has group or world write permissions, an insecurity exists. In this case, if the resource_security property is set to SECURE, execution of the application program fails at run time and an error is returned. If resource_security has any other setting, the application program is allowed to execute with a warning message.

A resource type that declares the application_user property sets the user ID for execution of application programs according to the setting of the resource_security cluster property. If resource_security is set to COMPATIBILITY, the setting of the application_user resource property is ignored and the application user will be the effective user ID of the caller (usually root). This behavior is compatible with previous releases of Oracle Solaris Cluster.

If resource_security is set to OVERRIDE, the application_user property is ignored and the application user will be the owner of the application program executable file.

If resource_security is set to SECURE or WARN, the application user will be the value of the application_user resource property; however, if application_user is unset or empty, the application user will be the owner of the application program executable file.

If the Tunable attribute is not specified in the RTR file, the tunability of the property is When_disabled.

Category	Conditional/Optional
Default	The empty string
Tunable	When disabled

`Cheap_probe_interval` (integer)

The number of seconds between invocations of a quick fault probe of the resource. This property is only created by the RGM and available to the cluster administrator if this property is declared in the RTR file.

This property is optional if a default value is specified in the RTR file. If the `Tunable` attribute is not specified in the resource-type file, the `Tunable` value for the property is `When_disabled`.

Category	Conditional
Default	See above
Tunable	When disabled

`CheckActivePortInstances(boolean)`

Determines whether a node participates in the scalable service, and receives client requests from the load balancer, when not all ports that are specified in the `Port_list` property have an active listening process. This property is only applicable to scalable services.

Supported values include:

- `FALSE` (default) – A node participates in the scalable service when at least one of its ports has an active listening process.
- `TRUE` – A node participates in the scalable service only when all ports have an active listening process.

Category	Conditional/Optional
Default	False
Tunable	When disabled

`Conn_threshold (integer)`

Maximum number of active connections or clients supported when `Round_robin` load distribution is enabled. TCP connections are considered active if the connection endpoint remains alive on the server node. UDP sessions are considered active if there is traffic flow within the UDP session active timeout window setting (see the `udp_session_timeout` cluster property).

Category	Optional
Default	10000
Tunable	WHEN_DISABLED

`Round_robin (boolean)`

Assigns incoming requests to specific server nodes in a round-robin fashion taking into account the relative `load_balancing_weights` value assigned to each node. Requests are assigned on a connection basis for resources with a non-sticky `load_balancing_policy` setting; otherwise, requests are assigned on a per-client IP address basis.

`Round_Robin` should be enabled for resources that require deterministic load distribution of incoming requests where a small number of connections or clients are expected.

A resource property, `Conn_threshold`, and a cluster property, `udp_session_timeout`, support the Round Robin scheme and can optionally be configured if the `Round_robin` resource property is set for a service.

No existing resource type registration (RTR) files need to be upgraded to use the `Round_robin` property.

Category	Optional
Default	FALSE
Tunable	WHEN_DISABLED

Extension properties

You declare resource-type properties in the RTR file. The RTR file defines the initial configuration of a data service when the cluster administrator registers the data service with Oracle Solaris Cluster software.

For information about the individual attributes that you can set for extension properties, see the `property_attributes(5)` man page.

You can specify that a cluster administrator can set an extension property on a per-node basis or for the entire cluster. However, you cannot specify (in the RTR file) that the cluster administrator can do the same for a system-defined property. System-defined properties implicitly can apply to all nodes or to particular nodes. Whether system-defined properties apply to all or particular nodes depends on the particular definition of the system-defined property.

Category	Conditional
Default	No default
Tunable	Depends on the particular property

`Failover_mode` (enum)

Modifies the recovery actions that the RGM takes when a resource fails to start or stop successfully, or when a resource monitor finds a resource to be unhealthy and consequently requests a restart or failover.

NONE, SOFT, or HARD (method failures)

These settings affect only failover behavior when a start or stop method (Prenet_start, Start, Monitor_stop, Stop, Postnet_stop) fails. The RESTART_ONLY and LOG_ONLY settings can also affect whether the resource monitor can initiate the execution of the scha_control command or the scha_control() function.

NONE indicates that the RGM is not to take any recovery action when one of the previously mentioned start or stop methods fails. SOFT or HARD indicates that if a Start or Prenet_start method fails, the RGM is to relocate the resource's group to a different node. For Start or Prenet_start failures, SOFT and HARD are the same.

For failure of a stop method (Monitor_stop, Stop, or Postnet_stop), SOFT is the same as NONE. If Failover_mode is set to HARD when one of these stop methods fails, the RGM reboots the node to force the resource group offline. The RGM might then attempt to start the group on another node. However, if the resource group is being quiesced by the clresourcegroup quiesce subcommand, the node will not be rebooted even if the Failover_mode is HARD and a stop method fails. In this case, the resource will instead move to a STOP_FAILED state.

RESTART_ONLY or LOG_ONLY

Unlike NONE, SOFT, and HARD, which affect failover behavior when a start or stop method fails, RESTART_ONLY and LOG_ONLY affect all failover behavior. Failover behavior includes monitor-initiated (scha_control) restarts of resources and resource groups, and give overs that are initiated by the resource monitor.

RESTART_ONLY indicates that the monitor can run scha_control to restart a resource or a resource group. The RGM allows Retry_count restarts within Retry_interval. If Retry_count is exceeded, no further restarts are permitted.

Note – A negative value of Retry_count, which is permitted by some but not all resource types, specifies an unlimited number of resource restarts. A more dependable way to specify unlimited restarts is to do the following:

- Set Retry_interval to a small value such as 1 or 0.
- Set Retry_count to a large value such as 1000.

If the resource type does not declare the Retry_count and Retry_interval properties, an unlimited number of resource restarts is permitted.

If Failover_mode is set to LOG_ONLY, no resource restarts or give overs are permitted. Setting Failover_mode to LOG_ONLY is the same as setting Failover_mode to RESTART_ONLY with Retry_count set to zero.

RESTART_ONLY or LOG_ONLY (method failures)

If a Prenet_start, Start, Monitor_stop, Stop, or Postnet_stop method fails, RESTART_ONLY and LOG_ONLY are the same as NONE. That is, the data service is not failed over or rebooted.

Effect of Failover_mode Settings on a Data Service

The effect that each setting for Failover_mode has on a data service depends on whether the data service is monitored or unmonitored and whether it is based on the Data Services Development Library (DSDL).

- A data service is monitored if it implements a Monitor_start method and monitoring of the resource is enabled. The RGM starts a resource monitor by executing the Monitor_start method after starting the resource itself. The resource monitor probes the health of the resource. If the probes fail, the resource monitor might request a restart or a failover by calling the scha_control() function. For DSDL-based resources, probes might reveal partial failure (degradation) or a complete failure of the data service. Repeated partial failures accumulate to a complete failure.
- A data service is unmonitored if it does not provide a Monitor_start method or if monitoring of the resource has been disabled.
- DSDL-based data services include those that are developed with Agent Builder, through the GDS, or by using the DSDL directly. Some data services, HA Oracle for example, were developed without using the DSDL.

NONE, SOFT, or HARD (probe failures)

If you set Failover_mode to NONE, SOFT, or HARD, if the data service is a monitored DSDL-based service, and if the probe fails completely, the monitor calls the scha_control() function to request a restart of the resource. If probes continue to fail, the resource is restarted up to a maximum of Retry_count times within Retry_interval. If the probes fail again after the Retry_count number of restarts is reached, the monitor requests a failover of the resource's group to another node.

If you set Failover_mode to NONE, SOFT, or HARD and the data service is an unmonitored DSDL-based service, the only failure that is detected is the death of the resource's process tree. If the resource's process tree dies, the resource is restarted.

If the data service is a not a DSDL-based service, the restart or failover behavior depends on how the resource monitor is coded. For example, the Oracle resource monitor recovers by restarting the resource or the resource group, or by failing over the resource group.

RESTART_ONLY (probe failures)

If you set Failover_mode to RESTART_ONLY, if the data service is a monitored DSDL-based service, and if the probe fails completely, the resource is restarted Retry_count times within Retry_interval. However, if Retry_count is exceeded, the resource monitor exits, sets the resource status to FAULTED, and generates the status message "Application faulted, but not restarted. Probe quitting." At this point, although monitoring is still enabled, the resource is effectively unmonitored until it is repaired and restarted by the cluster administrator.

If you set Failover_mode to RESTART_ONLY, if the data service is an unmonitored DSDL-based service, and if the process tree dies, the resource is *not* restarted.

If a monitored data service is not DSDL-based, the recovery behavior depends on how the resource monitor is coded. If you set Failover_mode to RESTART_ONLY, the resource or resource group can be restarted by a call to the scha_control() function Retry_count times within Retry_interval. If the resource monitor exceeds Retry_count, the attempt to restart fails. If the monitor calls scha_control() to request a failover, that request fails as well.

LOG_ONLY (probe failures)
If you set Failover_mode to LOG_ONLY for any data service, all scha_control() requests to restart the resource or resource group or to fail over the group are precluded. If the data service is DSDL-based, a message is logged when a probe completely fails, but the resource is not restarted. If a probe fails completely more than Retry_count times within Retry_interval, the resource monitor exits, sets the resource status to FAULTED, and generates the status message "Application faulted, but not restarted. Probe quitting." At this point, although monitoring is still enabled, the resource is effectively unmonitored until it is repaired and restarted by the cluster administrator.

If you set Failover_mode to LOG_ONLY, if the data service is an unmonitored DSDL-based service, and if the process tree dies, a message is logged but the resource is not restarted.

If a monitored data service is not DSDL-based, the recovery behavior depends on how the resource monitor is coded. If you set Failover_mode to LOG_ONLY, all scha_control() requests to restart the resource or resource group or to fail over the group fail.

Category	Optional
Default	NONE
Tunable	Any time

Global_zone_override (boolean)
This property is allowed only for resource types that set the Global_zone=TRUE property in the RTR file. The setting of the Global_zone_override property overrides the value of the resource type property Global_zone for the particular resource. See the rt_properties(5) man page for more information.

Setting the Global_zone_override property to FALSE forces the resource methods to execute in the non-global zone in which the resource group is configured, rather than always executing in the global zone as they usually would when the Global_zone property is set to TRUE.

This property is optional if a default value is specified in the RTR file.

If the `Tunable` attribute is not specified in the RTR file, the `Tunable` value for the property is `At_creation`. You can set the `Tunable` attribute in the RTR file to `At_creation`, `When_disabled`, or `Anytime`.

Note – Use caution when you set the `Tunable` attribute to `Anytime` in the RTR file. Changes to the `Global_zone_override` property take effect immediately, even if the resource is online. For example, suppose that the `Global_zone_override` tunability is set to `ANYTIME` and the `Global_zone_override` property is currently set to `FALSE` on a resource that is configured in a non-global zone. When the resource is switched online, the starting methods are executed in the non-global zone. If you then set the `Global_zone_override` property to `TRUE` and the resource is switched offline, the stopping methods are executed in the global zone. Your method code must handle this possibility. If your method code does not handle this possibility, you must set the `Tunable` attribute to `When_disabled` or `At_creation` instead.

Category	Conditional/Optional
Default	`TRUE`
Tunable	At creation

`Load_balancing_policy` (`string`)
A string that defines the load-balancing policy in use. This property is used only for scalable services. The RGM automatically creates this property if the `Scalable` property is declared in the RTR file.

`Load_balancing_policy` can take the following values:

- `Lb_weighted` (the default). The load is distributed among various nodes according to the weights set in the `Load_balancing_weights` property.
- `Lb_sticky`. The set of ports is known at the time the application resources are configured. A given client (identified by the client's IP address) of the scalable service is always sent to the same node of the cluster.
- `Lb_sticky_wild`. The port numbers are not known in advance but are dynamically assigned. A given client (identified by the client's IP address) that connects to an IP address of a wildcard sticky service is always sent to the same cluster node regardless of the port number to which that IP address is coming.

Category	Conditional/Optional
Default	`Lb_weighted`
Tunable	At creation

`Load_balancing_weights` (`string_array`)
For scalable resources only. The RGM automatically creates this property if the `Scalable` property is declared in the RTR file. The format is *weight@node,weight@node...*, where *weight* is an integer that reflects the relative portion of load distributed to the specified *node*. The fraction of load distributed to a node is the weight for this node divided by the

sum of all weights. For example, `1@1,3@2` specifies that node 1 receives 1/4 of the load and node 2 receives 3/4. The empty string (“”), the default, sets a uniform distribution. Any node that is not assigned an explicit weight receives a default weight of 1. You can specify weight 0 to assign no load to a node.

If the `Tunable` attribute is not specified in the resource-type file, the `Tunable` value for the property is `Anytime`. Changing this property revises the distribution for new connections only.

Category	Conditional/Optional
Default	Null
Tunable	Any time

*method*_`timeout` for each callback method (`integer`)

A time lapse, in seconds, after which the RGM concludes that an invocation of the method has failed.

Note – You cannot specify a maximum value for a method timeout (using the `Max` attribute). Likewise, you cannot specify a minimum value of zero (`Min=0`).

Category	Conditional/Optional
Default	3,600 (one hour) if the method itself is declared in the RTR file
Tunable	Any time

`Monitored_switch` (`enum`)

You cannot directly set this property. Rather, it is set to `Enabled` or to `Disabled` by the RGM, either on a particular node or for the entire cluster. The RGM does so if the cluster administrator enables or disables the monitor with an administrative utility, either on a particular node or for the entire cluster. If disabled, the `Monitor_start` method is not called on the resource until monitoring is enabled again. If the resource does not have a monitor callback method, this property evaluates to `Disabled`.

Category	Query-only
Default	Enabled, if the resource type has monitoring methods, disabled otherwise
Tunable	See the description

`Network_resources_used` (`string_array`)

A list of logical-hostname or shared-address resources on which this resource has a dependency. This list contains all network-address resources that appear in the properties `Resource_dependencies`, `Resource_dependencies_weak`, `Resource_dependencies_restart`, or `Resource_dependencies_offline_restart`.

The RGM automatically creates this property if the `Scalable` property is declared in the RTR file. If the `Scalable` property is not declared in the RTR file, `Network_resources_used` is unavailable unless it is explicitly declared in the RTR file.

If you do not assign a value to the `Network_resources_used` property, its value is updated automatically by the RGM, based on the setting of the resource-dependencies properties. You do not need to set this property directly. Instead, set the `Resource_dependencies`, `Resource_dependencies_offline_restart`, `Resource_dependencies_restart`, or `Resource_dependencies_weak` property. If per-node dependencies are specified, the derived value of the `Network_resources_used` property includes only those dependencies which are in effect on the local node. The value might differ on each node.

To maintain compatibility with earlier releases of Oracle Solaris Cluster software, you can still set the value of the `Network_resources_used` property directly. If you set the value of the `Network_resources_used` property directly, the value of the `Network_resources_used` property is no longer derived from the settings of the resource-dependencies properties. If you add a resource name to the `Network_resources_used` property, the resource name is automatically added to the `Resource_dependencies` property as well. The only way to remove that dependency is to remove it from the `Network_resources_used` property. If you are not sure whether a network-resource dependency was originally added to the `Resource_dependencies` property or to the `Network_resources_used` property, remove the dependency from both properties. For example, the following command removes a dependency of resource `r1` upon network resource `r2`, regardless of whether the dependency was added to the `Network_resources_used` or `Resource_dependencies` property:

```
# clresource set -p Network_resources_used-=r2 -p Resource_dependencies-=r2 r1
```

For simplicity, avoid setting a value for the `Network_resources_used` property. Set only the resource dependency properties, and treat the `Network_resources_used` property as a read-only property.

Category	Conditional/Optional
Default	The empty list
Tunable	Any time

`Num_resource_restarts` on each cluster node (`integer`)
The number of restart requests that have occurred on this resource within the past *n* seconds, where *n* is the value of the `Retry_interval` property.

A restart request is any of the following calls:

- The `scha_control` command with the `RESOURCE_RESTART` argument
- The `scha_control()` function with the `SCHA_RESOURCE_RESTART` argument
- The `scha_control` command with the `RESOURCE_IS_RESTARTED` argument
- The `scha_control()` function with the `SCHA_RESOURCE_IS_RESTARTED` argument

The RGM resets the restart counter to zero for a given resource on a given node whenever that resource executes one of the following:

- The scha_control command with the GIVEOVER argument
- The scha_control() function with the SCHA_GIVEOVER argument

The counter is reset whether the give over attempt succeeds or fails.

If a resource type does not declare the Retry_interval property, the Num_resource_restarts property is not available for resources of that type.

Category	Query-only
Default	No default
Tunable	See description

Num_rg_restarts on each cluster node (integer)
The number of resource-group restart requests that have occurred for this resource within the past *n* seconds, where *n* is the value of the Retry_interval property.

A resource-group restart request is either of the following calls:

- The scha_control command with the RESTART argument
- The scha_control() function with the SCHA_RESTART argument

If a resource type does not declare the Retry_interval property, the Num_rg_restarts property is not available for resources of that type.

Category	Query-only
Default	No default
Tunable	See description

On_off_switch (enum)
You cannot directly set this property. Rather, it is set to Enabled or to Disabled by the RGM, either on a particular node or for the entire cluster. The RGM does so if the cluster administrator enables or disables the resource with an administrative utility, either on a particular node or for the entire cluster. If disabled, a resource has no callbacks invoked until it is enabled again.

Category	Query-only
Default	Disabled
Tunable	See description

Outgoing_Connection(boolean)
Specifies whether the scalable service uses the virtual network address (see Network_resources_used property) in initiating outgoing requests to servers outside the cluster. The load balancer ensures that any incoming replies are forwarded to the initiating node.

Note – Only one node of the cluster can initiate requests to a given server at a time.

This property is only applicable to scalable services with `Generic_Affinity` set to `TRUE` and `Load_balancing_policy` set to `LB_STICKY_WILD`. Supported values include:

- `FALSE` (default) – The scalable service does not initiate outgoing requests to external servers by using the virtual network address that is specified in the `Network_resources_used` property.
- `TRUE` – The scalable service initiates outgoing requests to external servers by using the virtual network address that is specified in the `Network_resources_used` property. The load balancer forwards incoming replies to the initiating node.

Category	Conditional/Optional
Default	False
Tunable	At creation

`Port_list` (`string_array`)

A comma-separated list of port numbers on which the server is listening. Appended to each port number is a slash (`/`) followed by the protocol that is being used by that port, for example, `Port_list=80/tcp` or `Port_list=80/tcp6,40/udp6`.

Possible protocols that you can specify include:

- `tcp`, for only TCP IPv4
- `tcp6`, for both TCP IPv4 and TCP IPv6
- `udp`, for only UDP IPv4
- `udp6`, for both UDP IPv4 and UDP IPv6

If the `Scalable` property is declared in the RTR file, the RGM automatically creates `Port_list`. Otherwise, this property is unavailable unless it is explicitly declared in the RTR file.

Setting up this property for use with Oracle Solaris Cluster HA for Apache is described in the *Oracle Solaris Cluster Data Service for Apache Guide*.

Category	Conditional/Required
Default	No default
Tunable	Any time

`R_description` (`string`)

A brief description of the resource.

Category	Optional
Default	The empty string
Tunable	Any time

Resource_dependencies (string_array)

A list of resources in the same group or in different groups upon which this resource has a strong dependency. This resource cannot be started if the start of any resource in the list fails. If this resource and one of the resources in the list start at the same time, the RGM waits until the resource in the list starts before the RGM starts this resource. If the resource in this resource's Resource_dependencies list does not start (for example, if the resource group for the resource in the list remains offline or if the resource in the list is in a Start_failed state), this resource also remains offline. If this resource remains offline because of a dependency on a resource in a different resource group that fails to start, this resource's group enters a Pending_online_blocked state.

If this resource is brought offline at the same time as those in the list, this resource stops before those in the list. However, if this resource remains online or fails to stop, a resource in the list stops anyway.

By default in a resource group, application resources have an implicit strong resource dependency on network address resources.Implicit_network_dependencies in the rg_properties(5) man page contains more information.

Within a resource group, Prenet_start methods are run in dependency order before Start methods. Postnet_stop methods are run in dependency order after Stop methods. In different resource groups, the dependent resource waits for the depended-on resource to finish Prenet_start and Start before it runs Prenet_start. The depended-on resource waits for the dependent resource to finish Stop and Postnet_stop before it runs Stop.

To specify the scope of a dependency, append the following qualifiers, including the braces ({ }) or at-sign (@), to the resource name when you specify this property.

{ANY_NODE}

Extends the specified dependency to any node. The behavior of the dependent is affected by the depended-on resource on any node. The dependent resource waits for the depended-on resource to start on any primary node before it starts itself. The situation is similar for stopping and restarting.

{FROM_RG_AFFINITIES}

Specifies that the scope of the resource dependency is derived from the RG_affinities relationship of the resource groups to which the resources belong. If the dependent resource's group has a positive affinity for the depended-on resource's resource group, and they are starting or stopping on the same node, the dependency is {LOCAL_NODE}. If no such positive affinity exists, or if the groups are starting on different nodes, the dependency is {ANY_NODE}.

{LOCAL_NODE}

Limits the specified dependency to a per-node basis. The behavior of the dependent is affected by the depended-on resource only on the same node. The dependent resource waits for the depended-on resource to start on the same node. The situation is similar for stopping and restarting.

If the {LOCAL_NODE} dependent resource is in a failover (that is, single-mastered) resource group, and if the {LOCAL_NODE} dependency is unsatisfied on one node, the resource group might fail over to a different node on which the {LOCAL_NODE} dependency is satisfied, rather than remaining in the Pending_online_blocked state on the node where the dependency is unsatisfied.

@nodename

Specifies a {LOCAL_NODE} dependency which is limited to a particular node and has no effect on other nodes. This allows a resource to have different dependencies on each node of the cluster. The *nodename* is a node name or node ID.

For example, the following list indicates a dependency on resource res1 on node node1 and a dependency on resource res2 on node node2:

```
res1@node1,res2@node2
```

If the same dependency is applicable on multiple nodes, repeat the resource name with each node name. For example:

```
myres@node1,myres@node2,myres@node3,...
```

Resource dependencies between two resources that are located in the same resource group are always {LOCAL_NODE}.

If you do not specify a qualifier, FROM_RG_AFFINITIES is used by default.

The scha_resource_get(1HA), scha_resource_get(3HA), and scds_property_functions(3HA) man pages document alternate query forms to obtain the dependency list with qualifiers or without qualifiers.

Category	Optional
Default	The empty list
Tunable	Any time

Resource_dependencies_offline_restart (string_array)

A list of resources in the same group or in different groups upon which this resource has an offline-restart dependency.

This property works just as Resource_dependencies does, except that, if any resource in the offline-restart dependency list is stopped, this resource is stopped. If that resource in the offline-restart dependency list is subsequently restarted, this resource is restarted.

This resource cannot be started if the start of any resource in the list fails. If this resource and one of the resources in the list start at the same time, the RGM waits until the resource in the list starts before the RGM starts this resource. If the resource in this resource's Resource_dependencies list does not start (for example, if the resource group for the resource in the list remains offline or if the resource in the list is in a Start_failed state), this resource also remains offline. If this resource remains offline because of a dependency on a resource in a different resource group that fails to start, this resource's group enters a `Pending_online_blocked` state.

If this resource is brought offline at the same time as those in the list, this resource stops before those in the list. However, if this resource remains online or fails to stop, a resource in the list stops anyway.

If a fault occurs on a “depended-on” resource on a node, and the resource cannot recover, the RGM brings that resource on that node offline. The RGM also brings all of the depended-on resource's offline-restart dependents offline by triggering a restart on them. When the cluster administrator resolves the fault and re-enables the depended-on resource, the RGM brings the depended-on resource's offline-restart dependents back online as well.

To specify the scope of a dependency, append the following qualifiers, including the braces ({ }) or at-sign (@), to the resource name when you specify this property.

`{ANY_NODE}`
: Extends the specified dependency to any node. The behavior of the dependent is affected by the depended-on resource on any node. The dependent resource waits for the depended-on resource to start on any primary node before it starts itself. The situation is similar for stopping and restarting.

`{FROM_RG_AFFINITIES}`
: Specifies that the scope of the resource dependency is derived from the `RG_affinities` relationship of the resource groups to which the resources belong. If the dependent resource's group has a positive affinity for the depended-on resource's resource group, and they are starting or stopping on the same node, the dependency is `{LOCAL_NODE}`. If no such positive affinity exists, or if the groups are starting on different nodes, the dependency is `{ANY_NODE}`.

`{LOCAL_NODE}`
: Limits the specified dependency to a per-node basis. The behavior of the dependent is affected by the depended-on resource only on the same node. The dependent resource waits for the depended-on resource to start on the same node. The situation is similar for stopping and restarting.

  If the `{LOCAL_NODE}` dependent resource is in a failover (that is, single-mastered) resource group, and if the `{LOCAL_NODE}` dependency is unsatisfied on one node, the resource group might fail over to a different node on which the `{LOCAL_NODE}` dependency is satisfied, rather than remaining in the `Pending_online_blocked` state on the node where the dependency is unsatisfied.

@nodename
: Specifies a `{LOCAL_NODE}` dependency which is limited to a particular node and has no effect on other nodes. This allows a resource to have different dependencies on each node of the cluster. The *nodename* is a node name or node ID.

For example, the following list indicates a dependency on resource `res1` on node `node1` and a dependency on resource `res2` on node `node2`:

```
res1@node1,res2@node2
```

If the same dependency is applicable on multiple nodes, repeat the resource name with each node name. For example:

```
myres@node1,myres@node2,myres@node3,...
```

Resource dependencies between two resources that are located in the same resource group are always `{LOCAL_NODE}`.

If you do not specify a qualifier, `FROM_RG_AFFINITIES` is used by default.

The `scha_resource_get`(1HA), `scha_resource_get`(3HA), and `scds_property_functions`(3HA) man pages document alternate query forms to obtain the dependency list with qualifiers or without qualifiers.

Category	Optional
Default	The empty list
Tunable	Any time

`Resource_dependencies_restart` (`string_array`)

A list of resources in the same group or in different groups upon which this resource has an restart dependency.

This property works just as `Resource_dependencies` does, except that, if any resource in the restart dependency list is restarted, this resource is restarted. The restart of this resource occurs after the resource in the list comes back online.

This resource cannot be started if the start of any resource in the list fails. If this resource and one of the resources in the list start at the same time, the RGM waits until the resource in the list starts before the RGM starts this resource.

If the resource in this resource's `Resource_dependencies_restart` list does not start (for example, if the resource group for the resource in the list remains offline or if the resource in the list is in a `Start_failed` state), this resource remains offline. If this resource remains offline because of a dependency on a resource in a different resource group that fails to start, this resource's group enters a `Pending_online_blocked` state.

If this resource is brought offline at the same time as those in the list, this resource stops before those in the list. However, if this resource remains online or fails to stop, a resource in the list stops anyway.

Within a resource group, `Prenet_start` methods are run in dependency order before `Start` methods. `Postnet_stop` methods are run in dependency order after `Stop` methods. In different resource groups, the dependent resource waits for the depended-on resource to finish `Prenet_start` and `Start` before it runs `Prenet_start`. The depended-on resource waits for the dependent resource to finish `Stop` and `Postnet_stop` before it runs `Stop`.

To specify the scope of a dependency, append the following qualifiers, including the braces ({ }) or at-sign (@), to the resource name when you specify this property.

`{LOCAL_NODE}`
Limits the specified dependency to a per-node basis. The behavior of the dependent is affected by the depended-on resource only on the same node. The dependent resource waits for the depended-on resource to start on the same node. The situation is similar for stopping and restarting.

If the `{LOCAL_NODE}` dependent resource is in a failover (that is, single-mastered) resource group, and if the `{LOCAL_NODE}` dependency is unsatisfied on one node, the resource group might fail over to a different node on which the `{LOCAL_NODE}` dependency is satisfied, rather than remaining in the `Pending_online_blocked` state on the node where the dependency is unsatisfied.

`{ANY_NODE}`
Extends the specified dependency to any node. The behavior of the dependent is affected by the depended-on resource on any node. The dependent resource waits for the depended-on resource to start on any primary node before it starts itself. The situation is similar for stopping and restarting.

@*nodename*
Specifies a `{LOCAL_NODE}` dependency which is limited to a particular node and has no effect on other nodes. This allows a resource to have different dependencies on each node of the cluster. The *nodename* is a node name or node ID.

For example, the following list indicates a dependency on resource `res1` on node `node1` and a dependency on resource `res2` on node `node2`:

```
res1@node1,res2@node2
```

If the same dependency is applicable on multiple nodes, repeat the resource name with each node name. For example:

```
myres@node1,myres@node2,myres@node3,...
```

`{FROM_RG_AFFINITIES}`
Specifies that the scope of the resource dependency is derived from the `RG_affinities` relationship of the resource groups to which the resources belong. If the dependent resource's group has a positive affinity for the depended-on resource's resource group, and they are starting or stopping on the same node, the dependency is `{LOCAL_NODE}`. If no such positive affinity exists, or if the groups are starting on different nodes, the dependency is `{ANY_NODE}`.

Resource dependencies between two resources that are located in the same resource group are always `{LOCAL_NODE}`.

If you do not specify a qualifier, FROM_RG_AFFINITIES is used by default.

The scha_resource_get(1HA), scha_resource_get(3HA), and scds_property_functions(3HA) man pages document alternate query forms to obtain the dependency list with qualifiers or without qualifiers.

Category	Optional
Default	The empty list
Tunable	Any time

Resource_dependencies_weak (string_array)

A list of resources in the same group or in different groups upon which this resource has a weak dependency. A weak dependency determines the order of method calls within the group. The RGM calls the Start methods of the resources in this list before the Start method of this resource. The RGM calls the Stop methods of this resource before the Stop methods of those in the list. The resource can still start if those in the list fail to start or remain offline.

If this resource and a resource in its Resource_dependencies_weak list start concurrently, the RGM waits until the resource in the list starts before the RGM starts this resource. If the resource in the list does not start (for example, if the resource group for the resource in the list remains offline or the resource in the list is in a Start_failed state), this resource starts. This resource's resource group might enter a Pending_online_blocked state temporarily as resources in the this resource's Resource_dependencies_weak list start. When all resources in the list have started or failed to start, this resource starts and its group reenters the Pending_online state.

If this resource is brought offline at the same time as those in the list, this resource stops before those in the list. However, if this resource remains online or fails to stop, a resource in the list stops anyway.

Within a resource group, Prenet_start methods are run in dependency order before Start methods. Postnet_stop methods are run in dependency order after Stop methods. In different resource groups, the dependent resource waits for the depended-on resource to finish Prenet_start and Start before it runs Prenet_start. The depended-on resource waits for the dependent resource to finish Stop and Postnet_stop before it runs Stop.

To specify the scope of a dependency, append the following qualifiers, including the braces ({ }) or at-sign (@), to the resource name when you specify this property.

{LOCAL_NODE}

Limits the specified dependency to a per-node basis. The behavior of the dependent is affected by the depended-on resource only on the same node. The dependent resource waits for the depended-on resource to start on the same node. The situation is similar for stopping and restarting.

If the {LOCAL_NODE} dependent resource is in a failover (that is, single-mastered) resource group, and if the {LOCAL_NODE} dependency is unsatisfied on one node, the resource group might fail over to a different node on which the {LOCAL_NODE} dependency is satisfied, rather than remaining in the Pending_online_blocked state on the node where the dependency is unsatisfied.

{ANY_NODE}
Extends the specified dependency to any node. The behavior of the dependent is affected by the depended-on resource on any node. The dependent resource waits for the depended-on resource to start on any primary node before it starts itself. The situation is similar for stopping and restarting.

@nodename
Specifies a {LOCAL_NODE} dependency which is limited to a particular node and has no effect on other nodes. This allows a resource to have different dependencies on each node of the cluster. The *nodename* is a node name or node ID.

For example, the following list indicates a dependency on resource res1 on node node1 and a dependency on resource res2 on node node2:

```
res1@node1,res2@node2
```

If the same dependency is applicable on multiple nodes, repeat the resource name with each node name. For example:

```
myres@node1,myres@node2,myres@node3,...
```

{FROM_RG_AFFINITIES}
Specifies that the scope of the resource dependency is derived from the RG_affinities relationship of the resource groups to which the resources belong. If the dependent resource's group has a positive affinity for the depended-on resource's resource group, and they are starting or stopping on the same node, the dependency is {LOCAL_NODE}. If no such positive affinity exists, or if the groups are starting on different nodes, the dependency is {ANY_NODE}.

Resource dependencies between two resources that are located in the same resource group are always {LOCAL_NODE}.

If you do not specify a qualifier, FROM_RG_AFFINITIES is used by default.

The scha_resource_get(1HA), scha_resource_get(3HA), and scds_property_functions(3HA) man pages document alternate query forms to obtain the dependency list with qualifiers or without qualifiers.

Category	Optional
Default	The empty list
Tunable	Any time

`Resource_name` (`string`)

The name of the resource instance. Must be unique within the cluster configuration and cannot be changed after a resource has been created.

Category	Required
Default	No default
Tunable	Never

`Resource_project_name` (`string`)

The Oracle Solaris project name (see `projects(1)`) associated with the resource. Use this property to apply Solaris resource management features such as CPU shares and resource pools to cluster data services. When the RGM brings resources online, it launches the related processes under this project name. If this property is not specified, the project name will be taken from the `RG_project_name` property of the resource group that contains the resource (see the `rg_properties(5)` man page). If neither property is specified, the RGM uses the predefined project name `default`. The specified project name must exist in the projects database (see the `projects(1)` man page and *Oracle Solaris 11.1 Administration: Oracle Solaris Zones, Oracle Solaris 10 Zones, and Resource Management*).

Note – Changes to this property take affect the next time the resource is started.

Category	Optional
Default	Null
Tunable	Any time
Valid value	Any valid Oracle Solaris project name, or null

`Resource_state` on each cluster node (`enum`)

The RGM-determined state of the resource on each cluster node. Possible states include: `Online`, `Offline`, `Start_failed`, `Stop_failed`, `Monitor_failed`, `Online_not_monitored`, `Starting`, and `Stopping`.

`Online`

The starting methods (`Prenet_start`, `Start`, and `Monitor_start`) have executed successfully on the resource on this node.

`Offline`

The resource has not yet started for the first time on this node, or the stopping methods (`Monitor_stop`, `Stop`, and `Postnet_stop`, as applicable to the particular resource) have executed successfully on the resource on this node.

`Start_failed`

A `Prenet_start` or `Start` method failed on the resource on this node. `Start_failed` means that the method exited with a nonzero exit status or timed out. The service that is represented by the resource might or might not actually have started on this node.

Stop_failed
A Monitor_stop, Stop, or Postnet_stop method failed on the resource on this node. Stop_failed means that the method exited with a nonzero exit status or timed out. The service that is represented by the resource might or might not actually have stopped on this node.

When a resource enters this state, the resource-group state becomes Error_stop_failed and requires you to intervene. Error_stop_failed is described in more detail in the rg_properties(5) man page.

Monitor_failed
The resource successfully executed its Prenet_start or Start methods (as applicable to the specific resource type). However, the resources' Monitor_start method exited with a nonzero exit status or timed out. The resource monitor might or might not actually have started on this node.

Online_not_monitored
The resource successfully executed its Prenet_start or Start methods (as applicable to the specific resource type). The Monitor_start method has not yet been executed on the resource. A resource that is unmonitored (that is, for which there is no Monitor_start method, or for which monitoring has been disabled) remains in this state when the resource group goes to Online state.

Starting
The resource is running the Prenet_start or Start method in an attempt to go online.

Stopping
The resource is running the Start or Postnet_stop method in an attempt to go offline.

You cannot configure this property.

Category	Query-only
Default	No default
Tunable	Never

Retry_count (integer)
The number of times a monitor attempts to restart a resource if it fails. If the Retry_count is exceeded, depending on the particular data service and the setting of the Failover_mode property, the monitor might do one of the following:

- Allow the resource group to remain on the current primary, even though the resource is in a faulted state
- Request a failover of the resource group onto a different node

This property is created by the RGM and is made available to the cluster administrator only if this property is declared in the RTR file. This property is optional if a default value is specified in the RTR file.

If the Tunable attribute is not specified in the resource-type file, the Tunable value for the property is When_disabled.

If you specify a negative value for this property, the monitor attempts to restart the resource an unlimited number of times.

Note – Some resource types do not allow you to set Retry_count to a negative value. A more dependable way to specify unlimited restarts is to do the following:

- Set Retry_interval to a small value such as 1 or 0.
- Set Retry_count to a large value such as 1000.

Category	Conditional
Default	See above
Tunable	When disabled

Retry_interval (integer)

The number of seconds in which to count attempts to restart a failed resource. The resource monitor uses this property in conjunction with Retry_count. This property is created by the RGM and made available to the cluster administrator only if it is declared in the RTR file. This property is optional if a default value is specified in the RTR file.

If the Tunable attribute is not specified in the resource-type file, the Tunable value for the property is When_disabled.

Note – If the Retry_interval property is not declared, the call to scha_resource_get (num_*_restarts) fails with exit 13 (SCHA_ERR_RT).

Category	Conditional
Default	See above
Tunable	When disabled

Scalable (boolean)

Indicates whether the resource is scalable, that is, whether the resource uses the networking load balancing features of Oracle Solaris Cluster software.

If this property is declared in the RTR file, the RGM automatically creates the following scalable service properties for resources of that type: Affinity_timeout, Load_balancing_policy, Load_balancing_weights, Network_resources_used, Port_list, UDP_affinity, and Weak_affinity. These properties have their default values unless they are explicitly declared in the RTR file. The default for Scalable, when it is declared in the RTR file, is True.

If this property is declared in the RTR file, it is not permitted to be assigned a Tunable attribute other than At_creation.

If this property is not declared in the RTR file, the resource is not scalable, you cannot tune this property, and no scalable service properties are set by the RGM. However, you can explicitly declare the `Network_resources_used` and `Port_list` properties in the RTR file, if you want, because these properties can be useful in a non-scalable service as well as in a scalable service.

You use the `Scalable` resource property in combination with the `Failover` resource-type property, as follows:

`Failover`	`Scalable`	Description
`True`	`True`	Do not specify this illogical combination.
`True`	`False`	Specify this combination for a failover service.
`False`	`True`	Specify this combination for a scalable service that uses a `SharedAddress` resource for network load balancing.The *Oracle Solaris Cluster Concepts Guide* describes `SharedAddress` in more detail.
`False`	`False`	Use this combination to configure a multi-master service that does not use network load balancing.

The description for the `Failover` resource-type property in the `rt_properties(5)` man page contains additional information.

Category Optional

Default See above

Tunable At creation

`Status` on each cluster node (`enum`)
Set by the resource monitor. Possible values are: `Online`, `Degraded`, `Faulted`, `Unknown`, and `Offline`. The RGM sets the value to `Online` when the resource is started, if it is not already set by the `Start` (or `Prenet_start`) method. The RGM sets the value to `Offline` when the resource is stopped, if it is not already set by the `Stop` (or `Postnet_stop`) method.

Category Query-only

Default No default

Tunable Only by using the `scha_resource_setstatus` command

`Status_msg` on each cluster node (`string`)
Set by the resource monitor at the same time as the `Status` property. The RGM sets it to the empty string when the resource is brought `Offline`, if it was not already set by the `Stop` (or `Postnet_stop`) method.

Category Query-only

Default	No default
Tunable	Only by using the scha_resource_setstatus

Thorough_probe_interval (integer)

The number of seconds between invocations of a high-overhead fault probe of the resource. This property is created by the RGM and available to the cluster administrator only if it is declared in the RTR file. This property is optional if a default value is specified in the RTR file.

If the Tunable attribute is not specified in the resource-type file, the Tunable value for the property is When_disabled.

Category	Conditional
Default	No default
Tunable	When disabled

Type (string)

An instance's resource type.

Category	Required
Default	No default
Tunable	Never

Type_version (string)

Specifies which version of the resource type is currently associated with this resource. The RGM automatically creates this property, which cannot be declared in the RTR file. The value of this property is equal to the RT_version property of the resource's type. When a resource is created, the Type_version property is not specified explicitly, though it may appear as a suffix of the resource-type name. When a resource is edited, the Type_version may be changed to a new value.

Category	See above
Default	None
Tunable	Tunability is derived from the following: ■ The current version of the resource type. ■ The #$upgrade_from directive in the resource-type registration file (see the rt_reg(4) man page).

UDP_affinity (boolean)

If true, all UDP traffic from a given client is sent to the same server node that currently handles all TCP traffic for the client.

This property is relevant only when Load_balancing_policy is either Lb_sticky or Lb_sticky_wild. In addition, Weak_affinity must be set to FALSE (the default value).

This property is only used for scalable services.

Category	Conditional/Optional
Default	False
Tunable	When disabled

Weak_affinity (boolean)

If true, enable the weak form of the client affinity. This allows connections from a given client to be sent to the same server node except when a server listener starts (for example, due to a fault monitor restart, a resource failover or switchover, or a node rejoining a cluster after failing) or when load_balancing_weights for the scalable resource changes due to an administration action.

Weak affinity provides a low overhead alternative to the default form, both in terms of memory consumption and processor cycles.

This property is relevant only when Load_balancing_policy is either Lb_sticky or Lb_sticky_wild.

This property is only used for scalable services.

Category	Conditional/Optional
Default	False
Tunable	When disabled

See Also projects(1), clresource(1CL), clresourcegroup(1CL), clresourcetype(1CL), scha_control(1HA), scha_resource_get(1HA), scha_resource_setstatus(1HA), scha_control(3HA), scha_resource_get(3HA), scds_property_functions(3HA), rt_reg(4), property_attributes(5), rg_properties(5), rt_properties(5)

Oracle Solaris Cluster Concepts Guide, *Oracle Solaris 11.1 Administration: Oracle Solaris Zones, Oracle Solaris 10 Zones, and Resource Management*.

Name rt_properties – resource-type properties

Description The following information describes the resource-type properties that are defined by Oracle Solaris Cluster software. These descriptions have been developed for data service developers. For information about a particular data service, see the man page for that data service.

Resource-Type Property Values

Required	The property requires an explicit value in the Resource Type Registration (RTR) file. Otherwise, the object to which the property belongs cannot be created. A blank or the empty string is not allowed as a value.
Conditional	To exist, the property must be declared in the RTR file. Otherwise, the RGM does not create the property, and the property is not available to administrative utilities. A blank or the empty string is allowed. If the property is declared in the RTR file but no value is specified, the RGM supplies a default value.
Conditional/Explicit	To exist, the property must be declared in the RTR file with an explicit value. Otherwise, the RGM does not create the property and the property is not available to administrative utilities. A blank or the empty string is not allowed.
Optional	The property can be declared in the RTR file. If the property is not declared in the RTR file, the RGM creates it and supplies a default value. If the property is declared in the RTR file but no value is specified, the RGM supplies the same default value as if the property were not declared in the RTR file.
Query-only	The property cannot be set directly by an administrative utility. The property is not set in the RTR file. The value of the property is provided for information only.

Note – Resource-type properties cannot be updated by administrative utilities with the exception of `Installed_nodes` and `RT_system`. `Installed_nodes` cannot be declared in the RTR file and can only be set by the cluster administrator. `RT_system` can be assigned an initial value in the RTR file, and can also be set by the cluster administrator.

Resource-Type Properties and Descriptions

A resource type is defined by a resource-type registration file that specifies standard and extension property values for the resource type.

Note – resource-type property names, such as `API_version` and `Boot`, are *not* case sensitive. You can use any combination of uppercase and lowercase letters when you specify property names.

`API_version` (`integer`)

The version of the resource management API that is used by this resource-type implementation.

The following information summarizes the maximum `API_version` that is supported by each release of Oracle Solaris Cluster software.

Before and up to 3.1	2
3.1 10/03	3
3.1 4/04	4
3.1 9/04	5
3.1 8/05	6
3.2	7
3.2 2/08	8
3.2 1/09	9
3.2 11/09	10
3.3	11
3.3 5/11	12
3.3 12/12	13
4.0	20
4.1	21

Declaring a value for `API_version` that is greater than 2 in the RTR file prevents that resource type from being installed on a version of Oracle Solaris Cluster software that supports a lower maximum version. For example, if you declare `API_version=7` for a resource type, that resource type cannot be installed on any version of the cluster software that was released before the Sun Cluster 3.2 release.

Category	Optional
Default	2
Tunable	Never

`Boot` (`string`)

An optional callback method: the path to the program that the RGM invokes on a node when the following conditions occur:

- The node joins or rejoins the cluster.
- The resource group that contains the resource of this type is managed.

This method is expected to initialize resources of this type as the `Init` method does.

Category	Conditional/Explicit
Default	None
Tunable	Never

`Failover` (`boolean`)

If you set this property to `TRUE`, resources of this type cannot be configured in any group that can be online on multiple nodes at the same time.

You use this resource-type property in combination with the `Scalable` resource property, as follows:

`Failover`	`Scalable`	Description
`TRUE`	`TRUE`	Do not specify this illogical combination.
`TRUE`	`FALSE`	Specify this combination for a failover service.
`FALSE`	`TRUE`	Specify this combination for a scalable service that uses a `SharedAddress` resource for network load balancing. The *Oracle Solaris Cluster Concepts Guide* describes `SharedAddress` in more detail.
`FALSE`	`FALSE`	Use this combination to select a multi-master service that does not use network load balancing.

The description for `Scalable` in `r_properties(5)` and Chapter 3, "Key Concepts for System Administrators and Application Developers," in *Oracle Solaris Cluster Concepts Guide* contain additional information.

Category	Optional
Default	`FALSE`
Tunable	Never

`Fini` (`string`)

An optional callback method: the path to the program that the RGM invokes when a resource of this type is removed from RGM management.

Category	Conditional/Explicit
Default	No default
Tunable	Never

`Global_zone` (`boolean`)

If you set this property to `TRUE` for a resource type, its methods execute in the global zone under all circumstances. If you set this property to `TRUE`, even if the resource group is configured in a zone cluster, the method executes in the global zone. Set this property to `TRUE` only for services that can be managed only from the global zone, such as network addresses and file systems.

Caution – Do not register a resource type for which the `Global_zone` property is set to `TRUE` unless the resource type comes from a known and trusted source. Resource types for which this property is set to `TRUE` circumvent zone isolation and present a risk.

Do not set the `Global_zone` property to `TRUE` in an RTR file that is located in a zone cluster. All resource types for which this property is set to `TRUE` must be located in the global-cluster global zone.

The methods of a resource that is configured to start in a non-global zone and whose `Global_zone` property is set to `TRUE` are always run in the global zone. Such a resource, when configured in a non-global zone, does not benefit from the CPU shares and dedicated processor set configuration. This resource does not benefit even if you set the `RG_slm_type` property to `AUTOMATED`. Oracle Solaris Cluster software treats such a resource as though it is located in a resource group whose `RG_slm_type` property is set to `MANUAL`.

Because methods for resource types for which the `Global_zone` property is set to `TRUE` run in the global zone, the RGM does not immediately consider these resource types offline when a non-global zone dies. In fact, the RGM runs methods such as `Monitor_stop`, `Stop`, and `Postnet_stop` on these resource types, which include `LogicalHostname`, `SharedAddress`, and `HAStoragePlus` . However, the RGM considers the resources for which the `Global_zone` property is set to `FALSE` to be offline when a non-global zone dies. The RGM cannot run stopping methods on such resources because the methods would have to run in the non-global zone.

A resource type that declares `Global_zone=TRUE` might also declare the `Global_zone_override` resource property. In that case, the value of the `Global_zone_override` property supersedes the value of the `Global_zone` property for that resource. For more information about the `Global_zone_override` property, see the `r_properties(5)` man page.

Category	Optional
Default	`FALSE`
Tunable	Never

`Init` (`string`)

An optional callback method: the path to the program that the RGM invokes when a resource of this type becomes managed by the RGM.

Category	Conditional/Explicit

Default	No default
Tunable	Never

`Init_nodes` (`enum`)

Indicates the nodes on which the RGM is to call the `Init`, `Fini`, `Boot`, and `Validate` methods. You can set this property to `RG_primaries` (just the nodes that can master the resource) or `RT_installed_nodes` (all nodes on which the resource type is installed).

Category	Optional
Default	`RG_primaries`
Tunable	Never

`Installed_nodes` (`string_array`)

A list of the names of nodes on which the resource type is allowed to run. The RGM automatically creates this property. The cluster administrator can set the value. You cannot declare this property in the RTR file.

Category	Can be configured by the cluster administrator
Default	All cluster nodes
Tunable	Any time

`Is_logical_hostname` (`boolean`)

`TRUE` indicates that this resource type is some version of the `LogicalHostname` resource type that manages failover IP addresses.

Category	Query-only
Default	No default
Tunable	Never

`Is_shared_address` (`boolean`)

`TRUE` indicates that this resource type is some version of the `SharedAddress` resource type that manages shared IP (Internet Protocol) addresses.

Category	Query-only
Default	No default
Tunable	Never

`Monitor_check` (`string`)

An optional callback method: the path to the program that the RGM invokes before doing a monitor-requested failover of a resource of this type. If the monitor-check program exits with nonzero on a node, any attempt to fail over to that node is prevented.

Category	Conditional/Explicit
Default	No default

Tunable Never

`Monitor_start` (`string`)
An optional callback method: the path to the program that the RGM invokes to start a fault monitor for a resource of this type.

Category Conditional/Explicit

Default No default

Tunable Never

`Monitor_stop` (`string`)
A callback method that is required if `Monitor_start` is set: the path to the program that the RGM invokes to stop a fault monitor for a resource of this type.

Category Conditional/Explicit

Default No default

Tunable Never

`Pkglist` (`string_array`)
An optional list of packages that are included in the resource-type installation.

Category Conditional/Explicit

Default No default

Tunable Never

`Postnet_stop` (`string`)
An optional callback method: the path to the program that the RGM invokes after calling the `Stop` method of any network-address resources on which a resource of this type depends. This method is expected to perform `Stop` actions that must be performed after network interfaces are configured down.

Category Conditional/Explicit

Default No default

Tunable Never

`Prenet_start` (`string`)
An optional callback method: the path to the program that the RGM invokes before calling the `Start` method of any network-address resources on which a resource of this type depends. This method is expected to perform `Start` actions that must be performed before network interfaces are configured up.

Category Conditional/Explicit

Default No default

Tunable Never

`Proxy` (`boolean`)

Indicates whether a resource of this type is a proxy resource.

A *proxy resource* is an Oracle Solaris Cluster resource that imports the state of a resource from another cluster framework such as Oracle Clusterware. Oracle Clusterware is a platform-independent set of system services for cluster environments.

A proxy resource type uses the `Prenet_start` method to start a daemon that monitors the state of the external (proxied) resource. The `Postnet_stop` method stops the monitoring daemon. The monitoring daemon issues the `scha_control` command with the `CHANGE_STATE_ONLINE` or the `CHANGE_STATE_OFFLINE` tag to set the proxy resource's state to `Online` or to `Offline`, respectively. The `scha_control()` function similarly uses the `SCHA_CHANGE_STATE_ONLINE` and `SCHA_CHANGE_STATE_OFFLINE` tags.

If you set this property to `TRUE`, the resource is a proxy resource.

Category	Optional
Default	`FALSE`
Tunable	Never

`Resource_list` (`string_array`)

The list of all resources of the resource type. The administrator does not set this property directly. Rather, the RGM updates this property when the administrator adds or removes a resource of this type to or from any resource group.

Category	Query-only
Default	Empty list
Tunable	Never

`Resource_type` (`string`)

The name of the resource type. To view the names of the currently registered resource types, type:

`clresourcetype list`

A resource-type name includes the version, which is mandatory:

`vendor_id.resource_type:version`

The three components of the resource-type name are properties that are specified in the RTR file as *vendor-id*, *resource-type*, and *RT-version*. The `clresourcetype` command inserts the period (.) and colon (:) delimiters. The `RT_version` suffix of the resource-type name is the same value as the `RT_version` property. To ensure that the *vendor-id* is unique, the recommended approach is to use the stock symbol for the company creating the resource type.

Category	Required

Default	Empty string
Tunable	Never

`RT_basedir` (`string`)
The directory path that is used to complete relative paths for callback methods. This path is expected to be set to the installation location for the resource-type packages. The path must be a complete path, that is, the path must start with a forward slash (`/`). This property is not required if all the method path names are absolute.

Category	Required, unless all method path names are absolute
Default	No default
Tunable	Never

`RT_description` (`string`)
A brief description of the resource type.

Category	Conditional
Default	Empty string
Tunable	Never

`RT_system` (`boolean`)
If you set this property to `TRUE` for a resource type, you cannot delete the resource type (`clresourcetype unregister` *resource-type-name*). This property is intended to help prevent accidental deletion of resource types, such as `LogicalHostname`, that are used to support the cluster infrastructure. However, you can apply the `RT_system` property to any resource type.

To delete a resource type whose `RT_system` property is set to `TRUE`, you must first set the property to `FALSE`. Use care when you delete a resource type whose resources support cluster services.

Category	Optional
Default	`FALSE`
Tunable	Any time

`RT_version` (`string`)
A mandatory version string that identifies this resource-type implementation. The `RT_version` is the suffix component of the full resource-type name.

Category	Conditional/Explicit or Required
Default	No default
Tunable	Never

`Single_instance` (`boolean`)
If you set this property to `TRUE`, the RGM allows only one resource of this type to exist in the cluster.

Category	Optional
Default	`FALSE`
Tunable	Never

`Start` (`string`)
A callback method: the path to the program that the RGM invokes to start a resource of this type.

Category	Required, unless the RTR file declares a `Prenet_start` method
Default	No default
Tunable	Never

`Stop` (`string`)
A callback method: the path to the program that the RGM invokes to stop a resource of this type.

Category	Required, unless the RTR file declares a `Postnet_stop` method
Default	No default
Tunable	Never

`Update` (`string`)
An optional callback method: the path to the program that the RGM invokes when properties of a running resource of this type are changed.

Category	Conditional/Explicit
Default	No default
Tunable	Never

`Validate` (`string`)
An optional callback method: the path to the program that the RGM invokes to check values for properties of resources of this type.

Category	Conditional/Explicit
Default	No default
Tunable	Never

`Vendor_ID` (`string`)
See the `Resource_type` property.

Category	Conditional

Default	No default
Tunable	Never

See Also clresource(1CL), clresourcegroup(1CL), clresourcetype(1CL), rt_reg(4), SUNW.HAStoragePlus(5), property_attributes(5), r_properties(5), rg_properties(5), scha_control(1HA), scha_control(3HA).

Oracle Solaris Cluster Concepts Guide, *Oracle Solaris Cluster Data Services Developer's Guide*, *Oracle Solaris Cluster Data Services Planning and Administration Guide*

Name scalable_service – scalable resource types

Description A scalable data service is one that takes advantage of the Oracle Solaris Cluster networking facility. Such a service is implemented as a resource type managed by the Resource Group Manager (RGM).

Standard Resource Properties

The standard resource properties `Scalable`, `Network_resources_used`, `Port_list`, `Load_balancing_policy`, and `Load_balancing_weights` are common to all scalable resource types. See the `r_properties(5)` man page for the syntax and description of these properties.

Some data services can run in either a scalable or non-scalable mode. These services permit you to specify a value of `True` or `False` for the `Scalable` property at the time that the resource is created. If this property is set to `True` on a resource, the resource is said to be in "scalable mode." The resource then must be contained in a scalable mode resource group, that is, a group that can have its `Maximum_primaries` property set to a value that is greater than 1.

For a data service that can only run in scalable mode, the `Scalable` property is implicitly True for resources of this type, and cannot be changed by the administrator.

You can change the `Load_balancing_weights` and `Port_list` properties at any time, even while the resource is online. `Network_resources_used` and `Load_balancing_policy` are set when the resource is created, and you cannot edit these properties afterward. Depending on how the resource type is implemented, these properties might have default values, or you might be required to provide values when you create the resource.

Network Monitoring

A scalable service instance running on a particular node needs to be able to reply to clients over the public networks. The RGM automatically monitors the health of the public networks on nodes where scalable services are to run, and might bring down a scalable service instance on a particular node if the public network becomes inaccessible from that node. If you disable monitoring on a scalable resource by using the `clresource unmonitor` command, these network checks are disabled.

Resource Validation

When the `Scalable` resource property that is set to `True` is created or updated, the RGM validates various resource properties and will reject the attempted update if these properties are not configured correctly. Among the checks that are performed are the following:

- The `Network_resources_used` property must not be empty. This property must contain the names of existing `SharedAddress` resources. Every node that you specify for the `Nodelist` property of the resource group that contains the scalable resource must appear in either the `NetIfList` property or the `AuxNodeList` property of one of the `SharedAddress` resources.
- A resource group that contains a scalable resource must have its `RG_dependencies` property set to include the resource groups of all `SharedAddress` resources listed in the scalable resource's `Network_resources_used` property.

- The `Port_list` property must not be empty. This property must contain a list of port and protocol pairs, where protocol is `tcp`, `tcp6`, `udp`, or `udp6`. Possible protocols that you can specify include `tcp` for only TCP IPv4, `tcp6` for both TCP IPv4 and TCP IPv6, `udp` for only UDP IPv4, or `udp6` for both UDP IPv4 and UDP IPv6.

  For example, you can specify `Port_list=80/tcp,40/udp`.

Affinity IP affinity guarantees that connections from a given client IP address are forwarded to the same cluster node. `Affinity_timeout`, `UDP_affinity`, and `Weak_affinity` are only relevant when `Load_balancing_policy` is set to either `Lb_sticky` or `Lb_sticky_wild`. See `r_properties(5)` for detailed information.

See Also

`clresource(1CL)`, `clresourcegroup(1CL)`, `clresourcetype(1CL)`, `rt_callbacks(1HA)`, `rt_reg(4)`, `r_properties(5)`

Oracle Solaris Cluster Software Installation Guide, *Oracle Solaris Cluster Data Services Developer's Guide*

Name SUNW.crs_framework, crs_framework – resource type implementation that coordinates shutdown of Oracle Clusterware

Description The `SUNW.crs_framework` resource type coordinates the shutdown of Oracle Clusterware and Oracle Solaris Cluster resources in a configuration of Oracle Solaris Cluster Support for Oracle Real Application Clusters (Oracle RAC). This resource type enables Oracle Solaris Cluster and Oracle Clusterware to inter-operate by enabling Oracle Solaris Cluster to stop Oracle Clusterware.

Note – This resource type does *not* enable Oracle Clusterware to be started by using Oracle Solaris Cluster administration commands. Oracle Clusterware can be started only by using Oracle commands or by booting a node.

The Oracle Clusterware voting disk and Oracle cluster registry (OCR) files might reside on storage that is represented by resources of type `SUNW.ScalDeviceGroup` or `SUNW.ScalMountPoint`. In this situation, Oracle Clusterware must be stopped before resources of type `SUNW.ScalDeviceGroup` or `SUNW.ScalMountPoint` are brought offline. A resource of type `SUNW.crs_framework` ensures that this requirement is met by stopping Oracle Clusterware processes on a node in the following situations:

- When a resource of type `SUNW.ScalDeviceGroup` or `SUNW.ScalMountPoint` is brought offline on the node by. The Oracle Clusterware processes must be stopped for the following reasons:
  - To ensure that the resource of type `SUNW.ScalDeviceGroup` or `SUNW.ScalMountPoint` is stopped correctly
  - To prevent failure of the database or a node if a resource of type `SUNW.ScalDeviceGroup` or `SUNW.ScalMountPoint` is brought offline while Oracle Clusterware or Oracle RAC processes are accessing storage
- When a node is shut down. If the Oracle Clusterware processes are not stopped, the node fails to shut down.

The `SUNW.crs_framework` resource type is a single instance resource type. Only one resource of this type can be created in the cluster.

To ensure that Oracle Solaris Cluster stops resources in the correct order, configure a resource of type `SUNW.crs_framework` as follows:

- Ensure that any resource group that contains a resource of type `SUNW.ScalDeviceGroup` or `SUNW.ScalMountPoint` declares strong positive affinity for the resource group that is to contain the `SUNW.crs_framework` resource.

- Set an offline-restart dependency by the `SUNW.crs_framework` resource on any resources that represent storage for the Oracle Clusterware voting disk and OCR files. These resources are of type `SUNW.ScalDeviceGroup` or `SUNW.ScalMountPoint`. Limit the scope of each dependency to only the node where the `SUNW.ScalDeviceGroup` resource or `SUNW.ScalMountPoint` resource is running.
- Set a strong dependency by the resource of type `SUNW.crs_framework` on a resource of type `SUNW.rac_framework`.

Create these dependencies and affinities when you configure database resources for the Oracle Solaris Cluster Support for Oracle RAC data service. For more information, see "Configuring Resources for Oracle RAC Database Instances" in *Oracle Solaris Cluster Data Service for Oracle Real Application Clusters Guide*.

To register this resource type and create instances of this resource type, use one of the following means:

- The `clsetup(1CL)` utility, specifying the option for configuring Oracle Solaris Cluster Support for Oracle Real Application Clusters
- The following sequence of Oracle Solaris Cluster maintenance commands:
  1. To register this resource type, use the `clresourcetype(1CL)` command.
  2. To create instances of this resource type, use the `clresource(1CL)` command.

Standard Properties

For a description of all standard resource properties, see the `r_properties(5)` man page.

Standard resource properties are overridden for this resource type as follows:

`Monitor_start_timeout`

Minimum 60

Default 300

`Monitor_stop_timeout`

Minimum 60

Default 300

`Start_timeout`

Minimum 60

Default 300

`Stop_timeout`

Minimum 60

Default 1200

`Update_timeout`

Minimum 60

Default 300

`Validate_timeout`

Minimum 60

Default 300

Extension Properties

The `SUNW.crs_framework` resource type has no extension properties.

Examples

EXAMPLE 1 Creating a SUNW.crs_framework Resource

This example registers the `SUNW.crs_framework` resource type and creates an instance of the `SUNW.crs_framework` resource type that is named `crs_framework-rs`. The example makes the following assumptions:

- The C shell is used.
- A resource group that is named `crs-framework-rg` exists.
- The following resources exist:
  - A resource of type `SUNW.rac_framework` that is named `rac_framework-rs`, which represents the Oracle RAC framework
  - A resource of type `SUNW.ScalDeviceGroup` that is named `db-storage-rs`, which represents the scalable device group that stores the Oracle Clusterware voting disk and OCR files

```
phys-schost-1# clresourcetype register SUNW.crs_framework
phys-schost-1# clresource create -g crs-framework-rg \
-t SUNW.crs_framework \
-p resource_dependencies=rac_framework-rs \
-p resource_dependencies_offline_restart=db-storage-rs\{local_node\} \
crs_framework-rs
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	`ha-cluster/library/ucmm`

See Also

`clresource(1CL)`, `clresourcetype(1CL)`, `clsetup(1CL)`, `attributes(5)`, `SUNW.rac_framework(5)`, `SUNW.ScalDeviceGroup(5)`, `SUNW.ScalMountPoint(5)`

Oracle Solaris Cluster Data Service for Oracle Real Application Clusters Guide

Name SUNW.derby, derby – resource type implementation of the Java DB database

Description SUNW.derby is the failover resource type that enables you to use the Java DB database with Oracle Solaris Cluster. The Java DB database is based on the Derby database. For information about the database, see http://db.apache.org/derby/.

The extension properties associated with the SUNW.derby resource type are as follows:

DB_path(string)
: Specifies the location of the data file for the Java DB database.

The value for DB_path is a string specifying PATH. The specified path should be a path controlled by your chosen storage, for example HAStoragePlus.

Category	Mandatory
Tunable	When disabled

DB_port(integer)
: Specifies the port for the Java DB database.

Category	Mandatory
Default	1527
Tunable	When disabled

DB_probe_port(integer)
: Specifies the port that Oracle Solaris Cluster uses to test the health of the server for the Java DB database.

Category	Mandatory
Default	1528
Tunable	When disabled

Monitor_retry_count(integer)
: Controls fault-monitor restarts. The property indicates the number of times that the process monitor facility restarts the fault monitor. The property corresponds to the -n option passed to the pmfadm(1M) command. The Resource Group Manager (RGM) counts the number of restarts in a specified time window (see Monitor_retry_interval). Note that Monitor_retry_count refers to the restarts of the fault monitor itself, not of the SUNW.derby resource.

Category	Optional
Default	4
Tunable	Any time

`Monitor_retry_interval`(integer)

Indicates the time window in minutes during which the RGM counts fault-monitor failures. The property corresponds to the `-t` option passed to the pmfadm(1M) command. If the number of times that the fault monitor fails exceeds the value of the extension property `Monitor_retry_count`, the process monitor facility does not restart the fault monitor.

Category	Optional
Default	2 minutes
Tunable	Anytime

`Probe_timeout`(integer)

Specifies the timeout value, in seconds, for the probe command.

Category	Optional
Default	120 seconds
Default	2 seconds
Tunable	Anytime

See Also pmfadm(1M)

Name SUNW.Event – resource type implementation for the Cluster Reconfiguration Notification Protocol (CRNP)

Description The `SUNW.Event` resource type implementation provides highly available CRNP services on Oracle Solaris Cluster. This implementation makes the notification daemon (`/usr/cluster/lib/sc/cl_apid`) highly available by managing it as a resource under the Oracle Solaris Cluster resource group manager (RGM). The resource group that contains the `SUNW.Event` resource must have a network resource configured in the same resource group. Only a single resource of type `SUNW.Event` should exist on a cluster.

You can run the CRNP only in the global zone.

Standard Properties This section describes key standard properties that control the behavior of the implementation. You use the `clresource` command to set these properties on a `SUNW.Event` resource. The `r_properties(5)` man page describes these resource properties in more detail.

`Network_resources_used` (`string_array`)
A list of logical-hostname or shared-address network resources upon which this resource has a dependency. This list contains all network-address resources that appear in the properties `Resource_dependencies`, `Resource_dependencies_weak`, `Resource_dependencies_restart`, or `Resource_dependencies_offline_restart`.

This property is updated automatically by the RGM, based on the setting of the resource-dependencies properties. You do not set this property directly. Instead, use the `Resource_dependencies` property.

Category	Conditional/Optional
Default	The empty list
Tunable	When disabled

`Port_list` (`string_array`)
A comma-separated list of port numbers on which the server is listening. The `r_properties(5)` man page describes `Port_list` in more detail.

Category	Conditional/Required
Default	9444/tcp
Tunable	When disabled

`Resource_dependencies (string array)`
A list of resources upon which a resource depends. This list includes any logical-hostname or shared-address network resources that are used by a resource. The default value for this property is null. You must specify this property if the application needs to bind to one or more specific addresses. If no network resource dependencies are specified, the application listens on all addresses.

Before you create the event resource, a `LogicalHostname` or `SharedAddress` resource must already be configured.

You can specify one or more resource names. Each network resource can contain one or more logical hostnames. See the `clreslogicalhostname`(1CL) and `clressharedaddress`(1CL) man pages for more information.

You can specify an alternate kind of dependency by using the `Resource_dependencies_weak`, `Resource_dependencies_restart`, or `Resource_dependencies_offline_restart` property instead of the `Resource_dependencies` property. For more information, see the `r_properties`(5) man page.

Category	Optional
Default	The empty list
Tunable	Any time

`Retry_count` (`integer`)
The number of times that a monitor attempts to restart a resource if it fails. The `r_properties`(5) man page describes `Retry_count` in more detail.

Note – If you specify a negative value for this property, the monitor attempts to restart the resource an unlimited number of times.

Category	Conditional
Default	2
Maximum	10
Tunable	Anytime

`Retry_interval` (`integer`)
The number of seconds over which to count attempts to restart a failed resource. The `r_properties`(5) man page describes `Retry_interval` in more detail.

Category	Conditional
Default	300
Maximum	3600
Tunable	Anytime

`Thorough_probe_interval` (`integer`)
The number of seconds between invocations of a high overhead fault probe of the resource. The `r_properties`(5) man page describes `Thorough_probe_interval` in more detail.

Category	Conditional
Default	60

Maximum	3600
Tunable	Anytime

Extension Properties This section describes key extension properties that control the behavior of the implementation.

`Allow_hosts` (`string_array`)
This property controls the set of clients that are allowed to register with the implementation to receive cluster reconfiguration events. The general form of this property is `ipaddress/masklength`, which defines a subnet from which the clients are allowed to register. For example, the setting `129.99.77.0/24` allows clients on the subnet `129.99.77` to register for events. As another example, `192.9.84.231/32` allows only the client `192.9.84.231` to register for events.

In addition, the following special keywords are recognized:

- `LOCAL` refers to all clients that are located in directly connected subnets of the cluster.
- `ALL` allows all clients to register.

Note – If a client matches an entry in both the `Allow_hosts` and the `Deny_hosts` property, that client is prevented from registering with the implementation.

Category	Optional
Default	`LOCAL`
Tunable	Anytime

`Client_retry_count` (`integer`)
This property controls the number of attempts made by the implementation while communicating with external clients. If a client fails to respond within `Client_retry_count` attempts, the client times out. The client is subsequently removed from the list of registered clients that are eligible to receive cluster reconfiguration events. The client must reregister in order to start receiving events again. The section about the `Client_retry_interval` property describes how often these retries are made by the implementation.

Category	Optional
Default	3
Minimum	1
Tunable	Anytime

`Client_retry_interval` (`integer`)
This property defines the time period (in seconds) used by the implementation while communicating with unresponsive external clients. Up to `Client_retry_count` attempts are made during this interval to contact the client.

The value for this property can be modified at any time.

Category	Optional
Default	1800
Minimum	30
Tunable	Anytime

`Client_timeout` (`integer`)

This property is the timeout value (in seconds) that is used by the implementation while communicating with external clients. However, the implementation continues to attempt to contact the client for a tunable number of times. The sections about the `Client_retry_count` and `Client_retry_interval` properties describe the means of tuning this property.

Category	Optional
Default	60
Minimum	30
Tunable	Anytime

`Deny_hosts` (`string_array`)

This property controls the set of clients that are prevented from registering to receive cluster reconfiguration events. To determine access, the settings on this property take precedence over those in the `Allow_hosts` list. The format of this property is the same as the format that is defined in the `Allow_hosts`.

Category	Optional
Default	`NULL`
Tunable	Any time

`Max_clients` (`integer`)

This property controls the maximum number of clients that can register with the implementation to receive notification of cluster events. Attempts by additional clients to register for events are rejected by the implementation. Since each client registration uses resources on the cluster, tuning this property allows users to control resource usage on the cluster by external clients.

Category	Optional
Default	1000
Minimum	1
Tunable	When disabled

Examples

EXAMPLE 1 Creating a SUNW.Event Resource With Default Properties

This example shows how to create a failover `SUNW.Event` resource that is named `CRNP` in an existing resource group that is named `events-rg`. The `events-rg` resource group contains a `LogicalHostname` or `SharedAddress` resource, which identifies the failover hostname that is associated with the resource group.

```
# clresourcetype register SUNW.Event
# clresource create -g events-rg -t SUNW.Event CRNP
```

In this example, the `SUNW.Event` resource that is created is named `CRNP`. This resource listens on port 9444 and allows all clients on directly connected subnets to register for events.

EXAMPLE 2 Creating a SUNW.Event Resource With Non-Default Properties

This example shows how to create a `SUNW.Event` resource that is named `CRNP` in a resource group that is named `events-rg`. The `CRNP` resource is configured to listen on port 7000, and a specific network resource `foo-1`, which is already configured in the `events-rg` resource group. This CRNP resource allows clients on subnet `192.9.77.0` and clients on directly connected subnets to register, but disallows the client `192.9.77.98` from using the implementation.

```
# clresource create -g events-rg -t SUNW.Event \
-p Port_list=7000/tcp -p Network_resources_used=foo-1 \
-p Allow_hosts=LOCAL,192.9.77.0/24 \
-p Deny_hosts=192.9.77.98/32 CRNP
```

Files

`/usr/cluster/lib/sc/cl_apid`
CRNP daemon.

`/usr/cluster/lib/sc/events/dtds`
Directory that contains data type definitions for the CRNP protocol.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core

See Also

`clresource(1CL)`, `clresourcegroup(1CL)`, `clresourcetype(1CL)`, `scha_resource_get(1HA)`, `attributes(5)`, `r_properties(5)`

Name SUNW.gds – resource type for making simple network-aware and non-network-aware applications highly available or scalable

Description The Generic Data Service (GDS) is a mechanism that enables you to make simple network-aware and non-network-aware applications highly available or scalable by plugging them into the Oracle Solaris Cluster Resource Group Manager (RGM) framework.

The GDS contains a fully functional Oracle Solaris Cluster resource type, complete with callback methods (`rt_callbacks(1HA)`) and a Resource Type Registration (RTR) file (`rt_reg(4)`).

Standard Properties

`Failover_mode` (enum)

Modifies the recovery actions that the RGM takes when a resource fails to start or stop successfully, or when a resource monitor finds a resource to be unhealthy and consequently requests a restart or failover.

For more information on the `Failover_mode` property, see the `r_properties(5)` man page.

Category	Optional
Default	SOFT
Tunable	Any time

`Network_resources_used` (string array)

A list of logical-hostname or shared-address network resources upon which this resource has a dependency. This list contains all network-address resources that appear in the properties `Resource_dependencies`, `Resource_dependencies_weak`, `Resource_dependencies_restart`, or `Resource_dependencies_offline_restart`.

This property is updated automatically by the RGM, based on the setting of the resource-dependencies properties. You do not set this property directly. Instead, use the `Resource_dependencies` property.

Category	Conditional/Optional
Default	The empty list
Tunable	When disabled

`Port_list` (string array)

Specifies a comma-separated list of port numbers on which the application listens. See the `r_properties(5)` man page.

The `Port_list` property must be specified in the start script that Agent Builder creates or with the `clresource` command if you are using Oracle Solaris Cluster administration commands.

Note – If the `Network_aware` property is set to `False`, the `Port_list` property is not required.

Appended to each port number is a slash (/) followed by the protocol that is being used by that port, for example, `Port_list=80/tcp` or `Port_list=80/tcp6,40/udp6`.

You can specify the following protocol values:

- `tcp`, for TCP IPv4
- `tcp6`, for TCP IPv6
- `udp`, for UDP IPv4
- `udp6`, for UDP IPv6

Category	Conditional/Required
Default	No default
Tunable	Any time

`Resource_dependencies` (`string array`)

Specifies a list of resources upon which a resource depends. This list includes any logical-hostname or shared-address network resources that are used by a resource. The default value for this property is null. If the `Network_aware` property is set to true, you must set this property to the logical-hostname or shared-address network resources on which the application is listening.

Before you create the GDS resource, a `LogicalHostname` or `SharedAddress` resource must already be configured.

You can specify one or more resource names. Each network resource can contain one or more logical hostnames. See the `clreslogicalhostname`(1CL) and `clressharedaddress`(1CL) man pages for more information.

You can specify an alternate kind of dependency by using the `Resource_dependencies_weak`, `Resource_dependencies_restart`, or `Resource_dependencies_offline_restart` property instead of the `Resource_dependencies` property. For more information, see the `r_properties`(5) man page.

Category	Optional
Default	The empty list
Tunable	Any time

`Retry_count` (`integer`)

The number of times a monitor attempts to restart a resource if it fails.

For more information on the `Retry_count` property, see the `r_properties`(5) man page.

Category	Conditional
Default	2
Tunable	Any time

`Retry_interval` (`integer`)
The number of seconds in which to count attempts to restart a failed resource.

For more information on the `Retry_interval` property, see the `r_properties(5)` man page.

Category	Conditional
Default	370 seconds
Tunable	Any time

`Scalable` (`boolean`)
Indicates whether the resource is scalable, that is, whether the resource uses the networking load balancing features of Oracle Solaris Cluster software.

If the `Scalable` property is set to `TRUE`, then additional properties such as `Load_balancing_policy` and `Load_balancing_weights` are used to configure the load balancing behavior.

For more information on the `Scalable`, `Load_balancing_policy`, and `Load_balancing_weights` properties, see the `r_properties(5)` man page.

Category	Optional
Default	FALSE
Tunable	At creation

`Start_timeout` (`integer`)
Specifies the timeout value, in seconds, for the start command.

Category	Optional
Minimum	60 seconds
Default	300 seconds
Tunable	Any time

`Stop_timeout` (`integer`)
Specifies the timeout value, in seconds, for the stop command.

Category	Optional
Minimum	60 seconds
Default	300 seconds
Tunable	Any time

`Validate_timeout` (`integer`)
Specifies the timeout value, in seconds, for the validate command.

Category	Optional
Minimum	60 seconds
Default	300 seconds
Tunable	Any time

Extension Properties

`Child_mon_level` (`integer`)

Provides control over the processes that are monitored through the Process Monitor Facility (PMF). This property denotes the level to which the forked children processes are monitored. Omitting this property or setting this property to the default value is the same as omitting the `-C` option for `pmfadm`(1M): all children (and their descendents) are monitored.

Category	Optional
Default	`-1`
Tunable	At creation

`Failover_enabled` (`boolean`)

Allows the resource to fail over. If this property is set to `False`, failover of the resource is disabled. You can use this property to prevent the application resource from initiating a failover of the resource group.

Category	Optional
Default	`True`
Tunable	When disabled

Note – The `Failover_mode=RESTART_ONLY` setting matches the behavior of the `Failover_enabled=False` setting. The `Failover_mode=LOG_ONLY` setting goes a step further and prevents resources from restarting. Use the `Failover_mode` property instead of the `Failover_enabled` extension property to better control failover behavior. For more information, see the descriptions of the `LOG_ONLY` and `RESTART_ONLY` values for `Failover_mode` in `r_properties`(5).

`Log_level` (`enum`)

Specifies the level, or type, of diagnostic messages that are logged by GDS. You can specify `None`, `Info`, or `Err` for this property. When you specify `None`, diagnostic messages are not logged by GDS. When you specify `Info`, both information and error messages are logged. When you specify `Err`, only error messages are logged.

Category	Optional
Default	`Info`
Tunable	Any time

`Monitor_retry_count`

The number of times that the process monitor facility (PMF) restarts the fault monitor during the time window that the `Monitor_retry_interval` property specifies. This property refers to restarts of the fault monitor itself rather than to the resource. The system-defined properties `Retry_interval` and `Retry_count` control restarting of the resource.

Category	Optional
Data type	Integer
Default	`4`
Range	`0` - `2147483647` `-1` indicates an infinite number of retry attempts.
Tunable	At any time

`Monitor_retry_interval`

The time (in minutes) over which failures of the fault monitor are counted. If the number of times that the fault monitor fails exceeds the value that is specified in the extension property `Monitor_retry_count` within this period, the PMF does not restart the fault monitor.

Category	Optional
Data type	Integer
Default	`2`
Range	`0` – `2147483647` `-1` indicates an infinite retry interval.
Tunable	At any time

`Network_aware` (`boolean`)

This property specifies whether an application uses the network.

Category	Optional
Default	`True`
Tunable	At creation

`Probe_command` (`string`)

Specifies the command that periodically checks the health of a network-aware or non network-aware application. This command must be a complete command line that can be passed directly to a shell to probe the application. The probe command returns with an exit status of `0` if the application is running correctly.

The exit status of the probe command is used to determine the severity of the failure of the application. This exit status, called probe status, is an integer between `0` (for success) and `100` (for complete failure). The probe status can also be `201`, which causes the application to fail over unless `Failover_enabled` is set to `False`.

The probe status is used within the GDS probing algorithm to determine whether to restart the application locally or to fail over the application to another node. If the `probe` command is omitted, the GDS provides its own simple probe that connects to the application on the network resource. If the connect succeeds, the GDS disconnects immediately. If both connect and disconnect succeed, the application is deemed to be running correctly.

The GDS does not provide "default" probing behavior for non-network-aware applications. However, a non-network-aware application is started under the PMF, which monitors the application and restarts the application if it fails. The `pmfadm`(1M) man page contains more information.

Category	Optional
Default	Null
Tunable	When disabled

`Probe_timeout` (`integer`)
Specifies the timeout value, in seconds, for the probe command.

Category	Optional
Minimum	2 seconds
Default	30 seconds
Tunable	Any time

`Start_command` (`string`)
Specifies the command that starts the application. This command must be a complete command line that can be passed directly to a shell to start the application.

The start command, or one of its forked children, is expected to be a long-running program or daemon which actually provides the service to clients. The start command process tree is monitored by the Process Monitor Facility (PMF) as described under the `Child_mon_level` extension property. If the monitored processes exit, they are restarted according to the settings of the `Retry_count` and `Retry_interval` resource properties. If the retry count is exceeded, an attempt is made to relocate the resource group to a different node.

The exit status that is returned by the start command or its children is ignored.

Category	Required
Minimum	1

Default	No default
Tunable	When disabled

`Stop_command` (`string`)
Specifies the command that stops the application. This command must be a complete command line that can be passed directly to a shell to stop the application. If this property is omitted, or if the stop command exits nonzero, the GDS stops the application by using signals.

Category	Optional
Default	Null
Tunable	When disabled

`Stop_signal` (`integer`)
Specifies the signal that stops the application. The values of this property are the same as those defined in `signal`(3HEAD).

Category	Optional
Minimum	1
Maximum	37
Default	`15`
Tunable	When disabled

`Validate_command` (`string`)
Specifies the absolute path to the command that validates the application. If you do not provide an absolute path, the application is not validated.

The exit status of the validate command is used to determine whether the creation or update of the GDS resource should be permitted. Before creating or updating the resource, the specified validate command is executed on each node of the node list of the resource group that contains the resource. If the validate command exits nonzero, the requested resource creation or update is not permitted. Any output that is written to `stdout` or `stderr` by the validate command will be passed back to the user who issued the administrative command to create or update the resource. Such output can be used to explain why the resource validation failed.

The validate command is also executed when bringing the `gds` resource online, before executing the `Start_command` extension property. If the validate command exits nonzero, it is treated as a start failure.

The validate command is also executed before performing the `GIVEOVER` option of the `scha_control` command to relocate the resource group to a new node. If the command exits nonzero, the giveover is blocked and the resource group remains mastered on its current node.

Category	Optional
Default	Null
Tunable	When disabled

Examples The following examples show how to use GDS to make an application named app highly available. You can also use Oracle Solaris Cluster Agent Builder (scdsbuilder(1HA)) to create scripts that contain these commands.

Basic Example This example shows how to register the SUNW.gds resource type, create a resource group for the application, create the LogicalHostname resource for the logical host name hhead, create the network-aware application resource, manage the resource group, enable all its resources, and bring its resources online.

At this point, the application is running, highly available, and monitored by the simple probe that is provided by GDS. You can now check the status of the application.

```
# clresourcetype register SUNW.gds
# clresourcegroup create rg1
# clreslogicalhostname create -g rg1 -h hhead
# clresource create -g rg1 -t SUNW.gds \
-p Start_command="/usr/local/app/bin/start" \
-p Port_list="1234/tcp" -p Network_aware=True \
-p Resource_dependencies=hhead app-rs
# clresourcegroup online -M rg1
# clresourcegroup status +
```

Complex Example This example shows how to register the SUNW.gds resource type, create a resource group for the application, create the LogicalHostname resource for the logical host name hhead, create the network-aware application resource, log error messages only, manage the resource group, enable all the resources, and bring the resources online.

At this point, the application is running, highly available, and monitored by the fault monitor that is specified by Probe_command. You can now check the status of the application.

```
# clresourcetype register SUNW.gds
# clresourcegroup create rg1
# clreslogicalhostname create -g rg1 -h hhead
# clresource create -g rg1 -t SUNW.gds \
-p Start_command="/usr/local/app/bin/start" \
-p Stop_command="/usr/local/app/bin/stop" \
-p Validate_command="/usr/local/app/bin/config" \
-p Probe_command="/usr/local/app/bin/probe" \
-p stop_signal=9 -p failover_enabled=FALSE \
-p Start_timeout=120 -p Stop_timeout=180 \
-p Port_list="1234/tcp" -p Probe_timeout=60 \
-p Network_aware=True \-p Validate_timeout=120 -p Log_level=Err \
-p Resource_dependencies=hhead app-rs
```

```
# clresourcegroup online -M rg1
# clresourcegroup status +
```

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/ha-service/gds

See Also clreslogicalhostname(1CL), clresource(1CL), clresourcegroup(1CL), clresourcetype(1CL), clressharedaddress(1CL), rt_callbacks(1HA), scdsbuilder(1HA), scha_control(1HA), scha_resource_get(1HA), hatimerun(1M), pmfadm(1M), signal(3HEAD), rt_reg(4), attributes(5), r_properties(5), scalable_service(5)

Name SUNW.HAStoragePlus – resource type that enforces dependencies between Oracle Solaris Cluster device services, file systems, and data services and monitors those entities

Description `SUNW.HAStoragePlus` describes a resource type that enables you to specify dependencies between data service resources and device groups, cluster file systems, and local file systems.

Note – Local file systems include UFS, Sun QFS from Oracle, and Oracle Solaris ZFS.

This resource type enables you to bring data services online only after their dependent device groups and file systems are guaranteed to be available. The `SUNW.HAStoragePlus` resource type provides support for mounting, unmounting, and checking file systems.

Resource groups by themselves do not provide for direct synchronization with disk device groups, cluster file systems, or local file systems. As a result, during a cluster reboot or failover, an attempt to start a data service can occur while its dependent global devices and file systems are still unavailable. Consequently, the data service's `START` method might time out, and your data service might fail.

The `SUNW.HAStoragePlus` resource type represents the device groups, cluster, and local file systems that are to be used by one or more data service resources. You add a resource of type `SUNW.HAStoragePlus` to a resource group and set up dependencies between other resources and the `SUNW.HAStoragePlus` resource.

If an application resource is configured on top of an HAStoragePlus resource, the application resource must define the offline restart dependency on the underlying HAStoragePlus resource. This ensures the application resource comes online after the dependent HAStoragePlus resource comes online, and goes offline before the HAStoragePlus resource goes offline. For example:

```
# clresource set \
-p Resource_dependencies_offline_restart=hasp_rs \
applicaton_rs
```

These dependencies ensure that the data service resources are brought online after the following situations occur:

1. All specified device services are available (and collocated, if necessary).
2. All specified file systems are checked and mounted.

The `SUNW.HAStoragePlus` resource type also provides a fault monitor to monitor the health of the entities managed by the HAStoragePlus resource, including global devices, file systems, and ZFS storage pools. The fault monitor runs fault probes on a regular basis. If one of the entities becomes unavailable, the resource is restarted or a failover to another node is performed.

If more than one entity is monitored, the fault monitor probes them all at the same time. To see a list of what is monitored on global devices, raw device groups, Solaris Volume Manager device groups, file systems, and ZFS storage pools, see Chapter 2, "Administering Data Service Resources," in *Oracle Solaris Cluster Data Services Planning and Administration Guide*.

The HAStoragePlus resource fault monitor probes the devices and file systems it manages by reading and writing to the file systems. If a read operation is blocked by any software on the I/O stack and the HAStoragePlus resource is required to be online, the user must disable the fault monitor. For example, you must unmonitor the HAStoragePlus resource managing the Availability Suite Remote Replication volumes feature of Oracle Solaris because Availability Suite blocks reading from any bitmap volume or any data volume in the NEED SYNC state. The HAStoragePlus resource managing the Availability Suite volumes must be online at all times.

Standard Properties The following standard property is associated with the SUNW.HAStoragePlus resource type:

Thorough_probe_interval

Defines the time window (in seconds) between the invocations of the fault probe and the resource.

Category
: Optional

Minimum
: 5

Maximum
: 3600

Default
: 180

Tunable
: Anytime

Extension Properties The following extension properties are associated with the SUNW.HAStoragePlus resource type:

AffinityOn

Specifies whether a SUNW.HAStoragePlus resource needs to perform an affinity switchover for all global devices that are defined in the GlobalDevicePaths and FileSystemMountPoints extension properties. You can specify TRUE or FALSE..

Category
: Optional

Default
: TRUE

Tunable
: When disabled

The Zpools extension property ignores the AffinityOn extension property. The AffinityOn extension property is intended for use with the GlobalDevicePaths and FileSystemMountPoints extension properties only.

When you set the AffinityOn extension property to FALSE, the SUNW.HAStoragePlus resource passively waits for the specified global services to become available. In this case, the primary node of each online global device service might not be the same node that is the primary node for the resource group.

The purpose of an affinity switchover is to enhance performance by ensuring the co-location of the device groups and the resource groups on a specific node. Data reads and writes always occur over the device primary paths. Affinity switchovers require the potential primary node list for the resource group and the node list for the device group to be equivalent. The SUNW.HAStoragePlus resource performs an affinity switchover for each device service only once, that is, when the SUNW.HAStoragePlus resource is brought online.

The setting of the AffinityOn flag is ignored for scalable services. Affinity switchovers are not possible with scalable resource groups.

FileSystemCheckCommand

Overrides the check that SUNW.HAStoragePlus conducts on each unmounted file system before attempting to mount it. You can specify an alternate command string or executable, which is invoked on all unmounted file systems.

Category
Optional

Default
NULL

Tunable
Anytime

When a SUNW.HAStoragePlus resource is configured in a scalable resource group, the file-system check on each unmounted cluster file system is omitted. When you set this extension property to NULL, Oracle Solaris Cluster checks UFS by issuing the /usr/sbin/fsck -o p command. Oracle Solaris Cluster checks other file systems by issuing the /usr/sbin/fsck command.

When you set the FileSystemCheckCommand extension property to another command string, SUNW.HAStoragePlus invokes this command string with the file system mount point as an argument. You can specify any arbitrary executable in this manner. A nonzero return value is treated as an error that occurred during the file system check operation. This error causes the START method to fail.

When you do not require a file system check operation, set the FileSystemCheckCommand extension property to /bin/true.

FileSystemMountPoints

Specifies a list of valid file system mount points. You can specify global or local file systems. Global file systems are accessible from all nodes in a cluster. Local file systems are accessible from a single cluster node. Local file systems that are managed by a SUNW.HAStoragePlus resource are mounted on a single cluster node. These local file systems require the underlying devices to be Oracle Solaris Cluster global devices.

Category
: Optional

Default
: Empty list

Tunable
: Anytime

These file system mount points are defined in the format `paths[,…]`.

Each file system mount point should have an equivalent entry in `/etc/vfstab` on all cluster nodes and in all global zones. The `SUNW.HAStoragePlus` resource type does not check `/etc/vfstab` in non-global zones.

`SUNW.HAStoragePlus` resources that specify local file systems can only belong in a failover resource group with affinity switchovers enabled. These local file systems can therefore be termed failover file systems. You can specify both local and global file system mount points at the same time.

Any file system whose mount point is present in the `FileSystemMountPoints` extension property is assumed to be local if its `/etc/vfstab` entry satisfies both of the following conditions:

1. The non-global mount option is specified.
2. The "mount at boot" field for the entry is set to "no."

An Oracle Solaris ZFS file system is always a local file system. Do not list a ZFS file system in `/etc/vfstab`. Also, do not include ZFS mount points in the `FileSystemMountPoints` property.

GlobalDevicePaths

Specifies a list of valid global device group names or global device paths. The paths are defined in the format `paths[,…]`.

Category
: Optional

Default
: Empty list

Tunable
: When disabled

IOOption

Defines the type of I/O performed to probe file systems. The only supported values are `ReadOnly` and `ReadWrite`. The `ReadOnly` value indicates that the fault monitor is allowed to perform read-only I/O on the managed file systems, including the file systems specified in the `FileSystemMountPoints` property and the ZFS file systems that belong to ZFS storage pools specified in the `Zpools` property. The `ReadWrite` value indicates that the fault monitor is allowed to perform both read and write I/O on the managed file systems.

Category
Optional

Default
ReadOnly

Tunable
Anytime

IOTimeout
Defines the time out value (in seconds) for I/O probing.

Category
Optional

Minimum
10

Maximum
3600

Default
300

Tunable
Anytime

Monitor_retry_count
Controls the number of Process Monitor Facility (PMF) restarts allowed for the fault monitor.

Category
Optional

Minimum
1

Default
4

Tunable
Anytime

Monitor_retry_interval
Defines the time interval (in minutes) for fault monitor restarts.

Category
Optional

Minimum
2

Default
2

Tunable
Anytime

RebootOnFailure

Specifies whether to reboot the local system when a failure is detected by a probe. When set to `TRUE`, all devices that are used by the resource, directly or indirectly, must be monitored by disk-path monitoring.

If `RebootOnFailure` is set to `TRUE` and at least one device is found available for each entity specified in the `GlobalDevicePaths`, `FileSystemMountPoints`, or `Zpools` property, the local system is rebooted. The local system refers to the global—cluster node or the zone-cluster node where the resource is online.

Category
Optional

Default
FALSE

Tunable
Anytime

Zpools

Specifies a list of valid ZFS storage pools, each of which contains at least one ZFS. These ZFS storage pools are defined in the format `paths[,…]`. All file systems in a ZFS storage pool are mounted and unmounted together.

Category
Optional

Default
Empty list

Tunable
Anytime

The `Zpools` extension property enables you to specify ZFS storage pools. The devices that make up a ZFS storage pool must be accessible from all the nodes that are configured in the node list of the resource group to which a `SUNW.HAStoragePlus` resource belongs. A `SUNW.HAStoragePlus` resource that manages a ZFS storage pool can only belong to a failover resource group.

When a SUNW.HAStoragePlus resource that manages a ZFS storage pool is brought online, the ZFS storage pool is imported, and every file system that the ZFS storage pool contains is mounted.

When the resource is taken offline on a node, for each managed ZFS storage pool, all file systems are unmounted and the ZFS storage pool is exported.

Note – SUNW.HAStoragePlus does not support file systems created on ZFS volumes.

ZpoolsSearchDir
Specifies the location to search for the devices of Zpools. The ZpoolsSearchDir extension property is similar to the -d option of the zpool command.

Category
Optional

Default
/dev/dsk

Tunable
When disabled

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core

See Also rt_reg(4), attributes(5)

Warnings Make data service resources within a given resource group dependent on a SUNW.HAStoragePlus resource. Otherwise, no synchronization is possible between the data services and the global devices or file systems. Offline restart resource dependencies ensure that the SUNW.HAStoragePlus resource is brought online before other resources. Local file systems that are managed by a SUNW.HAStoragePlus resource are mounted only when the resource is brought online.

Enable logging on UFS systems.

Avoid configuring multiple SUNW.HAStoragePlus resources in different resource groups that refer to the same device group and with AffinityOn flags set to TRUE. Redundant device switchovers can occur. As a result, resource and device groups might be dislocated.

Avoid configuring a ZFS storage pool under multiple SUNW.HAStoragePlus resources in different resource groups.

Fault Monitor Errors The fault monitor monitors the entities managed by the HAStoragePlus resource, including global devices, file systems, and ZFS storage pools. The status of a monitored entity is one of the following:

- Online – No partial errors or severe errors.
- Degraded – Partial error.
- Faulted – Severe error. The Resource Group Manager (RGM) attempts to restart the resource and fail over to another cluster node.

If more than one entity is monitored, the resource's status is determined by the aggregated status of all monitored entities.

Note – Changing the configuration of managed entities while the fault monitor is running can cause the fault monitor to exit with a failure, which leads to the resource being restarted. You should disable the fault monitor before you make configuration changes to any managed entities and then re-enable the fault monitor. Configuration changes could include removing a ZFS storage pool or a ZFS file system in a pool, or a Solaris Volume Manager disk set or volume.

Notes

The `SUNW.HAStoragePlus` resource is capable of mounting any cluster file system that is found in an unmounted state.

All file systems are mounted in the overlay mode.

Local file systems are forcibly unmounted.

The waiting time for all device services and file systems to become available is specified by the `Prenet_start_timeout` property in `SUNW.HAStoragePlus`. This is a tunable property.

Name SUNW.Proxy_SMF_failover, Proxy_SMF_failover – resource type for proxying failover SMF services.

Description The `SUNW.Proxy_SMF_failover` resource type represents the proxy for failover of Service Management Facility (SMF) services.

Standard properties and extension properties that are defined for the `SUNW.proxysmffailover` resource type are described in the following subsections. To set these properties for an instance of the `SUNW.Proxy_SMF_failover` resource type, use the `clresource` command (`clresource`(1CL)).

Standard Properties See `r_properties`(5) for a description of the following resource properties.

`Start_timeout`
Default: `3600`

Minimum: `60`

`Stop_timeout`
Default: `3600`

Minimum: `60`

`Init_timeout`
Default: `3600`

Minimum: `60`

`Boot_timeout`
Default: `3600`

Minimum: `60`

`Fini_timeout`
Default: `3600`

Minimum: `60`

`Validate_timeout`
Default: `3600`

Minimum: `60`

`Failover_mode`
Default: `SOFT`

Tunable: `Anytime`

`R_description`
Default: `""`

Tunable: `Anytime`

`Retry_count`
Default: 2

Minimum: `0`

Maximum: `10`

Tunable: `Anytime`

`Retry_interval`
Default: `300`

Maximum: `3600`

Tunable: `Anytime`

`Through_probe_interval`
Default: `60`

Tunable: `Anytime`

Extension Properties

`Proxied_service_instances`
Includes information about the SMF services to be proxied by the resource. Its value is the path to a file that contains all the proxied SMF services. Each line in the file is dedicated to one SMF service and specifies `svc fmri` and the path to the corresponding service manifest file. For example, if the resource has to manage two services, `restarter_svc_test_1:default` and `restarter_svc_test_2:default`, the file should include the following two lines:

```
<svc:/system/cluster/restarter_svc_test_1:default>,
  svc:/system/cluster/restarter_svc_test_1:default>,
  </var/svc/manifest/system/cluster/restarter_svc_test_1.xml>

<svc:/system/cluster/restarter_svc_test_2:default>,
  </var/svc/manifest/system/cluster/restarter_svc_test_2.xml>
```

Note – The entries above should each appear on a single line. They are broken into multiple lines here for legibility.

Default: ""

Tunable: `When disabled`

Example

This example shows how to register the `SUNW.Proxy_SMF_failover` resource type, create a resource group for the application, create the failover application resource, manage the resource group, and enable a resource.

Register the resource type:

```
# clresourcetype -f <path-to-rtrfile> SUNW.Proxy_SMF_failover
```

Create a resource group called `rg1` for the application :

```
# clresourcegroup create rg1
```

Create the failover application resource called `myfailoverres`:

```
# clresource create -t SUNW.Proxy_SMF_failover -g rg1 \\
-x proxied_service_instances="/usr/local/app/svc myfailoverres"
```

where `/usr/local/app/svc` is a text file.

Manage the resource group `rg1`:

```
# clresourcegroup manage rg1
```

Enable the `myfailoverres` resource:

```
# clresource enable myfailoverres
```

Use the following command to check the status of the application:

```
# clresource status
```

See Also `pmfadm`(1M), `scha_resource_get`(1HA), `clresourcetype`(1CL), `clresource`(1CL), `clresourcegroup`(1CL), `attributes`(5), `r_properties`(5)

Oracle Solaris Cluster Data Services Planning and Administration Guide

Name SUNW.Proxy_SMF_multimaster, Proxy_SMF_multimaster – resource type for proxying multi-master SMF services

Description The `SUNW.Proxy_SMF_multimaster` resource type represents the proxy for multi-master Service Management Facility (SMF) services.

Standard properties and extension properties that are defined for the `SUNW.proxysmfmultimaster` resource type are described in the subsections that follow. To set these properties for an instance of the `SUNW.Proxy_SMF_multimaster` resource type, use the `clresource` command (`clresource`(1CL)).

Standard Properties

See `r_properties`(5) for a description of the following resource properties.

`Start_timeout`
Default: `3600`

Minimum: `60`

`Stop_timeout`
Default: `3600`

Minimum: `60`

`Init_timeout`
Default: `3600`

Minimum: `60`

`Boot_timeout`
Default: `3600`

Minimum: `60`

`Fini_timeout`
Default: `3600`

Minimum: `60`

`Validate_timeout`
Default: `3600`

Minimum: `60`

`Failover_mode`
Default: `SOFT`

Tunable: `Anytime`

`R_description`
Default: `""`

Tunable: `Anytime`

`Retry_count`
Default: `2`

Minimum: `0`

Maximum: `3`

Tunable: `Anytime`

`Retry_interval`
Default: `300`

Maximum: `3600`

Tunable: `Anytime`

`Through_probe_interval`
Default: `60`

Tunable: `Anytime`

Extension Properties

`Proxied_service_instances`
Includes information about the SMF services to be proxied by the resource. Its value is the path to a file that contains all the proxied SMF services. Each line in the file is dedicated to one SMF service and specifies `svc fmri` and the path to the corresponding service manifest file. For example, if the resource has to manage two services, `restarter_svc_test_1:default` and `restarter_svc_test_2:default`, the file should include the following two lines:

```
<svc:/system/cluster/restarter_svc_test_1:default>,
  svc:/system/cluster/restarter_svc_test_1:default>,
  </var/svc/manifest/system/cluster/restarter_svc_test_1.xml>

<svc:/system/cluster/restarter_svc_test_2:default>,
  </var/svc/manifest/system/cluster/restarter_svc_test_2.xml>
```

Note – The entries above should each appear on a single line. They are broken into multiple lines here for legibility.

Default: `""`

Tunable: `When disabled`

Example

This example shows how to register the `SUNW.Proxy_SMF_multimaster` resource type, create a resource group for the application, create the multi-master application resource, manage the resource group, and enable resources.

Register the resource type:

```
# clresourcetype -f <path-to-rtrfile> SUNW.Proxy_SMF_multimaster
```

Create a resource group called `rg1` for the application. :

```
# clresourcegroup create rg1
```

Create the failover application resource called `mymultimasterres`:

```
# clresource create -t SUNW.Proxy_SMF_multimaster -g rg1 \\
-x proxied_service_instances="/usr/local/app/svc" mymultimasterres
```

where `/usr/local/app/svc` is a text file.

Manage the resource group `rg1`:

```
# clresourcegroup manage rg1
```

Enable the `mymultimasterres` resource:

```
# clresource enable mymultimasterres
```

Use the following command to check the status of the application:

```
# clresource status
```

See Also pmfadm(1M), scha_resource_get(1HA), clresourcetype(1CL), clresource(1CL), clresourcegroup(1CL), attributes(5), r_properties(5)

Oracle Solaris Cluster Data Services Planning and Administration Guide

Name SUNW.Proxy_SMF_scalable, Proxy_SMF_scalable – resource type for proxying scalable SMF services

Description The SUNW.Proxy_SMF_scalable resource type represents the proxy for scalable Service Management Facility (SMF) services.

Standard properties and extension properties that are defined for the SUNW.proxysmfscalable resource type are described in the subsections that follow. To set these properties for an instance of the SUNW.Proxy_SMF_scalable resource type, use the clresource command.

Standard Properties See r_properties(5) for a description of the following resource properties.

Start_timeout
: Default: 3600

  Minimum: 60

Stop_timeout
: Default: 3600

  Minimum: 60

Init_timeout
: Default: 3600

  Minimum: 60

Boot_timeout
: Default: 3600

  Minimum: 60

Fini_timeout
: Default: 3600

  Minimum: 60

Validate_timeout
: Default: 3600

  Minimum: 60

Failover_mode
: Default: SOFT

  Tunable: Any time

R_description
: Default: ""

  Tunable: Any time

`Retry_count`
Default: 2

Minimum: 0

Maximum: 3

Tunable: Any time

`Retry_interval`
Default: 300

Maximum: 3600

Tunable: Any time

`Through_probe_interval`
Default: 60

Tunable: Any time

Extension Properties

`Proxied_service_instances`
Includes information about the SMF services to be proxied by the resource. Its value is the path to a file that contains all the proxied SMF services. Each line in the file is dedicated to one SMF service and specifies `svc fmri` and the path to the corresponding service manifest file. For example, if the resource has to manage two services, `restarter_svc_test_1:default` and `restarter_svc_test_2:default`, the file should include the following two lines:

```
<svc:/system/cluster/restarter_svc_test_1:default>,
  svc:/system/cluster/restarter_svc_test_1:default>,
  </var/svc/manifest/system/cluster/restarter_svc_test_1.xml>

<svc:/system/cluster/restarter_svc_test_2:default>,
  </var/svc/manifest/system/cluster/restarter_svc_test_2.xml>
```

Note – The entries above should each appear on a single line. They are broken into multiple lines here for legibility.

Default: ""

Tunable: When disabled

Example

This example shows how to register the `SUNW.Proxy_SMF_scalable` resource type, create a resource group for the application, create the load balanced application resource, manage the resource group, enable all its resources, and bring its resources online.

Register the resource type:

```
# clresourcetype -f <path-to-rtrfile> SUNW.Proxy_SMF_scalable
```

Create a resource group called `rg1` for the application :

```
# clresourcegroup create rg1
```

Create the failover application resource called `myloadbalancedres`:

```
# clresource create -t SUNW.Proxy_SMF_scalable -g rg1 \\
-x proxied_service_instances="/usr/local/app/svc myloadbalancedres"
```

where `/usr/local/app/svc` is a text file.

Manage the resource group `rg1`:

```
# clresourcegroup manage rg1
```

Enable the `myloadbalancedres` resource:

```
# clresource enable myloadbalancedres
```

Use the following command to check the status of the application:

```
# clresource status
```

See Also `pmfadm`(1M), `scha_resource_get`(1HA), `clresourcetype`(1CL), `clresource`(1CL), `clresourcegroup`(1CL), `attributes`(5), `r_properties`(5)

Oracle Solaris Cluster Data Services Planning and Administration Guide

Name SUNW.rac_framework, rac_framework – resource type implementation for the framework that enables Oracle Solaris Cluster Support for Oracle Real Application Clusters (Oracle RAC)

Description The `SUNW.rac_framework` resource type represents the framework that enables Oracle Solaris Cluster Support for Oracle RAC. This resource type enables you to monitor the status of this framework.

The `SUNW.rac_framework` resource type is a single instance resource type. Only one resource of this type may be created in the cluster.

To register this resource type and create instances of this resource type, use one of the following means:

- The `clsetup`(1CL) utility, specifying the option for configuring Oracle Solaris Cluster Support for Oracle Real Application Clusters
- The following sequence of Oracle Solaris Cluster maintenance commands:
  1. To register this resource type, use the `clresourcetype`(1CL) command.
  2. To create instances of this resource type, use the `clresource`(1CL) command.

When a resource of this type is brought offline on a node, the transition from the online state to the offline state requires a finite time to complete. During the transition to the offline state, the resource continues to participate in reconfiguration processes. However, when the resource is offline on a node, changes to resource properties are not effective on the node until the resource is brought back online. Oracle Solaris Cluster displays a warning message to this effect when a resource of this type is disabled.

The transition to the unmanaged state of a resource group that contains a resource of this type requires a finite time to complete. During the transition to the unmanaged state, the Oracle RAC framework continues to participate in framework reconfiguration processes. However, when the resource group is unmanaged, changes to resource properties are not effective on the node. To stop the Oracle RAC framework, the node must be rebooted.

The extension properties of the `SUNW.rac_framework` resource type are as follows:

`reservation_timeout`
: Type integer; minimum 100; maximum 99999; defaults to 325. This property specifies the timeout (in seconds) for the reservation step of a reconfiguration of Oracle Solaris Cluster Support for Oracle RAC. You can modify this property at any time.

Examples **EXAMPLE 1** Creating a rac_framework Resource

This example registers the `SUNW.rac_framework` resource type and creates an instance of the `SUNW.rac_framework` resource type named `rac_framework-rs`. The example assumes that a resource group named `rac-framework-rg` has been created.

```
phys-host-sc1# clresourcetype register SUNW.rac_framework
phys-host-sc1# clresource create -g rac-framework-rg \
-t SUNW.rac_framework rac_framework-rs
```

EXAMPLE 2 Changing a Property of a rac_framework Resource

This example sets the timeout for the reservation step of a reconfiguration of Oracle Solaris Cluster Support for Oracle RAC to 350 seconds. The example assumes that a resource of type `SUNW.rac_framework` that is named `rac_framework-rs` has been created.

```
phys-host-sc1# clresource set
\-p reservation_timeout=350 rac_framework-rs
```

Note – For examples to create a `SUNW.vucmm_framework` resource for use by volume-manager resources, see `SUNW.vucmm_framework(5)`.

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/library/ucmm

See Also

`clresource(1CL)`, `clresourcetype(1CL)`, `clsetup(1CL)`, `attributes(5)`, `SUNW.vucmm_framework(5)`

Oracle Solaris Cluster Data Service for Oracle Real Application Clusters Guide

Name SUNW.ScalDeviceGroup, ScalDeviceGroup – resource type implementation for a scalable device group

Description The `SUNW.ScalDeviceGroup` resource type represents a scalable device group. An instance of this resource type represents one of the following type of device group:

- A Solaris Volume Manager for Sun Cluster multi-owner disk set

The `SUNW.ScalDeviceGroup` resource type is a scalable resource type. An instance of this resource type is online on each node in the node list of the resource group that contains the resource.

To register this resource type and create instances of this resource type, use one of the following means:

- The `clsetup` utility, specifying the option for configuring Oracle Solaris Cluster Support for Oracle Real Application Clusters
- The following sequence of Oracle Solaris Cluster maintenance commands:
  1. To register this resource type, use the `clresourcetype` command.
  2. To create instances of this resource type, use the `clresource` command.

Standard properties and extension properties that are defined for the `SUNW.ScalDeviceGroup` resource type are described in the subsections that follow.

Standard Properties For a description of all standard resource properties, see the `r_properties(5)` man page.

Standard resource properties are overridden for this resource type as follows:

Monitor_start_timeout

Minimum
10

Default
300

Monitor_stop_timeout

Minimum
10

Default
300

Postnet_stop_timeout

Minimum
60

Default
300

Prenet_start_timeout

Minimum
60

Default
300

Start_timeout

Minimum
60

Default
300

Stop_timeout

Minimum
60

Default
300

Thorough_probe_interval

Default
300

Update_timeout

Minimum
60

Default
300

Validate_timeout

Minimum
60

Default
300

Extension Properties

The extension properties of this resource type are as follows:

Debug_level

This property specifies the level to which debug messages from the resource of this type are logged. When the debug level is increased, more debug messages are written to the log files.

Data type
Integer

Default
0

Range
0–10

Tunable
Any time

DiskGroupName
This property specifies the name of the device group that the resource represents. You must set this property to one of the following items:

- The name of an existing Solaris Volume Manager for Sun Cluster multi-owner disk set. This name was specified in the `metaset(1M)` command with which the disk set was created.

The requirements for the device group that you specify are as follows:

- The device group must be a valid, existing multi-owner disk set or shared-disk group.
- The device group must be hosted on all nodes that can master the resource.
- The device group must be accessible from all nodes that can master the scalable device group resource.
- The device group must contain at minimum one volume.

Data type
String

Default
No default defined

Range
Not applicable

Tunable
When disabled

IOTimeout
This property specifies the timeout value (in seconds) for I/O probing.

Default
30

Range
1–1800

Tunable
Anytime

LogicalDeviceList

This property specifies a comma-separated list of logical volumes that the fault monitor of the resource is to monitor. This property is optional. If you do not specify a value for this property, all logical volumes in the device group are to be monitored.

The status of the device group is derived from the statuses of the individual logical volumes that are monitored. If all monitored logical volumes are healthy, the device group is healthy. If any monitored logical volume is faulty, the device group is faulty.

The status of an individual logical volume is obtained by querying the volume's volume manager. If the status of a Solaris Volume Manager for Sun Cluster volume cannot be determined from a query, the fault monitor performs file input/output (I/O) operations to determine the status.

If a device group is discovered to be faulty, monitoring of the resource that represents the group is stopped and the resource is put into the disabled state.

Note – For mirrored disks, if one submirror is faulty, the device group is still considered to be healthy.

Note – When using Solaris Volume Manager for Sun Cluster, if soft partitions are to be specified to be monitored, then the corresponding top level or bottom level meta devices should also be specified.

The requirements for each logical volume that you specify are as follows:

- The logical volume must exist.
- The logical volume must be contained in the device group that the `diskgroupname` property specifies.
- The logical volume must be accessible from all nodes that can master the scalable device group resource.

Data type
String array

Default
""

Range
Not applicable

Tunable
Any time

Monitor_retry_count

This property specifies the maximum number of restarts by the process monitor facility (PMF) that are allowed for the fault monitor.

Data type
Integer

Default
4

Range
No range defined

Tunable
Any time

Monitor_retry_interval
This property specifies the period of time in minutes during which the PMF counts restarts of the fault monitor.

Data type
Integer

Default
2

Range
No range defined

Tunable
Any time

RebootOnFailure
This property specifies whether to reboot the local system when failure is detected by the probe. When this property is set to `TRUE`, all devices that are used by the resource, directly or indirectly, must be monitored by disk-path monitoring.

If `RebootOnFailure` is set to `TRUE` and at least one device is found available for the device group that is specified in the `DiskGroupName` property, the local system is rebooted. The local system refers to the global-cluster node or the zone-cluster node where the resource is online.

Default
`FALSE`

Tunable
Anytime

Examples

EXAMPLE 1 Creating a ScalDeviceGroup Resource Using the SUNW.vucmm_svm Resource Type

This example shows the creation of a `ScalDeviceGroup` resource to represent a Solaris Volume Manager for Sun Cluster multi-owner disk set that is named `datadg` using `SUNW.vucmm_svm` resource type. The resource is named `scaldatadg-rs`. This example assumes that the following Oracle Solaris Cluster objects exist:

- A scalable resource group that is named `scaldatadg-rg`.
- An instance of the `SUNW.vucmm_svm` resource type that is named `vucmm-svm-rs`.

EXAMPLE 1 Creating a ScalDeviceGroup Resource Using the SUNW.vucmm_svm Resource Type *(Continued)*

```
# clresourcetype register SUNW.ScalDeviceGroup
# clresource create -t SUNW.ScalDeviceGroup \
-g scaldatadg-rg \\
-p Resource_dependencies=vucmm-svm-rs \
-p DiskGroupName=datadg \\
scaldatadg-rs
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core

See Also

clresource(1CL), clresourcetype(1CL), clsetup(1CL), metaset(1M), attributes(5), r_properties(5), SUNW.vucmm_svm(5)

Oracle Solaris Cluster Data Service for Oracle Real Application Clusters Guide

Name SUNW.ScalMountPoint, ScalMountPoint – resource type implementation for a scalable file-system mount point

Description The `SUNW.ScalMountPoint` resource type represents a scalable file-system mount point. An instance of this resource type represents the mount point of one of the following types of file systems:

- A Sun QFS shared file system
- A file system on a network-attached storage (NAS) device.

  The NAS device and the file system must already be configured for use with Oracle Solaris Cluster. For more information, see *Oracle Solaris Cluster With Network-Attached Storage Device Manual*.

The `SUNW.ScalMountPoint` resource type is a scalable resource type. An instance of this resource type is online on each node in the node list of the resource group that contains the resource.

To register this resource type and create instances of this resource type, use one of the following means:

- The `clsetup` utility, specifying the option for configuring Oracle Solaris Cluster Support for Oracle Real Application Clusters
- The following sequence of Oracle Solaris Cluster maintenance commands:
  1. To register this resource type, use the `clresourcetype` command.
  2. To create instances of this resource type, use the `clresource` command.

Standard properties and extension properties that are defined for the `SUNW.ScalMountPoint` resource type are described in the subsections that follow.

Standard Properties For a description of all standard resource properties, see the `r_properties(5)` man page.

Standard resource properties are overridden for this resource type as follows:

Monitor_start_timeout

Minimum
10

Default
300

Monitor_stop_timeout

Minimum
10

Default
300

Postnet_stop_timeout

Minimum
60

Default
300

Prenet_start_timeout

Minimum
60

Default
300

Start_timeout

Minimum
60

Default
300

Stop_timeout

Minimum
60

Default
300

Thorough_probe_interval

Default
300

Update_timeout

Minimum
60

Default
300

Validate_timeout

Minimum
60

Default
300

Extension Properties

The extension properties of this resource type are as follows:

Debug_level

This property specifies the level to which debug messages from the resource for a file-system mount point are logged. When the debug level is increased, more debug messages are written to the log files.

Data type
: Integer

Default
: 0

Range
: 0–10

Tunable
: Any time

FileSystemType

This property specifies the type of file system whose mount point the resource represents. You must specify this property. Set this property to one of the following values:

`nas`
: Specifies that the file system is a file system on a NAS device.

`s-qfs`
: Specifies that the file system is a Sun QFS shared file system.

Data type
: String

Default
: No default defined

Range
: Not applicable

Tunable
: When disabled

IOTimeout

This property specifies the timeout value in seconds that the fault monitor uses for file input/output (I/O) probes. To determine if the mounted file system is available, the fault monitor performs I/O operations such as opening, reading, and writing to a test file on the file system. If an I/O operation is not completed within the timeout period, the fault monitor reports an error.

Data type
: Integer

Default
300

Range
5–1800

Tunable
Any time

Monitor_retry_count
This property specifies the maximum number of restarts by the process monitor facility (PMF) that are allowed for the fault monitor.

Data type
Integer

Default
4

Range
No range defined

Tunable
Any time

Monitor_retry_interval
This property specifies the period of time in minutes during which the PMF counts restarts of the fault monitor.

Data type
Integer

Default
2

Range
No range defined

Tunable
Any time

MountOptions
This property specifies a comma-separated list of mount options that are to be used when the file system that the resource represents is mounted. This property is optional. If you do not specify a value for this property, mount options are obtained from the file system's table of defaults.

- For a Sun QFS shared file system, these options are obtained from the `/etc/opt/SUNWsamfs/samfs.cmd` file.
- For a file system on a NAS device, these options are obtained from the `/etc/vfstab` file.

Mount options that you specify through this property override the mount options in the file system's table of defaults.

Data type
String

Default
`""`

Range
Not applicable

Tunable
When disabled

MountPointDir

This property specifies the mount point of the file system that the resource represents. The mount point is the full path to the directory where the file system is attached to the file system hierarchy when the file system is mounted. You must specify this property.

The directory that you specify must already exist.

Data type
String

Default
No default defined

Range
Not applicable

Tunable
When disabled

RebootOnFailure

This property specifies whether to reboot the local system when failure is detected by the probe. When this property is set to `TRUE`, all devices that are used by the resource, directly or indirectly, must be monitored by disk-path monitoring.

If `RebootOnFailure` is set to `TRUE` and at least one device is found available for the Sun QFS shared file system that is specified in the `TargetFileSystem` property, the local system is rebooted. The local system refers to the global—cluster node or the zone-cluster node where the resource is online.

Default
`FALSE`

Tunable
Anytime

TargetFileSystem

This property specifies the file system that is to be mounted at the mount point that the `MountPointDir` extension property specifies. You must specify this property. The type of the file system must match the type that the `FileSystemType` property specifies. The format of this property depends on the type of the file system as follows:

- For a Sun QFS shared file system, set this property to the name that was assigned to the file system when the file system was created. The file system must be correctly configured. For more information, see your Sun QFS shared file system documentation.
- For a file system on a NAS device, set this property to *nas-device*`:`*path*. The replaceable items in this format are as follows:

  nas-device
    Specifies the name of the NAS device that is exporting the file system. You can optionally qualify this name with a domain.

  path
    Specifies the full path to the file system that the NAS device is exporting.

  The NAS device and the file system must already be configured for use with Oracle Solaris Cluster. For more information, see *Oracle Solaris Cluster With Network-Attached Storage Device Manual*.

Data type
  String

Default
  No default defined

Range
  Not applicable

Tunable
  When disabled

Examples **EXAMPLE 1** Creating a ScalMountPoint Resource

This example shows the creation of a `ScalMountPoint` resource to represent the mount point of a Sun QFS shared file system that is used with Solaris Volume Manager for Sun Cluster. The resource is named `scal-db_qfs-Data-rs`. The characteristics of the file system are as follows:

- The mount point of the file system is `/db_qfs/Data`.
- The file system that is to be mounted is `Data`.
- Mount options are obtained from the file system's table of defaults, that is the `/etc/opt/SUNWsamfs/samfs.cmd` file.

This example assumes that the following Oracle Solaris Cluster objects exist:

- A scalable resource group that is named `scaldatadg-rg`.

EXAMPLE 1 Creating a ScalMountPoint Resource *(Continued)*

- An instance of the `SUNW.qfs` resource type that is named `qfs-db_qfs-Data-rs`.
- An instance of the `SUNW.ScalDeviceGroup` resource type that is named `scaldatadg-rs`.

```
# clresourcetype register SUNW.ScalMountPoint
# clresource create -t SUNW.ScalMountPoint \
-g scaldatadg-rg \
-p Resource_dependencies=qfs-db_qfs-Data-rs,scaldatadg-rs \
-p MountPointDir=/db_qfs/Data \\
-p FileSystemType=s-qfs \
-p TargetFileSystem=Data \\
scal-db_qfs-Data-rs
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core

See Also

`clresource`(1CL), `clresourcetype`(1CL), `clsetup`(1CL), `vfstab`(4), `attributes`(5), `r_properties`(5), `SUNW.ScalDeviceGroup`(5), `SUNW.vucmm_framework`(5)

Oracle Solaris Cluster Data Service for Oracle Real Application Clusters Guide, *Oracle Solaris Cluster With Network-Attached Storage Device Manual*

Name SUNW.SCTelemetry, SCTelemetry – resource type for collecting data on system resource usage

Description `SUNW.SCTelemetry` is the resource type that enables you to collect data on the usage of system resources. `SUNW.SCTelemetry` stores system resource usage data in a Java DB database for seven days. The resource of type `SUNW.SCTelemetry` has a dependency on the resource of type `SUNW.derby`. For more information, see the `SUNW.derby(5)` man page.

The extension properties associated with the `SUNW.SCTelemetry` resource type are as follows:

`Extended_accounting_cleanup`(boolean)
Specifies whether the extended accounting log file is cleaned up, that is whether historical data is deleted. Possible values for `Extended_accounting_cleanup` are `TRUE` and `FALSE`.

Category	Optional
Default	TRUE
Tunable	Any time

`Monitor_retry_count`(integer)
Controls fault-monitor restarts. The property indicates the number of times that the process monitor facility restarts the fault monitor. The property corresponds to the `-n` option passed to the `pmfadm(1M)` command. The Resource Group Manager (RGM) counts the number of restarts in a specified time window. See the `Monitor_retry_interval` property for more information. Note that `Monitor_retry_count` refers to the restarts of the fault monitor itself, not to the resource of type `SUNW.SCTelemetry`.

Category	Optional
Default	4
Tunable	Any time

`Monitor_retry_interval`(integer)
Indicates the time window in minutes during which the RGM counts fault-monitor failures. The property corresponds to the `-t` option passed to the `pmfadm(1M)` command. If the number of times the fault monitor fails exceeds the value of the `Monitor_retry_count` property, the process monitor facility does not restart the fault monitor.

Category	Optional
Default	2 minutes
Tunable	Any time

`Probe_timeout`(integer)
Specifies the timeout value, in seconds, for the probe.

Category	Optional
Default	60 seconds

Minimum	2 seconds
Tunable	Any time

Sampling_interval(integer)

Specifies how often monitoring data is collected. The Telemetry_sampling_interval property must have a value of between 30 and 3600.

Category	Mandatory
Default	60
Minimum	30 seconds
Maximum	3600 seconds
Tunable	Any time

See Also pmfadm(1M), SUNW.derby(5)

Name SUNW.vucmm_framework, vucmm_framework – resource type implementation for the Oracle Solaris Cluster volume manager reconfiguration framework

Description The `SUNW.vucmm_framework` resource type represents the framework that enables different clustered volume managers in an Oracle Solaris Cluster configuration. This resource type enables you to monitor the status of this framework.

The `SUNW.vucmm_framework` resource type is a single instance resource type. You can create only one resource of this type in the cluster.

To register this resource type and create instances of this resource type, use the following means:

- To register this resource type, use the `clresourcetype`(1CL) command.
- To create instances of this resource type, use the `clresource`(1CL) command.

When a resource of this type is brought offline on a node, the transition from the online state to the offline state requires a finite time to complete. During the transition to the offline state, the resource continues to participate in reconfiguration processes. However, when the resource is offline on a node, changes to resource properties are not effective on the node until the resource is brought back online. Oracle Solaris Cluster software displays a warning message to this effect when a resource of this type is disabled.

The transition to the unmanaged state of a resource group that contains a resource of this type requires a finite time to complete. During the transition to the unmanaged state, the framework continues to participate in framework reconfiguration processes. However, when the resource group is unmanaged, changes to resource properties are not effective on the node. To stop the framework, you must reboot the node.

The extension properties of the `SUNW.vucmm_framework` resource type are as follows:

`reservation_timeout`
: Type integer; minimum 100; maximum 99999; defaults to 325. This property specifies the timeout (in seconds) for the reservation step of a reconfiguration of the framework. You can modify this property at any time.

Examples **EXAMPLE 1** Creating a vucmm_framework Resource

This example registers the `SUNW.vucmm_framework` resource type and creates an instance of the `SUNW.vucmm_framework` resource type named `vucmm_framework-rs`. The example assumes that a resource group named `vucmm_framework-rg` has been created.

```
phys-host-scl# clresourcetype register SUNW.vucmm_framework
phys-host-scl# clresource create -g vucmm_framework-rg \
-t SUNW.vucmm_framework vucmm_framework-rs
```

EXAMPLE 2 Changing a Property of a vucmm_framework Resource

This example sets the timeout for the reservation step of a reconfiguration of the framework to 350 seconds. The example assumes that a resource of type `SUNW.vucmm_framework` that is named `vucmm_framework-rs` has been created.

```
phys-host-sc1# clresource set -p reservation_timeout=350 vucmm_framework-rs
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core

See Also

`clresource(1CL)`, `clresourcetype(1CL)`, `clsetup(1CL)`, `SUNW.vucmm_svm(5)`, `attributes(5)`

Oracle Solaris Cluster Data Services Planning and Administration Guide

Name SUNW.vucmm_svm, vucmm_svm – resource type implementation that represents the Solaris Volume Manager for Sun Cluster component of the volume manager reconfiguration framework

Description The `SUNW.vucmm_svm` resource type represents the Solaris Volume Manager for Sun Cluster component of the Oracle Solaris Cluster volume manager reconfiguration framework.

Instances of the `SUNW.vucmm_svm` resource type hold Solaris Volume Manager for Sun Cluster component configuration parameters. Instances of this type also show the status of a reconfiguration of the Solaris Volume Manager for Sun Cluster component.

The `SUNW.vucmm_svm` resource type is a single-instance resource type. Only one resource of this type may be created in the cluster.

To register this resource type and create instances of this resource type, use the following means:

- To register this resource type, use the `clresourcetype(1CL)` command.
- To create instances of this resource type, use the `clresource(1CL)` command.

The `SUNW.vucmm_svm` resource type is only valid in a resource group that uses the `SUNW.vucmm_framework` resource type. Do not use this resource type in a `SUNW.rac_framework` resource group.

When a resource of this type is brought offline on a node, the transition from the online state to the offline state requires a finite time to complete. During the transition to the offline state, the resource continues to participate in reconfiguration processes. However, when the resource is offline on a node, changes to resource properties are not effective on the node until the resource is brought back online. Oracle Solaris Cluster software displays a warning message to this effect when a resource of this type is disabled.

The transition to the unmanaged state of a resource group that contains a resource of this type requires a finite time to complete. During the transition to the unmanaged state, the volume manager reconfiguration framework continues to participate in framework reconfiguration processes. However, when the resource group is unmanaged, changes to resource properties are not effective on the node. To stop the volume manager reconfiguration framework, you must reboot the node.

The extension properties of the `SUNW.vucmm_svm` resource type are as follows.

`debug_level`
: Type integer; minimum 0; maximum 10; defaults to 1. This property specifies the debug level for the Solaris Volume Manager for Sun Cluster module of the volume manager reconfiguration framework. When the debug level is increased, more messages are written to the log files during reconfiguration. You can modify this property at any time.

`svm_abort_step_timeout`
Type integer; minimum 30; maximum 99999; defaults to 120. This property specifies the timeout (in seconds) for the abort step of a reconfiguration of the Solaris Volume Manager for Sun Cluster module of the volume manager reconfiguration framework. You can modify this property at any time.

`svm_return_step_timeout`
Type integer; minimum 30; maximum 99999; defaults to 120. This property specifies the timeout (in seconds) for the return step of a reconfiguration of the Solaris Volume Manager for Sun Cluster module of the volume manager reconfiguration framework. You can modify this property at any time.

`svm_start_step_timeout`
Type integer; minimum 30; maximum 99999; defaults to 120. This property specifies the timeout (in seconds) for the start step of a reconfiguration of the Solaris Volume Manager for Sun Cluster module of the volume manager reconfiguration framework. You can modify this property at any time.

`svm_step1_timeout`
Type integer; minimum 30; maximum 99999; defaults to 120. This property specifies the timeout (in seconds) for step 1 of a reconfiguration of the Solaris Volume Manager for Sun Cluster module of the volume manager reconfiguration framework. You can modify this property at any time.

`svm_step2_timeout`
Type integer; minimum 30; maximum 99999; defaults to 120. This property specifies the timeout (in seconds) for step 2 of a reconfiguration of the Solaris Volume Manager for Sun Cluster module of the volume manager reconfiguration framework. You can modify this property at any time.

`svm_step3_timeout`
Type integer; minimum 30; maximum 99999; defaults to 120. This property specifies the timeout (in seconds) for step 3 of a reconfiguration of the Solaris Volume Manager for Sun Cluster module of the volume manager reconfiguration framework. You can modify this property at any time.

`svm_step4_timeout`
Type integer; minimum 100; maximum 99999; defaults to 120. This property specifies the timeout (in seconds) for step 4 of a reconfiguration of the Solaris Volume Manager for Sun Cluster module of the volume manager reconfiguration framework. You can modify this property at any time.

`svm_stop_step_timeout`
Type integer; minimum 30; maximum 99999; defaults to 120. This property specifies the timeout (in seconds) for the stop step of a reconfiguration of the Solaris Volume Manager for Sun Cluster module of the volume manager reconfiguration framework. You can modify this property at any time.

Examples

EXAMPLE 1 Creating a vucmm_svm Resource

This example registers the `SUNW.vucmm_svm` resource type and creates an instance of the `SUNW.vucmm_svm` resource type that is named `vucmm_svm-rs`. The example assumes that the following Oracle Solaris Cluster objects have been created:

- A resource group that is named `vucmm_framework-rg`
- A resource of type `SUNW.vucmm_framework` that is named `vucmm_framework-rs`

```
phys-schost-1# clresourcetype register SUNW.vucmm_svm
phys-schost-1# clresource create -g vucmm_framework-rg \
-t SUNW.vucmm_svm \
-p resource_dependencies=vucmm_framework-rs vucmm_svm-rs
```

EXAMPLE 2 Changing a Property of a vucmm_svm Resource

This example sets the timeout for step 4 of a reconfiguration of the Solaris Volume Manager for Sun Cluster component of the volume manager reconfiguration framework to 300 seconds. The example assumes that an instance of the `SUNW.vucmm_svm` resource type named `vucmm_svm-rs` has been created.

```
phys-schost-1# clresource set \
-p svm_step4_timeout=300 vucmm_svm-rs
```

Attributes

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

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	ha-cluster/system/core

See Also

clresource(1CL), clresourcetype(1CL), clsetup(1CL), SUNW.vucmm_framework(5), attributes(5)

R E F E R E N C E

OSC4 5cl

Name clconfiguration – describes the cluster DTD for the Oracle Solaris Cluster configuration XML file

Description `clconfiguration` describes the Documentation Type Definition (DTD) for the Oracle Solaris Cluster configuration eXtensible Markup Language (XML) file. The Oracle Solaris Cluster configuration file contains Oracle Solaris Cluster configuration information tagged with XML elements. The file can contain configuration information for one or more clusters, or even for a portion of a cluster. This Oracle Solaris Cluster configuration information can be used for many cluster functions, including cluster configuration backup and cluster duplication.

The DTD defines the elements, their relationships, and their attributes. The element names reflect the content that they provide. For example, the element `<devicegroup>` defines cluster device groups. Elements might have attributes that are used to modify or refine their properties or characteristics. Many of the object-oriented Oracle Solaris Cluster commands include an `export` subcommand that exports cluster object information in the format described in the DTD. Many Oracle Solaris Cluster commands have the option to add, create, and modify Oracle Solaris Cluster objects through the use of cluster configuration XML data.

Element Hierarchy The following list provides the element hierarchy required by the DTD. This list uses the following defaults for children and attribute properties:

required	Unless otherwise specified, one or more is required.
optional	Unless otherwise specified, there can be zero or one.

```
<propertyList>
  <property>
<state>
<allNodes>

<-- Cluster -->

<cluster>

  <-- Cluster Nodes -->

  <nodelist>
    <node>

  <-- Cluster Transport -->

  <clusterTransport>
    <transportNodeList>
      <transportNode>
        <transportAdapter>
          <transportType>
    <transportSwitchList>
      <transportSwitch>
```

```
  <transportCableList>
    <transportCable>
      <endpoint>

<-- Cluster Global Devices -->

<deviceList>
  <device>
    <devicePath>

<-- Cluster Quorum -->

<clusterQuorum>
  <quorumNodeList>
    <quorumNode>
  <quorumDeviceList>
    <quorumDevice>
      <quorumDevicePathList>
        <quorumDevicePath>

<-- Cluster Device Groups -->

<devicegroupList>
  <devicegroup>
    <memberDeviceList>
      <memberDevice>
    <devicegroupNodeList>
      <devicegroupNode>

<-- Cluster Resource Types -->

<resourcetypeList>
  <resourcetype>
     <resourcetypeRTRFile>
     <resourcetypeNodeList>
       <resourcetypeNode>
       <methodList>
       <method>
       <parameterList>
         <parameter>

<-- Cluster Resources -->

<resourceList>
  <resource>
    <resourceNodeList>
      <resourceNode)
```

```
    <monitoredState>

<-- Cluster Resource Groups -->

<resourcegroupList>
  <resourcegroup>
    <failoverMode>
    <managedState>
    <resourcegroupNodeList>
      <resourcegroupNode>
    <resourcegroupResourceList>
      <resourcegroupResource>

<-- Cluster NAS Devices -->

<nasdeviceList>
  <nasdevice>
     <nasdir>

<-- Cluster SNMP -->

<snmpmibList>
  <snmpmib>
<snmphostList>
  <snmphost>
<snmpuserList>
  <snmpuser>
<-- Cluster Telemetrics -->

<telemetrics>
  <telemetryObjectType>
    <telemetryAttribute>
```

Elements This section lists and describes all of the elements that are defined in the cluster DTD. If an element has required children or attributes, the required default is one. Optional elements default to zero or one.

`<allNodes>`

A list of all member nodes in the cluster. The `<allNodes>` element is a generic element.

The `<allNodes>` element is used to denote all nodes of the cluster.

Parent:	`<resourcetypeNodeList>`
Children:	None
Attributes:	None

`<cluster>`

The root element of a complete cluster configuration XML file. Every cluster configuration XML file must begin with this element as the root. The DTD can accept only one `<cluster>` element. Subsequent `<cluster>` elements in the cluster configuration XML file are ignored.

Parent: None

Children: Optional:

- `<propertyList>`
- `<nodeList>`
- `<clusterTransport>`
- `<deviceList>`
- `<clusterQuorum>`
- `<deviceGroupList>`
- `<resourcetypeList>`
- `<resourcegroupList>`
- `<resourceList>`
- `<nasdeviceList>`
- `<snmpmibList>`
- `<snmphostList>`
- `<snmpuserList>`

Attributes: Required:

- `name`

  The name of the cluster.

`<clusterQuorum>`

The root element of the cluster quorum configuration. All cluster quorum information is defined in the child elements of the `<clusterQuorum>` element.

Parent: `<cluster>`

Children: Optional:

- `<quorumDeviceList>`
- `<quorumNodeList>`

Attributes: None

`<clusterTransport>`

The root element of the cluster transport configuration. All cluster transport information is displayed in a sublevel of the `<clusterTransport>` element.

Parent: `<cluster>`.

Children: Optional:

- `<transportNodeList>`

- `<transportSwitchList>`
- `<transportCableList>`

Attributes: None

`<device>`

A cluster device ID pseudo-driver (DID) device.

Parent: `<deviceList>`

Children: Optional:

- `<devicePath> (zero or more)`

Attributes: Required:

- `ctd`

  The UNIX disk name.

- `name`

  The instance number of the device.

`<devicegroup>`

The root element of a cluster device-group instance. All aspects of an individual device group are defined in the child elements of the `<devicegroup>` element.

Parent: `<devicegroupList>`

Children: Optional:

- `<devicegroupNodeList>`
- `<memberDeviceList>`
- `<propertyList>`

Attributes: Required:

- `name`

  The name of the device group. The `name` attribute can be any valid sequence of characters.

- `type`

  The type of the device group. The `type` attribute can have a value of `rawdisk`, `vxvm`, `svm`, or `sds`.

`<devicegroupList>`

A list of all the cluster device groups.

Parent: `<cluster>`

Children: Optional:

- `<devicegroup>`

  One `<devicegroup>` element can be used for each device group in the cluster.

Attributes: None

`<devicegroupNode>`
The node on which a device group is located.

Parent: `<devicegroupNodeList>`

Children: None

Attributes: Required:

- `nodeRef`

  Specifies the name of a cluster node.

`<devicegroupNodeList>`
A list of nodes on which a device group is located.

Parent: `<devicegroup>` (1 or more)

Children: Required:

- `<devicegroupNode> (1 or more)`

Attributes: None

`<deviceList>`
A list of cluster DID devices.

Parent: `<cluster>`

Children: Optional:

- `<device>`

Attributes: Fixed:

- `readonly`

  The `readonly` attribute has a fixed value of `true`.

`<deviceNode>`
The node and disk device on which a particular `<device>` exists.

Parent: `<device>`

Children: None

Attributes: Required:

- `nodeRef`

The name of the node on which an instance exists.

`<endpoint>`

One of the transport endpoints.

Parent: `<transportCable>`

Children: None

Attributes: Required:

- `name`

  The name of the adapter or switch.
- `nodeRef`

  The name of the node that hosts the specified adapter. The `nodeRef` attribute is required only if the `type` attribute is set to `adapter`.
- `type`

  The `type` attribute can be set to either `adapter` or `switch`.

  If the `type` attribute is set to `adapter`, you must specify a `nodeRef` attribute.

  If the `type` attribute is set to `switch`, you can specify a `port` attribute. However, the `port` attribute is not required.

Optional:

- `port`

  The number of the port on the switch. Specify the `port` attribute only if the `type` attribute is set to `switch`.

`<failoverMode>`

The failover mode of a resource group.

Parent: `<resourcegroup>`

Children: None

Attributes: Required:

- `value`

The `value` attribute can be set to `failover` or `scalable`.

`<managedState>`

Indicates whether a resource group is managed or unmanaged.

Parent: `<resourcegroup>`

Children: None

Attributes: Required:

- `value`

  The `value` attribute can be either `true` or `false`.

`<memberDevice>`

The member name of a particular device group. If the `<devicegroup>` is a set of type `rawdisk`, then you must specify one or more `<member>` elements, each with the name of the raw-disk path.

Parent: `<memberDeviceList>`

Children: None

Attributes: Required:

- `name`

  The name of the member.

`<memberDeviceList>`

A list of device group members.

Parent: `<devicegroup>` (one or more)

Children: Required:

- `<memberDevice>`

Attributes: None

`<method>`

Mapping between a generic method type and the actual method name for a specific resource type.

Parent: `<methodList>`

Children: None

Attributes: Required:

- `name`

  The actual name of the method for the resource type.

- `type`

  The type of method for the resource type. You can specify the following types:

  - `MONITOR_CHECK`
  - `MONITOR_START`
  - `MONITOR_STOP`
  - `PRENET_START`
  - `START`
  - `STOP`
  - `VALIDATE`
  - `UPDATE`

`<methodList>`

A list of all of the `<method>` elements that are available for a specific `<resourcetype>`.

Parent: `<resourcetype>`

Children: Optional:

- `<method>`

Attributes: Fixed:

- `readonly`

  The `readonly` attribute has a fixed value of `true`.

`<monitoredState>`

A Boolean value that indicates a portion of an element's state in the cluster. For example, the `<monitoredState>` of a resource specifies whether the resource is monitored, but does not specify whether the resource is available.

Parent: `<resource>`

Children: None

Attributes: Required:

- `value`

  The `value` attribute can be set to `true` or `false`.

`<nasdevice>`

A single instance of a NAS device on the cluster.

Parent: `<nasdeviceList>`

Children: Optional:

- `<nasdir>`

Attributes: Required:

- `name`

  The hostname of the NAS device.
- `type`

  The type of NAS device. You must specify `sun_uss` for a Sun ZFS Storage Appliance.

Optional:

- `userid`

  The user name that is required to access the NAS device.

`<nasdeviceList>`
A list of all NAS devices on the cluster.

Parent: `<cluster>`

Children: Optional:
- `<nasdevice>`

Attributes: None

`<nasdir>`
One directory on a NAS device. Each NAS device can have multiple NAS directories.

Parent: `<nasdevice>`

Children: None

Attributes: Required:
- `path`

  The path to the NAS directory.

`<node>`
A cluster node. Specify one `<node>` element for each node in the cluster.

Parent: `<nodeList>`

Children: Optional:
- `<propertyList>`

Attributes: Required:
- `name`

  Must be equal to the name of the node.

Optional:

- `id`

  The cluster node ID. If not specified, the cluster node ID attribute is provided a default value of an empty string.

`<nodeList>`
A list of all nodes in the cluster.

Parent: `<cluster>`

Children: Optional:

- `<node>`

  At least one `node` attribute must be supplied for each node on the cluster.

Attributes: None

`<parameter>`
A set of attributes that describes the `<method>` element timeout values and other parameters for a cluster resource type.

Parent: `<parameterList>`

Children: None

Attributes: Required:

- `extension`

  The `extension` attribute can be set to `true` or `false`.

- `name`

  The name of the parameter.

- `tunability`

  The value of the parameter's tunability. The `tunability` attribute can be set to one of the following values: `atCreation`, `anyTime`, or `whenDisabled`.

- `type`

  The type of the parameter. The `type` attribute can be set to one of the following values: `boolean`, `enum`, `int` , `string`, or `stringArray`.

Optional:

- `default`

  The default value of this parameter if a value is not explicitly specified. For example, the default for the `method` element timeout is `START`.
- `description`

  A description of the parameter. If not defined, this attribute defaults to an empty string.
- `enumList`

  An enumerated list of objects. For example, the attribute might be a list of failover modes in order of preference.
- `maxLength`

  The maximum length of a `string` or `stringArray` type parameter.
- `minArrayLength`

  The minimum size of an `stringArray` type parameter.
- `minLength`

  The minimum length of a `string` or `stringArray` type parameter.

`<parameterList>`
A list of `<parameter>` elements that describes a resource type.

Parent: `<resourcetype>`

Children: Optional:

- `<parameter>`

Attributes: Fixed:

- `readonly`

  The `readonly` attribute has a fixed value of `true`.

`<property>`
A generic element that describes one property. The property is not specific to any subset of cluster related configuration.

Parent: `<propertyList>`

Children: None

Attributes: Required:

- `name`

  The name of the property.
- `value`

  The value of the property.

Optional:

- `readonly`

  The `readonly` attribute can be set to `true` or `false`. If this value is not specified, the attribute defaults to the value `false`.
- type

  The property type.

`<propertyList>`
A list of `<property>` elements. The `<propertyList>` element is a generic element.

Parents: `<cluster>`, `<deviceGroup>`, `<node>`, `<quorumDevice>`, `<quorumNode>`, `<resource>`, `<resourceNode>`, `<resourcegroup>`, `<resourceType>`, `<transportAdapter>`, `<transportType>`

Children: `Optional:`

- `<property>`

Attributes: Optional:

- `extension`

  This attribute can have one of the following values: `true`, `false`, `mixed`, or `doesNotApply`. If a value is not specified, the `extension` attribute has a default value of `doesNotApply`.
- `readonly`

  This attribute can have a value of `true` or `false`. If a value is not specified, the `readonly` attribute has a default value of `false`.

`<quorumDevice>`
An individual cluster quorum device.

Parent: `<quorumDeviceList>`

Children: Optional:

- `<propertyList>`

  The `<quorumDevice>` element can have only one `<propertyList>` child.

- `<quorumDevicePathList>`

  The `<quorumDevice>` element can have only one `<quorumDevicePathList>` child.

Attributes: Required:

- `name`

  The name of the quorum device.

- `type`

  The type of quorum device that is referenced by this element. The `type` attribute can be set to `scsi` or `quorum_server`.

`<quorumDeviceList>`
A list of all quorum devices in the cluster.

Parent: `<clusterQuorum>`

Children: Optional:

- `<quorumDevice>`

Attributes: None

`<quorumDevicePath>`
The path to a cluster quorum device.

Parent: `<quorumDevicePathList>`

Children: Optional:

- `<state>`

  The `<quorumDevicePath>` element can have only one `<state>` child.

Attributes: Required:

- `nodeRef`

  The name of the node that the quorum device resides on.

`<quorumDevicePathList>`

A list of all paths to a particular `<quorumDevice>`.

Parent: `<quorumDevice>`

Children: Required:

- `<quorumDevicePath>`

Attributes: Fixed:

- `readonly`

  The `readonly` attribute is set to `true`.

`<quorumNode>`

A node in the cluster that participates in the cluster quorum.

Parent: `<quorumNodeList>`

Children: Optional:

- `<propertyList>`

Attributes: Required:

- `<nodeRef>`

  The name of the node.

`<quorumNodeList>`

A list of all nodes that participate in the cluster quorum. In a functional cluster that is not in `installmode`, this list typically contains all nodes in the cluster. In a cluster that is still in `installmode`, this list might contain only one of the cluster nodes.

Parent: `<clusterQuorum>`

Children: Required:

- `<quorumNode>`

Attributes: Fixed:

- `readonly`

  The `readonly` attribute is set to `true`.

`<resource>`

A cluster resource.

Parent: `<resourceList>`

Children: Optional:

- `<resourceNodeList>`
- `<propertyList>`

Attributes: Required:

- `name`

  The name of the resource.

- `resourcegroupRef`

  The resource group to which the resource belongs.

- `resourcetypeRef`

  The type of resource that is described by this element.

`<resourceList>`

A list of the root node for the cluster resources that are defined in the configuration.

Parent: `<cluster>`

Children: Optional:

- `<resource>`

Attributes: None

`<resourcegroup>`

A cluster resource group.

Parent: `<resourcegroupList>`

Children: Required:

- `<failoverMode>`
- `<managedState>`
- `<resourcegroupNodeList>`
- `<resourcegroupResourceList>`
- `<propertyList>`

Attributes: Required:

- `name`

  The name of the resource.

`<resourcegroupList>`

The root node for the cluster resource groups that are defined in the configuration.

Parent: `<cluster>`

Children: Optional:

- `<resourcegroup>`

Attributes: None

`<resourcegroupNode>`
The node on which a resource group is defined.

Parent: `<resourcegroupNodeList>`

Children: None

Attributes: Required:

- `nodeRef`

  The name of the cluster node.

`<resourcegroupNodeList>`
The cluster nodes on which a particular resource group operates.

Parent: `<resourcegroup>`

Children: Required:

- `<resourcegroupNode>`

Attributes: None

`<resourcegroupResource>`
A cluster resource that belongs to a particular resource group.

Parent: `<resourcegroupResourceList>`

Children: None

Attributes: Required:

- `resourceRef`

  The name of the resource.

`<resourcegroupResourceList>`
A list of the resources that are defined in a resource group.

Parent: `<resourcegroup>`

Children: Optional:

- `<resourcegroupResource>`

Attributes: None

`<resourceNode>`
The node on which a resource is defined.

Parent: `<resourceNodeList>`

Children: Required:

- `<state>`
- `<monitoredState>`

Optional:

- <propertyList>

Attributes: Required:

- nodeRef

  The name of the resource type.

<resourcetype>
A cluster resource type that is available in the cluster.

Parent: <resourcetypeList>

Children: Optional:

- <resourcetypeRTRFile>
- <resourcetypeNodeList>
- <methodList>
- <parameterList>
- <propertyList>

Attributes: Required:

- name

  The name of the resource type.

<resourcetypeList>
The root node of the cluster resource types that are defined in the configuration.

Parent: <cluster>

Children: Optional:

- <resourcetype>

Attributes: None

<resourcetypeNode>
A node on which a resource type is defined.

Parent: <resourcetypeNodeList>

Children: None

Attributes: Required:

- nodeRef

  The name of the cluster node.

<resourcetypeNodeList>
A list of the cluster nodes on which a particular resource type exists.

Parent: `<resourcetype>`

Children: Required : The `<resourcetypeNodeList>` element must contain either one or more `<resourcetypeNode>` elements or exactly one `<allNodes>` element.

- `<resourcetypeNode>`
- `<allNodes>`

Attributes: None

`<resourcetypeRTRFile>`
The name of a resource type registration (RTR) file that describes a particular resource type.

Parent: `<resourcetype>`

Children: None

Attributes: Required:

- `name`

  The name of the RTR file.

`<snmphost>`
The SNMP host and community that are configured on a cluster node.

Parent: `<snmphostList>`

Children: None

Attributes: Required:

- `community`

  The SNMP community name.

- `name`

  The name of the instance.

- `nodeRef`

  The node on which the SNMP host and community exist.

`<snmphostList>`
A list of the SNMP hosts and communities that are configured on a cluster node.

Parent: `cluster>`

Children: Optional:

- `<snmphost>`

Attributes: None

`<snmpmib>`
An SNMP MIB that is on a cluster node.

Parent: `<snmpmibList>`

Children: Optional:

- `state`

Attributes: Required:

- `name`

  The name of the MIB.

- `nodeRef`

  The node on which the SNMP MIB exists.

Optional:

- `protocol`

  The SNMP protocol that the MIB will use. This attribute defaults to `SNMPv2`.

- `value`

  SNMPv3 or SNMPv2

`snmpmibList`
A list of the SNMP MIBs that are on a cluster node.

Parent: `<cluster>`

Children: Optional:

- `<snmpmib>`

Attributes: None

`<snmpuser>`
The SNMPv3 user that is configured on a cluster node.

Parent: `<snmpuserList>`

Children: None

Attributes: Required:

- `name`

  The name of the user.

- `nodeRef`

  The node on which the SNMPv3 user exists.
- `auth`

  The `auth` attribute can be set to `MD5` or `SHA`.

Optional:

- `defaultUser`

  The `defaultUser` attribute can be set to `yes` or `no`. If a value is not specified, the attribute defaults to whichever value is appropriate, based on the node configuration.
- `defaultSecurityLevel`

  The security level of the user. The `security` attribute can be set to one of the following values:
  - `authPriv`
  - `authNoPriv`
  - `noAuthNoPriv`

`<snmpuserList>`

A list of the SNMPv3 users that are configured on a cluster node.

Parent:	`<cluster>`
Children:	`<snmpuser>`
Attributes:	None

`<state>`

The state of various objects within the cluster configuration. The `<state>` element is a generic element.

Parent:	`<quorumDevicePath>`, `<resourceNode>`, `snmpmib>`, `telemetryAttribute`, `<transportAdapter>`, `<transportCable>`, `<transportSwitch>`
Children:	None
Attributes:	Required:

- `value`

  The `value` attribute can be set to `enabled` or `disabled`.

`<telemetrics>`
Cluster monitoring thresholds

Parent:	`<cluster>`
Children:	Optional: ■ `<telemetryObjectType>`
Attributes:	None

`<telemetryAttribute>`
The attributes of system resources that you can monitor.

Parent:	`<telemetryObjectType>`
Children:	Required: ■ `<state>` (1 or more)
Attributes:	Required: ■ `name` The name of the attribute.

`<telemetryObjectType>`
The types of objects you can monitor.

Parent:	`<telemetrics>`
Children:	Required: ■ `<telemetryAttibute>`
Attributes:	Required: ■ name The name of the attribute.

`<transportAdapter>`
A network adapter that is used in the private cluster transport.

Parent:	`<transportNode>`
Children:	Optional: ■ `<state>` ■ `<transportType>` ■ `<propertyList>`
Attributes:	Required: ■ `name` The name of the network adapter.

`<transportCable>`

A network cable that is used in the private cluster transport. The cable does not necessarily imply a physical cable, but rather a path between two `<endpoint>` elements.

Parent:	`<transportCableList>`
Children:	Required: ■ `<endpoint>` The `<transportCable>` element must have two `<endpoint>` elements. Each `endpoint` element must describe one of the cable endpoints. Optional: ■ `<state>` The `<transportCable>` element can have one `<state>` element.
Attributes:	None

`<transportCableList>`

A list of the network cables that are used to connect two cluster `<endpoint>` elements.

Parent:	`<clusterTransport>`
Children:	`Optional:` ■ `<transportCable>`
Attributes:	None

`<transportNode>`

One of the cluster nodes that is used in the private cluster transport. Specify one `<transportNode>` element for each node of the cluster.

Parent:	`<transportNodeList>`
Children:	Optional: ■ `<nodeRef>`
Attributes:	Required: ■ `transportAdapterList` The name of the cluster node.

`<transportNodeList>`

A list of the nodes that are used in the private cluster transport. This list of nodes always contains the same set of nodes as the members of the cluster.

Parent:	`<clusterTransport>`

Children:	Optional: ■ `<transportNode>`
Attributes:	None

`<transportSwitch>`
A cluster transport switch.

Parent:	`<transportSwitchList>`
Children:	Optional: ■ `<state>`
Attributes:	Required: ■ `name` The name of the transport switch. Optional: ■ `port` The number of the port on the switch.

`<transportSwitchList>`
A list of the network switches that are used by the private cluster transport system.

Parent:	`<clusterTransport>`
Children:	Optional: ■ `<transportSwitch>`
Attributes:	None

`<transportType>`
The type of network transport that is used for a `<transportAdapter>` element.

Parent:	`<transportAdapter>`
Children:	Optional: ■ `<propertyList>`
Attributes:	Required: ■ `value` The `value` attribute can be set to `dlpi` or `rsm`.

Files `/usr/cluster/lib/xml/cluster.dtd`
The document type definition (DTD) file that defines the structure of the Oracle Solaris Cluster configuration XML file.

See Also `Intro`(1CL), `cluster`(1CL)

http://www.w3.org/XML/

R E F E R E N C E

OSC4 7

Name clprivnet – SUNW,clprivnet Oracle Solaris Cluster private network driver

Synopsis `/dev/clprivnet`

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

The `SUNW,clprivnet` Oracle Solaris Cluster private network driver is a STREAMS pseudo driver supporting Oracle Solaris Cluster resident applications that use standard Solaris interfaces to communicate over the Oracle Solaris Cluster private network. By striping data traffic over all links, this driver optimally utilizes the bandwidth of the private network while supporting highly available, software fault-tolerant communication.

Application Programming Interface The driver is supported by the character-special device `/dev/clprivnet`, but is reserved for Oracle Solaris Cluster internal operation and the standard Solaris network utilities. This device interface must not be directly used for general application communication.

Administration The administration and configuration of the driver as a network interface is done completely by the Oracle Solaris Cluster infrastructure internals.

Files `/dev/clprivnet`
`clprivnet` special character device

`/usr/kernel/drv/clprivnet.conf`
System-wide default device driver properties

Name did – user-configurable DID pseudo driver

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

DID is a user-configurable pseudo device driver that provides access to underlying disk, tape, and CDROM devices. When the device supports unique device IDs, multiple paths to a device are determined according to the device ID of the device. Even if multiple paths are available with the same device ID, only one DID name is given to the actual device.

In a clustered environment, a particular physical device will have the same DID name regardless of its connectivity to more than one host or controller. This, however, is only true of devices that support a global unique device identifier such as physical disks.

DID maintains parallel directories for each type of device that it manages under `/dev/did`. The devices in these directories behave the same as their non-DID counterparts. This includes maintaining slices for disk and CD-ROM devices as well as names for different tape device behaviors. Both raw and block device access is also supported for disks by means of `/dev/did/rdsk` and `/dev/did/rdsk`.

At any point in time, I/O is only supported down one path to the device. No multipathing support is currently available through DID.

Before a DID device can be used, it must first be initialized by means of the `scdidadm(1M)` command.

ioctls The DID driver maintains an admin node as well as nodes for each DID device minor.

No user ioctls are supported by the admin node.

The `DKIOCINFO` ioctl is supported when called against the DID device nodes such as `/dev/did/rdsk/d0s2`.

All other ioctls are passed directly to the driver below.

Files

`/dev/did/dsk/d`*nsm*
: Block disk or CD-ROM device, where *n* is the device number and *m* is the slice number

`/dev/did/rdsk/d`*nsm*
: Raw disk or CD-ROM device, where *n* is the device number and *m* is the slice number

`/dev/did/rmt/`*n*
: Tape device, where *n* is the device number

`/dev/did/admin`
: Administrative device

`/kernel/drv/did`
: Driver module

`/kernel/drv/did.conf`
Driver configuration file

`/etc/did.conf`
`cldevice` configuration file for non-clustered systems

`Cluster Configuration Repository` (CCR) files
`cldevice`(1CL) maintains configuration in the CCR for clustered systems

See Also `Intro`(1CL), `cldevice`(1CL), `devfsadm`(1M)

Notes DID creates names for devices in groups, in order to decrease the overhead during device hot-plug. For disks, device names are created in `/dev/did/dsk` and `/dev/did/rdsk` in groups of 100 disks at a time. For tapes, device names are created in `/dev/did/rmt` in groups of 10 tapes at a time. If more devices are added to the cluster than are handled by the current names, another group will be created.

R E F E R E N C E

OSC4 7p

Name sctransp_dlpi – configure the dlpi cluster interconnect

Description **Note –** Oracle Solaris Cluster software includes an object-oriented command set. Although Oracle Solaris Cluster software still supports the original command set, Oracle Solaris Cluster procedural documentation uses only the object-oriented command set. For more information about the object-oriented command set, see the `Intro(1CL)` man page.

`dlpi` is a supported cluster transport type.

See Also `Intro(1CL)`, `cluster(1CL)`, `scconf(1M)`, `scinstall(1M)`

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