Oracle® Solaris 10 1/13 Installation Guide: Network-Based Installations

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Contents

Preface

This book describes how to install the Oracle Solaris operating system remotely over a local area network or a wide area network.

This book does not include instructions about how to set up system hardware or other peripherals.

Note – This Oracle Solaris release supports systems that use the SPARC and x86 families of processor architectures. The supported systems appear in the *Oracle Solaris OS: Hardware Compatibility Lists*. This document cites any implementation differences between the platform types.

In this document, these x86 related terms mean the following:

- x86 refers to the larger family of 64-bit and 32-bit x86 compatible products.
- x64 relates specifically to 64-bit x86 compatible CPUs.
- "32-bit x86" points out specific 32-bit information about x86 based systems.

For supported systems, see the *Oracle Solaris OS: Hardware Compatibility Lists*.

Who Should Use This Book

This book is intended for system administrators who are responsible for installing the Oracle Solaris software. This book provides advanced Oracle Solaris installation information for enterprise system administrators who manage multiple Oracle Solaris machines in a networked environment.

For basic installation information, see *Oracle Solaris 10 1/13 Installation Guide: Basic Installations*.

Related Books

The following table lists related documentation for system administrators.

TABLE P–1 Are You a System Administrator Who is Installing Oracle Solaris?

Description	Information
Do you need system requirements or high-level planning information? Or want a high-level overview of Oracle Solaris ZFS installations, booting, Oracle Solaris Zones partitioning technology, or creating RAID-1 volumes?	*Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*
Do you need to install a single system from DVD or CD media? The Oracle Solaris installation program steps you through an installation.	*Oracle Solaris 10 1/13 Installation Guide: Basic Installations*
Do you need to upgrade or patch your system with almost no downtime? Save system downtime when upgrading by using Live Upgrade, a feature of Oracle Solaris.	*Oracle Solaris 10 1/13 Installation Guide: Live Upgrade and Upgrade Planning*
Do you need to install a secure installation over the network or Internet? Use WAN boot to install a remote client. Or, do you need to install over the network from a network installation image? The Oracle Solaris installation program steps you through an installation.	*Oracle Solaris 10 1/13 Installation Guide: Network-Based Installations*
Do you need to install or patch multiple systems quickly? Use Flash Archive, a feature of Oracle Solaris, to create an archive and install a copy of the OS on clone systems.	*Oracle Solaris 10 1/13 Installation Guide: Flash Archives (Creation and Installation)*
Do you need to back up your system?	Chapter 19, "Backing Up and Restoring UFS File Systems (Overview/Tasks)," in *System Administration Guide: Devices and File Systems*
Do you need troubleshooting information, a list of known problems, or a list of patches for this release?	*Oracle Solaris Release Notes*
Do you need to verify that your system works on Oracle Solaris?	SPARC: *Solaris Sun Hardware Platform Guide*
Do you need to check on which packages have been added, removed, or changed in this release?	*Oracle Solaris Package List*
Do you need to verify that your system and devices work with Solaris SPARC and x86 based systems and other third-party vendors.	Solaris Hardware Compatibility List for x86 Platforms

Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info` or visit `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs` if you are hearing impaired.

Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P–2 Typographic Conventions

Typeface	Description	Example
`AaBbCc123`	The names of commands, files, and directories, and onscreen computer output	Edit your `.login` file. Use `ls -a` to list all files. `machine_name% you have mail.`
`AaBbCc123`	What you type, contrasted with onscreen computer output	`machine_name%` **`su`** `Password:`
aabbcc123	Placeholder: replace with a real name or value	The command to remove a file is `rm` *filename*.
AaBbCc123	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the *User's Guide*. A *cache* is a copy that is stored locally. Do *not* save the file. **Note:** Some emphasized items appear bold online.

Shell Prompts in Command Examples

The following table shows UNIX system prompts and superuser prompts for shells that are included in the Oracle Solaris OS. In command examples, the shell prompt indicates whether the command should be executed by a regular user or a user with privileges.

TABLE P–3 Shell Prompts

Shell	Prompt
Bash shell, Korn shell, and Bourne shell	`$`

TABLE P–3 Shell Prompts *(Continued)*

Shell	Prompt
Bash shell, Korn shell, and Bourne shell for superuser	#
C shell	machine_name%
C shell for superuser	machine_name#

PART I

Planning to Install Over the Network

This part describes how to plan your installation over the network.

◆ ◆ ◆ CHAPTER 1

Where to Find Oracle Solaris Installation Planning Information

This book describes how to install the Oracle Solaris OS remotely over a local area network or a wide area network.

This chapter describes the preparations for completing a successful installation. Many preparatory tasks are common to all Oracle Solaris installations, and so are described in one master planning document.

Where to Find Planning and System Requirement Information

The *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade* provides system requirements and high-level planning information, such as planning guidelines for file systems, and upgrade planning and much more. The following list describes the chapters in the planning book.

Chapter Descriptions From the Planning Guide	Reference
This chapter provides you with information about decisions you need to make before you install or upgrade the Oracle Solaris OS. For example, you'll find information on deciding when to use a network installation image or DVD media and descriptions of all the Oracle Solaris installation programs.	Chapter 2, "Oracle Solaris Installation and Upgrade Roadmap," in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*
This chapter describes system requirements to install or upgrade to the Oracle Solaris OS. General guidelines for planning the disk space and default swap space allocation are also provided. Upgrade limitations are also described.	Chapter 3, "System Requirements, Guidelines, and Upgrade Information," in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*
This chapter contains checklists to help you gather all of the information that you need to install or upgrade your system. This is useful if you are doing an interactive installation. You'll have all the information in the checklist that you'll need to do an interactive installation.	Chapter 4, "Gathering Information Before an Installation or Upgrade," in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*

Chapter Descriptions From the Planning Guide	Reference
This book part includes chapters that provide overviews of several technologies that relate to Oracle Solaris OS installation or upgrade. Guidelines and requirements related to these technologies are also included. These chapters include information about ZFS installations, booting, Oracle Solaris Zones partitioning technology, and RAID-1 volumes that can be created at installation.	Part II, "Understanding Installations Related to ZFS, Booting, Oracle Solaris Zones, and RAID-1 Volumes," in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*

◆ ◆ ◆ CHAPTER 2

Preconfiguring System Configuration Information (Tasks)

This chapter describes how to preconfigure system information by using the `sysidcfg` file. Preconfiguration can help you to avoid being prompted for this information when you install the Oracle Solaris OS. This chapter also describes how to preconfigure Power Management information. This chapter contains the following sections:

Advantages of Preconfiguring System Configuration Information

The installation methods require configuration information about a system, such as peripheral devices, host name, Internet Protocol (IP) address, and naming service. Before the installation tools prompt you for configuration information, they check for configuration information that is stored elsewhere.

The following table describes the ways to preconfigure system information.

TABLE 2–1 Preconfiguration Options

Preconfiguration File or Service	Description	Further Information
`sysidcfg` file	Preset the domain name, netmask, DHCP, IPv6 and other parameters by using keywords in the `sysidcfg` file.	"Preconfiguring With the `sysidcfg` File" on page 18

TABLE 2–1 Preconfiguration Options *(Continued)*

Preconfiguration File or Service	Description	Further Information
Naming service	Preset host name and IP addresses by preconfiguring your system information in your naming service.	"Preconfiguring With the Naming Service" on page 41
DHCP	enables host system in a TCP/IP network to be configured automatically for the network as the system boots. DHCP can manage IP addresses by leasing them as needed to clients.	"Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45

For more detailed information about choosing a preconfiguration method, see "Choosing a Naming Service" on page 39.

When the Oracle Solaris or the JumpStart, a feature of Oracle Solaris, installation program detects preconfigured system information, the installation program does not prompt you to provide the information. For example, say you have several systems and you do not want a time zone prompt every time you install the current Oracle Solaris release on one of the systems. You can specify the time zone in the `sysidcfg` file or the naming service databases. When you install the current Oracle Solaris release, the installation program does not prompt you for a time zone value.

Preconfiguring With the sysidcfg File

You can specify a set of keywords in the `sysidcfg` file to preconfigure a system. The keywords are described in "`sysidcfg` File Keywords" on page 22.

Note – The `name_service` keyword in the `sysidcfg` file automatically sets the naming service during installation of the Oracle Solaris OS. This setting overrides SMF services previously set up for `site.xml`. Therefore, you might need to reset your name service after installation.

You must create a unique `sysidcfg` file for every system that requires different configuration information. For example, you can use the same `sysidcfg` file to preconfigure the time zone on a set of systems if you want all the systems to be assigned the same time zone. However, if you want to preconfigure a different root (superuser) password for each of those systems, you need to create a unique `sysidcfg` file for each system.

You can place the `sysidcfg` file in one of the locations described in the following table.

TABLE 2–2 `sysidcfg` Locations

NFS file system	If you put the `sysidcfg` file in a shared NFS file system, you must use the `-p` option of the `add_install_client(1M)` command when you set up the system to install from the network. The `-p` option specifies where the system can find the `sysidcfg` file when you install the current Oracle Solaris release.
UFS or PCFS diskette	Place the `sysidcfg` file in the root (`/`) directory on the diskette. If you are performing a JumpStart installation and you want to use a `sysidcfg` file on a diskette, you must place the `sysidcfg` file on the profile diskette. To find out how to create a profile diskette, see "Creating a Profile Diskette for Stand-alone Systems" in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*. You can place only one `sysidcfg` file in a directory or on a diskette. If you are creating more than one `sysidcfg` file, you must place each file in a different directory or on a different diskette.
HTTP or HTTPS server	If you want to perform a WAN boot installation, place the `sysidcfg` file in the document root directory of the web server.

You can use the naming service or DHCP to preconfigure your system. For information, see Chapter 3, "Preconfiguring With a Naming Service or DHCP."

If you plan to use the `sysidcfg` file in an installation over the network, you need to set up an installation server and add the system as an installation client. For more information, see Chapter 4, "Installing From the Network (Overview)."

If you plan to use the `sysidcfg` file in a WAN boot installation, you need to perform additional tasks. For more information, see Chapter 10, "WAN Boot (Overview)."

If you plan to use the `sysidcfg` file in a JumpStart installation, you need to create a profile and a `rules.ok` file. For more information, see Chapter 2, "JumpStart (Overview)," in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

For more information about the `sysidcfg` file, see the man page `sysidcfg(4)`.

EXAMPLE 2–1 SPARC: `sysidcfg` File

This example shows a `sysidcfg` file for a SPARC based system. The host name, IP address, and netmask of this system have been preconfigured by editing the naming service. Because all of the system configuration information is preconfigured in this file, you can use a JumpStart

EXAMPLE 2–1 SPARC: `sysidcfg` File *(Continued)*

profile to perform a JumpStart installation. In this example, the NFSv4 domain name is automatically derived from the naming service. Because the `service_profile` keyword is not included in this example, configuration is not altered for the network services during installation.

```
keyboard=US-English
system_locale=en_US
timezone=US/Central
terminal=sun-cmd
timeserver=localhost
name_service=NIS {domain_name=marquee.central.example.com
                  name_server=nmsvr2(172.31.112.3)}
nfs4_domain=dynamic
root_password=m4QPOWNY
network_interface=hme0 {hostname=host1
                        default_route=172.31.88.1
                        ip_address=172.31.88.210
                        netmask=255.255.0.0
                        protocol_ipv6=no}
security_policy=kerberos {default_realm=example.com
                          admin_server=krbadmin.example.com
                          kdc=kdc1.example.com,
                          kdc2.example.com}
```

EXAMPLE 2–2 x86: `sysidcfg` File

The following sample `sysidcfg` file is for a group of x86 based systems. In this example, the NFSv4 domain name is specified to be `example.com`. This custom name overrides the default domain name. Also in this example, the network services are disabled or restricted to local connections only.

```
keyboard=US-English
timezone=US/Central
timeserver=timehost1
terminal=ibm-pc
service_profile=limited_net

name_service=NIS {domain_name=marquee.central.example.com
                  name_server=nmsvr2(172.25.112.3)}
nfs4_domain=example.com
root_password=URFUni9
```

EXAMPLE 2–3 `sysidcfg` File for Configuring Multiple Interfaces

In the following sample `sysidcfg` file, configuration information is specified for both the `eri0` and `eri1` network interfaces. The `eri0` interface is configured as the primary network interface, and `eri1` is configured as a secondary network interface. In this example, the NFSv4 domain name is automatically derived from the naming service.

```
timezone=US/Pacific
system_locale=C
```

EXAMPLE 2–3 `sysidcfg` File for Configuring Multiple Interfaces *(Continued)*

```
terminal=xterms
timeserver=localhost
network_interface=eri0 {primary
                        hostname=host1
                        ip_address=192.168.2.7
                        netmask=255.255.255.0
                        protocol_ipv6=no
                        default_route=192.168.2.1}

network_interface=eri1 {hostname=host1-b
                        ip_address=192.168.3.8
                        netmask=255.255.255.0
                        protocol_ipv6=no
                        default_route=NONE}
root_password=JE2C35JGZi4B2
security_policy=none
name_service=NIS {domain_name=domain.example.com
                  name_server=nis-server(192.168.2.200)}
nfs4_domain=dynamic
```

Syntax Rules for the `sysidcfg` File

You can use two types of keywords in the `sysidcfg` file: independent and dependent. Dependent keywords are guaranteed to be unique only within independent keywords. A dependent keyword exists only when it is identified with its associated independent keyword.

In this example, `name_service` is the independent keyword, while `domain_name` and `name_server` are the dependent keywords:

```
name_service=NIS {domain_name=marquee.central.example.com
name_server=connor(192.168.112.3)}
```

Syntax Rule	Example
Independent keywords can be listed in any order.	`pointer=MS-S` `display=ati {size=15-inch}`
Keywords are not case sensitive.	`TIMEZONE=US/Central` `terminal=sun-cmd`

Enclose all dependent keywords in curly braces ({}) to tie them to their associated independent keyword.	`name_service=NIS`
	`{domain_name=marquee.central.example.com`
	`name_server=connor(192.168.112.3)}`

You can optionally enclosed values in single (‘) or double quotes (“).	`network_interface='none'`

Syntax Rule	Example
For all keywords except the `network_interface` keyword, only one instance of a keyword is valid. However, if you specify the keyword more than once, only the first instance of the keyword is used.	`name_service=NIS` `name_service=DNS`

`sysidcfg` File Keywords

The following table lists the keywords you can use to configure system information in the `sysidcfg` file.

TABLE 2–3 Keywords to Use in `sysidcfg`

Configuration Information	Keyword	For More Information
Keyboard layout and language	keyboard	"`keyboard` Keyword" on page 25
Naming service, domain name, name server	name_service	"`name_service` Keyword" on page 26
Network interface, host name, Internet Protocol (IP) address, netmask, DHCP, IPv6	network_interface	"`network_interface` Keyword" on page 29
Domain name definition for NFSv4	nfs4_domain	"`nfs4_domain` Keyword" on page 34
Root password	root_password	"`root_password` Keyword" on page 35
Security policy	security_policy	"`security_policy` Keyword" on page 35
Network security profile	service_profile	"`service_profile` Keyword" on page 36
Language in which to display the install program and desktop	system_locale	"`system_locale` Keyword" on page 36
Terminal type	terminal	"`terminal` Keyword" on page 37
Time zone	timezone	"`timezone` Keyword" on page 37
Date and time	timeserver	"`timeserver` Keyword" on page 37
Auto Registration setup	auto_reg	"`auto_reg` Keyword" on page 22

The following sections describe the keywords that you can use in the `sysidcfg` file.

auto_reg Keyword

Starting with the Oracle Solaris 10 9/10 release, you can use the `auto_reg` keyword to set up or disable Auto Registration, a feature of Oracle Solaris. Auto Registration is new in the Oracle Solaris 10 9/10 release. When you install or upgrade your system, configuration data about your

system is, when you reboot, automatically communicated through the existing service tag technology to the Oracle Product Registration System. You may elect to have your configuration data sent to the Oracle Product Registration System anonymously so that the configuration data sent to Oracle has no link to the name of a customer. You also have the option to disable Auto Registration.

You can use the `auto_reg` keyword in the `sysidcfg` file prior to a hands-off installation or upgrade to provide your support credentials for Auto Registration, to choose anonymous registration, or to disable Auto Registration. If you do not set up the `sysidcfg` file with these keywords, you are prompted to provide your credentials or to register anonymously during the installation or upgrade.

The general syntax for the `auto_reg` keyword is as follows:

```
auto_reg=[anon |none |noproxy |all |disable ] {
oracle_user=username
oracle_pw=oracle-password
http_proxy_host=hostname
http_proxy_port=port-number
http_proxy_user=proxy-username
htty_proxy_pw=proxy-password
}
```

To use this keyword, first specify a basic type of registration by choosing one of the main values: `anon`, `none`, `noproxy`, `all`, or `disable`, as described in the following table. Then, use additional keywords to provide specific My Oracle Support credentials and to provide your proxy information for the Auto Registration.

The values that you use for the `auto-reg` keyword depend on the type of Auto Registration that you want to use.

- **Anonymous registration** — If you use the `anon` value or the `none` value, your service tags are anonymously registered with Oracle. An anonymous registration means that the configuration data sent to Oracle has no link to the name of a customer or a person. If My Oracle Support credentials are provided during the installation, these credentials are ignored and the registration remains anonymous.
  - If you also want to provide proxy information either in the `sysidcfg` file or when prompted during the installation or upgrade, use the `anon` value.
  - If you do not want to provide proxy information in the `sysidcfg` file, use the `none` value. For example, `auto_reg=none`. If you provide proxy information during an installation or upgrade, that proxy information will be ignored.
- **Register With Your Support Credentials** – If you use the `noproxy` value or the `all` value, your service tags are registered with Oracle using your My Oracle Support credentials when you reboot after installing or upgrading your system. You need to provide your My Oracle Support credentials either in the `sysidcfg` file or when prompted during the installation or upgrade.

- If you also want to provide proxy information either in the `sysidcfg` file or when prompted during the installation or upgrade, use the `all` value.
- If you do not want to provide proxy information in the `sysidcfg` file, use the `noproxy` value. If you provide proxy information during an installation or upgrade, that proxy information will be ignored.

- **Disable Auto Registration**After an installation, the Oracle Configuration Manager (OCM) is enabled by default. The OCM service can be disabled using the following command:

  ```
  svcadm disable ocm
  ```

  If you use the `disable` value, OCM is configured in disconnected mode. Once it is disconnected, you would need to use the `configCCR` command to reconnect OCM. For more information, see the `configCCR(1M)` man page.

Secondary keywords

You use the following keywords and values within the main `auto_reg` keyword to provide either your My Oracle Support credentials or your proxy information.

Oracle_user username	Provide your My Oracle Support username, for example, `oracle_user=myusername`.
`oracle_pw` *oracle-password*	Provide your My Oracle Support password in plain, not encrypted, text, for example, `oracle_pw=j32js94jrjsW`.
`http_proxy_host` *hostname*	Provide your proxy hostname, for example, `http_proxy_host=sss.com`.
`http_proxy_port` *port-number*	Provide your proxy port, for example, `http_proxy_port=8050`.
`http_proxy_user` *proxy-username*	Provide your proxy username, for example, `http_proxy_user=proxyusername`.
`htty_proxy_pw` *proxy-password*	Provide your proxy password in plain, not encrypted, text, for example, `http_proxy_pw=sej47875WSjs`.

EXAMPLE 2–4 Auto Registration Examples

In this example, the `anon` value specifies that your service tags are anonymously registered with Oracle. The `sysidcfg` file, provides the proxy information.

```
auto_reg=anon {
http_proxy_host=sss.com
http_proxy_port=8040
http_proxy_user=myproxyusername
htty_proxy_pw=si329jehId
}
```

In the example, the `none` value specifies that your service tags are anonymously registered with Oracle, and that you do not want to include proxy information. If you do provide proxy information during an installation or upgrade, that proxy information will be ignored.

```
auto_reg=none
```

EXAMPLE 2–5 Registration Using Support Credentials Examples

In this example, the `all` value specifies that your service tags are registered with Oracle using your My Oracle Support credentials when you reboot after installing or upgrading your system. You need to provide your My Oracle Support credentials and when prompted proxy.

```
auto_reg=all {
oracle_user=myusername
oracle_pw=ajsi349EKS987
http_proxy_host=sss.com
http_proxy_port=8030
http_proxy_user=myproxyusername
htty_proxy_pw=adjsi2934IEls
}
```

In this example, the `noproxy` value specifies that your service tags are registered with Oracle using your My Oracle Support credentials when you reboot after installing or upgrading your system. You need to provide your My Oracle Support credentials but do not need to provide proxy information. If you do provide proxy information during the installation or upgrade, that information is ignored.

```
auto_reg=noproxy {
oracle_user=myusername
oracle_pw=sie7894KEdjs2
}
```

keyboard Keyword

The `sysidkdb` tool configures your USB language and its corresponding keyboard layout.

The following procedure occurs:

- If the keyboard is self-identifying, the keyboard language and layout automatically configures during installation.
- If the keyboard is not self-identifying, the `sysidkdb` tool provides you with a list of supported keyboard layouts during installation.

Note – PS/2 keyboards are not self-identifying. You will be asked to select the keyboard layout during the installation.

You can configure the keyboard language and its corresponding keyboard layout information by using the `keyboard` keyword. Each language has its own keyboard layout. Use the following syntax to a language and its corresponding layout in your `sysidcfg` file.

`keyboard=`*keyboard-layout*

If the value provided for *keyboard-layout* is not a valid value, an interactive response is required during installation. The valid *keyboard-layout* strings are defined in the `/usr/share/lib/keytables/type_6/kbd_layouts` file.

SPARC only – Previously, the USB keyboard assumed a self-identifying value of 1 during the installation. Therefore, all of the keyboards that were not self-identifying always configured for a U.S. English keyboard layout during installation.

If the keyboard is not self-identifying and you want to prevent being prompted during your JumpStart installation, set the keyboard language in your `sysidcfg` file. For JumpStart installations, the default is for the U.S. English language.

The following example, sets the keyboard language and its corresponding keyboard layout for the German language:

`keyboard=`*German*

name_service Keyword

You can use the `name_service` keyword to configure the naming service, the domain name, and the name server for the system. The following sample shows the general syntax for the `name_service` keyword.

```
name_service=name-service {domain_name=domain-name
                           name_server=name-server
                           optional-keyword=value}
```

Choose only one value for `name_service`. Include all or none of the `domain_name`, `name_server`, or optional keywords, as needed. If no keywords are used, omit the curly braces {}.

Note – The `name_service` option in the `sysidcfg` file automatically sets the naming service during installation of the Oracle Solaris OS. This setting overrides SMF services that were previously set up for `site.xml`. Therefore, you might need to reset your name service after installation.

The following sections describe the keyword syntax to configure the system to use a specific naming service.

NIS and NIS+ Syntax for the name_service Keyword

Use the following syntax to configure the system to use the NIS or NIS+ naming service.

```
name_service=NIS {domain_name=domain-name
                  name_server=hostname(IP-address)}

name_service=NIS+ {domain_name=domain-name
                   name_server=hostname(IP-address)}
```

domain-name	Specifies the domain name
hostname	Specifies the host name of the name server
IP-address	Specifies the IP address of the name server

EXAMPLE 2–6 Specifying a NIS Server With the name_service Keyword

The following example specifies a NIS server with the domain name `west.example.com`. The server's host name is `timber`, and the server IP address is `192.168.2.1`.

```
name_service=NIS {domain_name=west.example.com
                  name_server=timber(192.168.2.1)}
```

EXAMPLE 2–7 Specifying a NIS+ Server With the name_service Keyword

The following example specifies a NIS+ server with the domain name `west.example.com`. The server's host name is `timber`, and the server IP address is `192.168.2.1`.

```
name_service=NIS+ {domain_name=west.example.com
                   name_server=timber(192.168.2.1)}
```

For more information about the NIS name service, see *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*.

DNS Syntax for the name_service Keyword

Use the following syntax to configure the system to use DNS.

```
name_service=DNS {domain_name=domain-name
                  name_server=IP-address,[IP-address,IP-address]
                  search=domain-name,[domain-name,domain-name,
                  domain-name,domain-name,domain-name]}
```

`domain_name=`*domain-name*	Specifies the domain name.
`name_server=`*IP-address*	Specifies the IP address of the DNS server. You can specify up to three IP addresses as values for the `name_server` keyword, separated by commas.
`search=`*domain-name*	(Optional) Specifies additional domains to search for naming service information. You can specify up to six domain names to search, separated by commas. The total length of each search entry cannot exceed 250 characters.

EXAMPLE 2–8 Specifying a DNS Server With the name_service Keyword

The following example specifies a DNS server with the domain name `west.example.com`. The server IP addresses are `10.0.1.10` and `10.0.1.20`. `example.com` and `east.example.com` are listed as additional domains to search for naming service information.

```
name_service=DNS {domain_name=west.example.com
                  name_server=10.0.1.10,10.0.1.20
                  search=example.com,east.example.com}
```

For more information about the DNS name service, see *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*.

LDAP Syntax for the name_service Keyword

Use the following syntax to configure the system to use LDAP.

```
name_service=LDAP {domain_name=domain-name
                   profile=profile-name profile_server=IP-address
                   proxy_dn="proxy-bind-dn" proxy_password=password}
```

domain-name Specifies the domain name of the LDAP server.

profile-name Specifies the name of the LDAP profile you want to use to configure the system.

IP-address Specifies the IP address of the LDAP profile server.

proxy-bind-dn (Optional) Specifies the proxy bind distinguished name. You must enclose the *proxy-bind-dn* value in double quotation marks.

password (Optional) Specifies the client proxy password.

EXAMPLE 2–9 Specifying an LDAP Server With the name_service Keyword

This example specifies an LDAP server with the following configuration information:

- The domain name is `west.example.com`.
- The installation program uses the LDAP profile that is named `default` to configure the system.
- The IP address of the LDAP server is `172.31.2.1`.
- The proxy bind distinguished name includes the following information:
  - The common name for the entry is `proxyagent`.
  - The organizational unit is `profile`.
  - The proxy domain includes the `west`, `example`, and `com` domain components.
- The proxy password is `password`.

EXAMPLE 2–9 Specifying an LDAP Server With the name_service Keyword *(Continued)*

```
name_service=LDAP {domain_name=west.example.com
                   profile=default
                   profile_server=172.31.2.1
                   proxy_dn="cn=proxyagent,ou=profile,
                   dc=west,dc=example,dc=com"
                   proxy_password=password}
```

For more information about how to use LDAP, see *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*.

network_interface Keyword

Use the `network_interface` keyword to perform the following tasks:

- Specify a host name
- Specify an IP address
- Specify the default router address
- Specify a netmask value
- Use DHCP to configure the network interface
- Enable IPv6 on the network interface

The following sections describe how to use the `network_interface` keyword to configure the system interfaces.

Syntax for Nonnetworked Systems

To turn off networking for the system, set the `network_interface` value to `none`. For example:

```
network_interface=none
```

Syntax for Configuring a Single Interface

You can use the `network_interface` keyword to configure a single interface with DHCP or without DHCP by using a `sysidcfg` file entry.

- **With DHCP** – You can use a DHCP server on your network to configure the network interface. For more information on how to use a DHCP server during your installation, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

  To use the DHCP server to configure a single interface on the system, use the following syntax for the `network_interface` keyword:

  ```
  network_interface=PRIMARY | value {dhcp protocol_ipv6=yes | no}
  ```

`PRIMARY`	Instructs the installation program to configure the first up, non-loopback interface that is found on the system. The order is the same as the order that is displayed with the `ifconfig` command. If no interfaces are up, then the first non-loopback interface is used. If no non-loopback interfaces are found, then the system is nonnetworked.
value	Instructs the installation program to configure a specific interface, such as `hme0` or `eri1`.
`protocol_ipv6=`*yes-or-no*	Instructs the installation program to configure the system to use either IPv6 or to not use IPv6. For WAN boot installations, you must set the value of `protocol_ipv6=no`.

- **Without DHCP** – If you do not want to use DHCP to configure the network interface, you can specify the configuration information in the `sysidcfg` file. To instruct the installation program to configure a single interface on the system without using DHCP, use the following syntax.

```
network_interface=PRIMARY | value
                  {hostname=host-name
                   default_route=IP-address
                   ip_address=IP-address
                   netmask=netmask
                   protocol_ipv6=yes | no}
```

PRIMARY	Instructs the installation program to configure the first up, non-loopback interface that is found on the system. The order is the same as the order that is displayed with the `ifconfig` command. If no interfaces are up, then the first non-loopback interface is used. If no non-loopback interfaces are found, then the system is not networked. **Note –** Do not use the `PRIMARY` keyword value if you want to configure multiple interfaces.
value	Instructs the installation program to configure a specific interface, such as `hme0` or `eri1`.
`hostname=`*host-name*	(Optional) Specifies the host name of the system.
`default_route=`*IP-address* or `NONE`	(Optional) Specifies the IP address of the default router. If you want the installation program to detect the router by using the ICMP router discovery protocol, omit this keyword.

	Note – If the installation program cannot detect the router, you are prompted for the router information during the installation.
`ip_address=`*IP-address*	(Optional) Specifies the IP address of the system.
`netmask=`*netmask*	(Optional) Specifies the netmask value for the system.
`protocol_ipv6=yes_or_no`	(Optional) Instructs the installation program to configure the system to either use IPv6 or not use IPv6.
	Note – To perform an unattended JumpStart installation, you must specify a value for the `protocol_ipv6` keyword. For WAN boot installations, you must set the value of `protocol_ipv6=no`.

Include any combination or none of the `hostname`, `ip_address`, and `netmask` keywords, as needed. If you do not use any of these keywords, omit the curly braces ({}).

EXAMPLE 2–10 Configuring a Single Interface by Using DHCP With the network_interface Keyword

The following example instructs the installation program to use DHCP to configure the `eri0` network interface. IPv6 support is not enabled.

```
network_interface=eri0 {dhcp protocol_ipv6=no}
```

EXAMPLE 2–11 Configuring a Single Interface by Specifying Configuration Information With the network_interface Keyword

The following example configures the interface `eri0` with the following settings.

- The host name is set to `host1`.
- The IP address is set to `172.31.88.100`.
- The netmask is set to `255.255.255.0`.
- IPv6 support is not enabled on the interface.

```
network_interface=eri0 {hostname=host1 ip_address=172.31.88.100
                        netmask=255.255.255.0 protocol_ipv6=no}
```

Syntax for Configuring Multiple Interfaces

You can configure multiple network interfaces in your `sysidcfg` file. For each interface that you want to configure, include a `network_interface` entry in the `sysidcfg` file.

You can use the `network_interface` keyword to configure multiple interfaces with DHCP or without DHCP by using a `sysidcfg` file entry.

- **With DHCP** – You can use a DHCP server on your network to configure a network interface. For more information on how to use a DHCP server during your installation, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

  To use the DHCP server to configure a network interface on the system, use the following syntax for the `network_interface` keyword.

  ```
  network_interface=value {primary dhcp protocol_ipv6=yes | no}
  ```

value	Instructs the installation program to configure a specific interface, such as `hme0` or `eri1`.
`primary`	(Optional) Specifies *value* as the primary interface.
`protocol_ipv6=yes | no`	Instructs the installation program to configure the system to either use IPv6 or not use IPv6.

  Note – For WAN boot installations, you must set the value of `protocol_ipv6=no`.

- **Without DHCP** – If you do not want to use DHCP to configure the network interface, you can specify the configuration information in the `sysidcfg` file. To instruct the installation program to configure multiple interfaces without using DHCP, use the following syntax.

  ```
  network_interface=value {primary hostname=host_name
                           default_route=IP-address or NONE
                           ip_address=IP-address
                           netmask=netmask
                           protocol_ipv6=yes | no}
  ```

value	Instructs the installation program to configure a specific interface, such as `hme0` or `eri1`.
`primary`	(Optional) Specifies *value* as the primary interface.
`hostname=`*host-name*	(Optional) Specifies the host name of the system.
`default_route=`*IP-address* or NONE	(Optional) Specifies the IP address of the default router. If you want the installation program to

detect the router by using the ICMP router discovery protocol, omit this keyword.

If you configure multiple interfaces in the `sysidcfg` file, set `default_route=NONE` for each secondary interface that does not use a static default route.

Note – If the installation program cannot detect the router, you are prompted for the router information during the installation.

`ip_address=`*IP-address*

(Optional) Specifies the IP address of the system.

`netmask=`*netmask*

(Optional) Specifies the netmask value for the system.

`protocol_ipv6=` `yes` | `no`

(Optional) Instructs the installation program to configure the system to either use IPv6 or not use IPv6.

Note – To perform an unattended JumpStart installation, you must specify a value for the `protocol_ipv6` keyword.

For WAN boot installations, you must set the value of `protocol_ipv6=no`.

Include any combination or none of the `hostname`, `ip_address`, and `netmask` keywords, as needed. If you do not use any of these keywords, omit the curly braces ({}).

In the same `sysidcfg` file, you can use DHCP to configure certain interfaces while also specifying the configuration information for other interfaces in the `sysidcfg` file.

EXAMPLE 2–12 Configuring Multiple Interfaces With the network_interface Keyword

In the following example, the network interfaces `eri0` and `eri1` are configured in the following way:

- `eri0` is configured by using the DHCP server. IPv6 support is not enabled on `eri0`.
- `eri1` is the primary network interface. The host name is set to host1, and the IP address is set to `172.31.88.100`. The netmask is set to `255.255.255.0`. IPv6 support is not enabled on `eri1`.

EXAMPLE 2–12 Configuring Multiple Interfaces With the network_interface Keyword *(Continued)*

```
network_interface=eri0 {dhcp protocol_ipv6=no}
network_interface=eri1 {primary hostname=host1
                        ip_address=172.146.88.100
                        netmask=255.255.255.0
                        protocol_ipv6=no}
```

nfs4_domain Keyword

To prevent being asked to specify an NFSv4 domain name during installation, use the `nfs4_domain` keyword in the `sysidcfg` file. This keyword suppresses selection of a domain name during the installation process. Use the following syntax:

`nfs4_domain=dynamic or` *domain-name*

`dynamic` This reserved keyword dynamically derives the NFSv4 domain name, based on naming services configuration. For example:

```
nfs4_domain=dynamic
```

This example enables the domain name to be derived by the naming service.

The reserved keyword, `dynamic`, is not case sensitive.

Note – By default, NFSv4 uses a domain name that is automatically derived from the system's naming services. This domain name is sufficient for most configurations. In a few cases, mount points that cross domain boundaries can cause files to appear to be owned by "nobody" because no common domain name exists. To prevent this situation, you can override the default domain name and select a custom domain name.

---

domain_name This value overrides the default domain name.

This value must be a valid domain name, name is composed of a combination of alphanumeric characters, dots, underscores, and dashes only. The first character must be an alphabetical character. For example:

```
nfs4_domain=example.com
```

This example sets the value that is used by the `nfsmapid` daemon to be `example.com`. This selection overrides the default domain name.

Note – In previous releases, scripts enabled users to avoid being prompted for the NFSv4 domain name during installation.

For JumpStart installations in the Oracle Solaris 10 OS, you could use the workaround JumpStart sample script, `set_nfs4_domain`, to suppress the NFSv4 prompt during installation. This script is no longer required. Use the `sysidcfg` keyword `nfs4_domain` instead.

In prior releases, the `/etc/.NFS4inst_state.domain` file was created by the `sysidnfs4` program. This file would suppress the prompt for an NFSv4 domain name during installation. This file is no longer created. Use the `sysidcfg` keyword `nfs4_domain` instead.

root_password Keyword

You can specify the root password to the system in the `sysidcfg` file by using the `root_password` keyword with the following syntax:

`root_password=`*encrypted-password*

encrypted-password is the encrypted password as it appears in the `/etc/shadow` file.

security_policy Keyword

You can use the `security_policy` keyword in your `sysidcfg` file to configure your system to use the Kerberos network authentication protocol. Use the following syntax:

```
security_policy=kerberos {default_realm=FQDN
                          admin_server=FQDN kdc=FQDN1, FQDN2, FQDN3}
```

FQDN specifies the fully qualified domain name of the Kerberos default realm, the administration server, or key distribution center (KDC). You must specify at least one, but no more than three, key distribution centers.

If you do not want to set the security policy for the system, set `security_policy=NONE`.

For more information about the Kerberos network authentication protocol, see *System Administration Guide: Security Services*.

EXAMPLE 2–13 Configuring the System to Use Kerberos With the security_policy Keyword

This example configures the system to use Kerberos with the following information:

- The Kerberos default realm is `example.com`.
- The Kerberos administration server is `krbadmin.example.com`.
- The two key distribution centers are `kdc1.example.com` and `kdc2.example.com`.

EXAMPLE 2–13 Configuring the System to Use Kerberos With the security_policy Keyword *(Continued)*

```
security_policy=kerberos
                {default_realm=example.COM
                 admin_server=krbadmin.example.com
                 kdc=kdc1.example.com,
                 kdc2.example.com}
```

service_profile Keyword

You can use the `service_profile` keyword to install a more secure system by restricting network services. This security option is available only for initial installations. An upgrade maintains all previously set services.

Set `service_profile=limited_net` to specify that all network services except secure shell, are either disabled or constrained to respond to local requests only. After installation, any individual network service can be enabled by using the `svcadm` and `svccfg` commands.

To specify that no network service changes are made during installation, set `service_profile=open`.

If the `service_profile` keyword is not present in the `sysidcfg` file, no changes are made to the status of the network services during installation.

The network services can be enabled after installation by using the `netservices open` command or by enabling individual services by using SMF commands. See "Revising Security Settings After Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

For further information about limiting network security during installation, see "Planning Network Security" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*. See also the following man pages:

- `netservices`(1M)
- `svcadm`(1M)
- `svccfg`(1M) commands

system_locale Keyword

You can use the `system_locale` keyword to specify the language in which to display the install program and desktop:

`system_locale=`*locale*

locale specifies the language that you want the system to use to display the installation panels and screens.

For example,

```
system_locale=de_CH. UTF-8
```

for swiss German `UTF-8`

For a list of valid locale values, see the `/usr/lib/locale` directory or *International Language Environments Guide*.

terminal Keyword

You can use the `terminal` keyword to specify the terminal type for the system:

```
terminal=terminal-type
```

For a list of valid terminal values, see the subdirectories in the `/usr/share/lib/terminfo` directory.

timezone Keyword

You can set the time zone for the system with the `timezone` keyword:

```
timezone=timezone
```

The directories and files in the `/usr/share/lib/zoneinfo` directory provide the valid time zone values. The *timezone* value is the name of the path relative to the `/usr/share/lib/zoneinfo` directory. You can also specify any valid Olson time zone.

EXAMPLE 2–14 Configuring the System Time Zone With the timezone Keyword

In the following example, the system time zone is set to mountain standard time in the United States.

```
timezone=US/Mountain
```

The installation program configures the system to use the time zone information in `/usr/share/lib/zoneinfo/US/Mountain`.

timeserver Keyword

You can use the `timeserver` keyword to specify the system that sets the date and time on the system you want to install.

Choose one of the following methods to set the `timeserver` keyword.

- To configure the system to serve as its own time server, set `timeserver=localhost`. If you specify `localhost` as the time server, the system's time is assumed to be correct.

- To specify another system as the time server, specify either the host name or the IP address of the time server with the `timeserver` keyword.

SPARC: Preconfiguring Power Management Information

You can use the Power Management software that is provided in the Oracle Solaris OS to automatically save the state of a system and turn it off after it is idle for 30 minutes. When you install the current Oracle Solaris release on a system that complies with version 2 of the EPA's Energy Star guidelines, for example, a Sun4U system, the Power Management software is installed by default. If you install with the Oracle Solaris installation program GUI, the installation program prompts you to enable or disable the Power Management software. The Oracle Solaris text installer prompts you to enable or disable the Power Management software after the installation is complete and the system reboots.

Note – If your system has Energy Star version 3 or later, you are not prompted for this information.

If you are performing interactive installations, you cannot preconfigure the Power Management information and avoid the prompt. However, by using a JumpStart installation, you can preconfigure the Power Management information by using a finish script to create an `/autoshutdown` or `/noautoshutdown` file on the system. When the system reboots, the `/autoshutdown` file enables Power Management and the `/noautoshutdown` file disables Power Management.

For example, the following line in a finish script enables the Power Management software and prevents the display of the prompt after the system reboots.

```
touch /a/autoshutdown
```

Finish scripts are described in "Creating Finish Scripts" in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

◆ ◆ ◆ CHAPTER 3

Preconfiguring With a Naming Service or DHCP

This chapter describes how to preconfigure system information with a naming service or DHCP. This chapter contains the following sections:

Choosing a Naming Service

You can add the system configuration information to any of the following:

- A `sysidcfg` file on a remote system or diskette

  Note – The `name_service` option in the `sysidcfg` file automatically sets the naming service during installation of the Oracle Solaris OS. This setting overrides SMF services previously setup for `site.xml`. Therefore, you might need to reset your name service after installation.

- The naming service database available at your site
- If your site uses DHCP, you can also preconfigure some system information in the site DHCP server. For more information about how to use a DHCP server to preconfigure system information, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

Use the information in following table to determine whether to use a `sysidcfg` file or a naming service database to preconfigure system configuration information.

TABLE 3–1 Methods to Preconfigure System Configuration Information

Preconfigurable System Information	Preconfigurable With the `sysidcfg` File?	Preconfigurable With the Naming Service?
Naming service	Yes	Yes
Domain name	Yes	No
Name server	Yes	No
Network interface	Yes	No
Host name	Yes	Yes
	Because this information is system specific, edit the naming service rather than create a different `sysidcfg` file for each system.	
IP address	Yes	Yes
	Because this information is system specific, edit the naming service rather than create a different `sysidcfg` file for each system.	
Netmask	Yes	No
DHCP	Yes	No
IPv6	Yes	No
Default route	Yes	No
Root password	Yes	No
Security policy	Yes	No
Language (locale) in which to display the install program and desktop	Yes	Yes, if NIS or NIS+ No, if DNS or LDAP
Terminal type	Yes	No
Time zone	Yes	Yes
Date and time	Yes	Yes
Web proxy	No	No
	You can configure this information with the Oracle Solaris installation program, but not through the `sysidcfg` file or the naming service.	
x86: Monitor type	Yes	No

TABLE 3–1 Methods to Preconfigure System Configuration Information *(Continued)*

Preconfigurable System Information	Preconfigurable With the `sysidcfg` File?	Preconfigurable With the Naming Service?
x86: Keyboard language, keyboard layout	Yes	No
x86: Graphics card, color depth, display resolution, screen size	Yes	No
x86: Pointing device, number of buttons, IRQ level	Yes	No
SPARC: Power Management (`autoshutdown`) You cannot preconfigure Power Management through the `sysidcfg` file or the naming service. "SPARC: Preconfiguring Power Management Information" on page 38 contains details.	No	No

Preconfiguring With the Naming Service

The following table provides a high-level overview of the naming service databases that you need to edit and populate to preconfigure system information.

System Information to Preconfigure	Naming Service Database
Host name and IP address	`hosts`
Date and time	`hosts`. Specify the `timehost` alias next to the host name of the system that will provide the date and time for the systems that are being installed.
Time zone	`timezone`
Netmask	`netmasks`

You cannot preconfigure the locale for a system with the DNS or LDAP name service. If you use the NIS or NIS+ name service, follow the procedures in this section to use your naming service to preconfigure the locale for a system.

▼ How to Preconfigure the Locale Using NIS

Before You Begin The NIS server must be available to access during the installation.

1 Boot your system from the network.

- **To install with the Oracle Solaris interactive installation GUI, type the following command:**

  ```
  ok boot net
  ```

- **To install with the Oracle Solaris interactive text installer in a desktop session, type the following command:**

  ```
  ok boot net - text
  ```

- **To install with the Oracle Solaris interactive text installer in a console session, type the following command:**

  ```
  ok boot net - nowin
  ```

The system boots from the network.

2 Become superuser or assume an equivalent role on the name server.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

3 Modify `/var/yp/Makefile` to add the locale map.

a. Insert this shell procedure after the last *variable*`.time` shell procedure.

```
locale.time:  $(DIR)/locale
        -@if [ -f $(DIR)/locale ]; then \
               sed -e "/^#/d" -e s/#.*$$// $(DIR)/locale \
               | awk '{for (i = 2; i<=NF; i++) print $$i, $$0}' \
               | $(MAKEDBM) - $(YPDBDIR)/$(DOM)/locale.byname; \
               touch locale.time; \
               echo "updated locale"; \
               if [ ! $(NOPUSH) ]; then \
                       $(YPPUSH) locale.byname; \
                       echo "pushed locale"; \
               else \
               : ; \
               fi \
        else \
               echo "couldn't find $(DIR)/locale"; \
        fi
```

b. Find the string `all:` and, at the end of the list of variables, insert the word `locale`.

```
all: passwd group hosts ethers networks rpc services protocols \
    netgroup bootparams aliases publickey netid netmasks c2secure \
    timezone auto.master auto.home locale
```

c. Near the end of the file, after the last entry of its type, insert the string `locale: locale.time` on a new line.

```
passwd: passwd.time
group: group.time
hosts: hosts.time
ethers: ethers.time
networks: networks.time
rpc: rpc.time
services: services.time
protocols: protocols.time
```

```
netgroup: netgroup.time
bootparams: bootparams.time
aliases: aliases.time
publickey: publickey.time
netid: netid.time
passwd.adjunct: passwd.adjunct.time
group.adjunct: group.adjunct.time
netmasks: netmasks.time
timezone: timezone.time
auto.master: auto.master.time
auto.home: auto.home.time
locale: locale.time
```

d. Save the file.

4 Create the file `/etc/locale` and include one locale entry for each domain or specific system.

For example, the following entry specifies that French is the default language that is used in the `example.com` domain:

```
fr example.com
```

The following example specifies that Belgian French is the default locale that is used by a system named `myhost`:

```
fr_BE myhost
```

Note – *International Language Environments Guide* contains a list of valid locales.

Locales are available on the Oracle Solaris DVD or Oracle Solaris Software - 1 CD.

---

5 Make the locale maps.

```
# cd /var/yp; make
```

Systems that are specified by domain or individually in the `locale` map are now set up to use the default locale. The default locale that you specified is used during installation and by the desktop after the system is rebooted.

Next Steps If you plan to use the NIS name service in an installation over the network, you need to set up an installation server and add the system as an installation client. For more information, see Chapter 4, "Installing From the Network (Overview)."

If you plan to use the NIS name service in a JumpStart installation, you need to create a profile and a `rules.ok` file. For more information, see Chapter 2, "JumpStart (Overview)," in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

See Also For more information about the NIS name service, see Part III, "NIS Setup and Administration," in *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*.

How to Preconfigure the Locale Using NIS+

The following procedure assumes the NIS+ domain is set up. Setting up the NIS+ domain is documented in the *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*. The NIS+ server must be available to access during installation.

1. **Boot your system from the network.**

   - **To install with the Oracle Solaris interactive installation GUI, type the following command:**

     ```
     ok boot net
     ```

   - **To install with the Oracle Solaris interactive text installer in a desktop session, type the following command:**

     ```
     ok boot net - text
     ```

   - **To install with the Oracle Solaris interactive text installer in a console session, type the following command:**

     ```
     ok boot net - nowin
     ```

   The system boots from the network.

2. **Log in to a name server as superuser or as a user in the NIS+ administration group.**

3. **Create the `locale` table.**

   ```
   # nistbladm -D access=og=rmcd,nw=r -c locale_tbl name=SI,nogw=
   locale=,nogw= comment=,nogw= locale.org_dir.'nisdefaults -d'
   ```

4. **Add needed entries to the `locale`.**

   ```
   # nistbladm -a name=name locale=locale comment=comment
   locale.org_dir.'nisdefaults -d'
   ```

   name — Either the domain name or a specific system name for which you want to preconfigure a default locale.

   locale — The locale you want to install on the system and use on the desktop after the system is rebooted. *International Language Environments Guide* contains a list of valid locales.

   comment — The comment field. Use double quotation marks to begin and end comments that are longer than one word.

Note – Locales are available on the Oracle Solaris DVD or Oracle Solaris Software - 1 CD.

Systems that are specified by domain or individually in the `locale` table are now set up to use the default locale. The default locale you specified is used during installation and by the desktop after the system is rebooted.

Next Steps If you plan to use the NIS+ name service in an installation over the network, you need to set up an installation server and add the system as an installation client. For more information, see Chapter 4, "Installing From the Network (Overview)."

If you plan to use the NIS+ name service in a JumpStart installation, you need to create a profile and a `rules.ok` file. For more information, see Chapter 2, "JumpStart (Overview)," in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

See Also For more information about the NIS+ name service, see *System Administration Guide: Naming and Directory Services (NIS+)*.

Preconfiguring System Configuration Information With the DHCP Service (Tasks)

The Dynamic Host Configuration Protocol (DHCP) enables host systems in a TCP/IP network to be configured automatically for the network as they boot. DHCP uses a client and server mechanism. Servers store and manage configuration information for clients, and provide that information on a client's request. The information includes the client's IP address and information about network services available to the client.

A primary benefit of DHCP is its ability to manage IP address assignments through leasing. Leasing allows IP addresses to be reclaimed when not in use and reassigned to other clients. This ability enables a site to use a smaller pool of IP address than would be needed if all clients were assigned a permanent address.

You can use DHCP to install the Oracle Solaris OS on certain client systems on your network. All SPARC based systems that are supported by the Oracle Solaris OS and x86 based systems that meet the hardware requirements for running the Oracle Solaris OS can use this feature.

The following task map shows the high-level tasks that must be performed to enable clients to obtain installation parameters by using DHCP.

TABLE 3–2 Task Map: Preconfiguring System Configuration Information With the DHCP Service

Task	Description	Instructions
Set up an install server.	Set up an Oracle Solaris server to support clients that must install the Oracle Solaris OS from the network.	Chapter 4, "Installing From the Network (Overview)"

TABLE 3–2 Task Map: Preconfiguring System Configuration Information With the DHCP Service *(Continued)*

Task	Description	Instructions
Set up client systems for Oracle Solaris installation over the network by using DHCP.	Use `add_install_client -d` to add DHCP network installation support for a class of client (of a certain machine type, for example) or a particular client ID.	Using Oracle Solaris DVD: "Adding Systems to Be Installed From the Network With a DVD Image" on page 72 Using Oracle Solaris CD: "Adding Systems to Be Installed From the Network With a CD Image" on page 93 `add_install_client(1M)`
Prepare your network to use the DHCP service.	Decide how you want to configure your DHCP server.	Chapter 13, "Planning for DHCP Service (Tasks)," in *Oracle Solaris Administration: IP Services*
Configure the DHCP server.	Use DHCP Manager to configure your DHCP server	Chapter 14, "Configuring the DHCP Service (Tasks)," in *Oracle Solaris Administration: IP Services*
Create DHCP options for installation parameters and macros that include the options.	Use DHCP Manager or `dhtadm` to create new vendor options and macros that the DHCP server can use to pass installation information to the clients.	"Creating DHCP Options and Macros for Oracle Solaris Installation Parameters" on page 46

Creating DHCP Options and Macros for Oracle Solaris Installation Parameters

When you add clients with the `add_install_client -d` script on the install server, the script reports DHCP configuration information to standard output. This information can be used when you create the options and macros that are needed to pass network installation information to clients.

You can customize the options and macros in your DHCP service to perform the following types of installations:

- **Class-specific installations** – You can instruct the DHCP service to perform a network installation for all clients of a specific class. For example, you can define a DHCP macro that performs the same installation on all Sun Blade systems on the network. Use the output of the `add_install_client -d` command to set up a class-specific installation.
- **Network-specific installations** – You can instruct the DHCP service to perform a network installation for all clients in a specific network. For example, you can define a DHCP macro that performs the same installation on all systems in the `192.168.2` network.

- **Client-specific installations** – You can instruct the DHCP service to perform a network installation for a client with a specific Ethernet address. For example, you can define a DHCP macro that performs a specific installation on the client with the Ethernet address `00:07:e9:04:4a:bf`. Use the output of the `add_install_client -d -e` *ethernet_address* command to set up a client-specific installation.

For more information about setting up clients to use a DHCP server for a network installation, see the following procedures:

- For network installations that use DVD media, see "Adding Systems to Be Installed From the Network With a DVD Image" on page 72.
- For network installations that use CD media, see "Adding Systems to Be Installed From the Network With a CD Image" on page 93.

DHCP Options and Macro Values

To install DHCP clients from the network, you must create vendor category options to pass information that is needed to install the Oracle Solaris OS. The following tables describe common DHCP options that you can use to install a DHCP client.

- You can use the standard DHCP options that are listed in Table 3–3 to configure and install x86 based systems. These options are not platform specific, and can be used to install the Oracle Solaris OS on a variety of x86 based systems by using DHCP. For a complete list of standard options, see the `dhcp_inittab(4)` man page.
- Table 3–4 lists options that you can use to install Oracle Solaris client systems. The vendor client classes that are listed in this table determine what classes of client can use the option. Vendor client classes that are listed here are examples only. You should specify client classes that indicate the actual clients in your network that you need to install from the network. See "Working With DHCP Options (Task Map)" in *Oracle Solaris Administration: IP Services* for information about how to determine a client's vendor client class.

For detailed information on DHCP options, see "DHCP Option Information" in *Oracle Solaris Administration: IP Services*.

TABLE 3–3 Values for Standard DHCP Options

Option Name	Code	Data Type	Granularity	Maximum	Description
`BootFile`	N/A	ASCII	1	1	Path to the client's boot file
`BootSrvA`	N/A	IP address	1	1	IP address of boot server
`DNSdmain`	15	ASCII	1	0	DNS domain name
`DNSserv`	6	IP address	1	0	List of DNS name servers
`NISdmain`	40	ASCII	1	0	NIS domain name
`NISservs`	41	IP address	1	0	IP address of NIS server

TABLE 3–3 Values for Standard DHCP Options *(Continued)*

Option Name	Code	Data Type	Granularity	Maximum	Description
`NIS+dom`	64	ASCII	1	0	NIS+ domain name
`NIS+serv`	65	IP address	1	0	IP address of NIS+ server
`Router`	3	IP address	1	0	IP addresses of network routers

The Vendor category options listed in the following table are required to enable a DHCP server to support Oracle Solaris installation clients. The options are used in the Oracle Solaris client's startup scripts.

Note – Vendor client classes that are listed here are examples only. You should specify client classes that indicate the actual clients in your network that you need to install from the network.

TABLE 3–4 Values for Creating Required Vendor Category Options for Oracle Solaris Clients

Name	Code	Data Type	Granularity	Maximum	Vendor Client Classes *	Description
`SrootIP4`	2	IP address	1	1	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	IP address of root server
`SrootNM`	3	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	Host name of root server
`SrootPTH`	4	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	Path to the client's root directory on the root server
`SinstIP4`	10	IP address	1	1	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	IP address of JumpStart install server
`SinstNM`	11	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	Host name of install server
`SinstPTH`	12	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	Path to installation image on install server

The options listed in the following table can be used by the client startup scripts, but are not required by the scripts.

Note – Vendor client classes that are listed here are examples only. You should specify client classes that indicate the actual clients in your network that you need to install from the network.

TABLE 3–5 Values for Optional Vendor Category Options for Oracle Solaris Clients

Name	Code	Data Type	Granularity	Maximum	Vendor Client Classes *	Description
`SrootOpt`	1	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	NFS mount options for the client's root file system
`SbootFIL`	7	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	Path to the client's boot file
`SbootRS`	9	NUMBER	2	1	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	NFS read size used by standalone boot program when loading the kernel
`SsysidCF`	13	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	Path to `sysidcfg` file, in the format *server:/path*
`SjumpsCF`	14	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	Path to JumpStart configuration file in the format *server:/path*

TABLE 3–5 Values for Optional Vendor Category Options for Oracle Solaris Clients *(Continued)*

`SbootURI`	16	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	Path to the stand-alone boot file or path to the WAN boot file. For the stand-alone boot file, use the following format: `tftp://inetboot.sun4u` For the WAN boot file, the format is: `http://`*host.domain/path-to-file* This option can be used to override `BootFile` and `siaddr` settings in order to retrieve a stand-alone boot file. Supported protocols: `tftp` (inetboot) and `http` (wanboot). For example, use the following format: `tftp://inetboot.sun4u`
`SHTTPproxy`	17	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	IP address and port number of the proxy server that is used on your network. This option is needed only when a client is booting across a WAN, and the local network uses a proxy server. For example, use the following format: `198.162.10.5:8080`

The options listed in the following table are not currently used by the Oracle Solaris client startup scripts. You can use them only if you edit the startup scripts.

Note – Vendor client classes that are listed here are examples only. You should specify client classes that indicate the actual clients in your network that you need to install from the network.

TABLE 3–6 Startup Script Vendor Category Options

Name	Code	Data Type	Granularity	Maximum	Vendor Client Classes *	Description
`SswapIP4`	5	IP address	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	IP address of swap server
`SswapPTH`	6	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	Path to the client's swap file on the swap server
`Stz`	8	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	Time zone for client
`Sterm`	15	ASCII text	1	0	`SUNW.Sun-Blade-1000`, `SUNW.Sun-Fire-880`, `SUNW.i86pc`	Terminal type

When you have created the options, you can create macros that include those options. The following table lists sample macros you can create to support Oracle Solaris installation for clients.

TABLE 3–7 Sample Macros to Support Network Installation Clients

Macro Name	Contains These Options and Macros
`Solaris`	`SrootIP4`, `SrootNM`, `SinstIP4`, `SinstNM`
`sparc`	`SrootPTH`, `SinstPTH`
`sun4u`	`Solaris` and `sparc` macros
`sun4v`	`Solaris` and `sparc` macros
`i86pc`	`Solaris` macro, `SrootPTH`, `SinstPTH`, `SbootFIL`
`SUNW.i86pc`	`i86pc` macro **Note –** The `SUNW.i86pc` vendor client class is only valid for the Solaris 10 3/05 release and compatible versions.

TABLE 3–7 Sample Macros to Support Network Installation Clients *(Continued)*

Macro Name	Contains These Options and Macros
`SUNW.Sun-Blade-1000`	`sun4u` macro, `SbootFIL`
`SUNW.Sun-Fire-880`	`sun4u` macro, `SbootFIL`
`PXEClient:Arch:00000:UNDI:002001`	`BootSrvA`, `BootFile`
xxx.xxx.xxx.xxx network address macros	`BootSrvA` option could be added to existing network address macros. The value of `BootSrvA` should indicate the `tftboot` server.
`01`*client-MAC-address* client-specific macros (for example, `010007E9044ABF`)	`BootSrvA`, `BootFile`

The macro names that are listed in the previous table match the vendor client classes of the clients that must install from the network. These names are examples of clients you might have on your network. See "Working With DHCP Options (Task Map)" in *Oracle Solaris Administration: IP Services* for information about determining a client's vendor client class.

You can create these options and macros by using the following methods.

- Create the options and macros in DHCP Manager. See "Using DHCP Manager to Create Install Options and Macros" on page 52 for instructions about how to create options and macros in DHCP Manager.
- Write a script that creates the options and macros by using the `dhtadm` command. See "Writing a Script That Uses `dhtadm` to Create Options and Macros" on page 55 for information about how to write scripts that create these options and macros.

Note that the total size of the vendor options that are provided to a particular client must not exceed 255 bytes, including the option codes and length information. Generally, you should pass the minimum amount of vendor information needed. Use short path names in options that require path names. If you create symbolic links to long paths, you can use the shorter link names.

Using DHCP Manager to Create Install Options and Macros

You can use DHCP Manager to create the options that are listed in Table 3–4 and the macros that are listed in Table 3–7.

▼ How to Create Options to Support Oracle Solaris Installation (DHCP Manager)

Before You Begin Perform the following tasks before you create DHCP macros for your installation.

- Add the clients that you want to install with DHCP as install clients of your network installation server. For information about how to add a client to an install server, see Chapter 4, "Installing From the Network (Overview)."
- Configure your DHCP server. If you have not configured your DHCP server, see Chapter 13, "Planning for DHCP Service (Tasks)," in *Oracle Solaris Administration: IP Services*.

1 Become superuser or assume an equivalent role on the DHCP server system.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

2 Start the DHCP Manager.

```
# /usr/sadm/admin/bin/dhcpmgr &
```

The DHCP Manager window is displayed.

3 Select the Options tab in DHCP Manager.

4 Choose Create from the Edit menu.

The Create Option panel is displayed.

5 Type the option name for the first option, then type values appropriate for that option.

Use the output of the `add_install_client` command and the information in Table 3–3 and Table 3–4 to check the option names and values for options you must create.

6 Click OK when you have entered all the values.

7 In the Options tab, select the option you just created.

8 Select Duplicate from the Edit menu.

The Duplicate Option panel is displayed.

9 Type the name of another option, then modify other values appropriately.

The values for code, data type, granularity, and maximum are most likely to need modification. See Table 3–3 and Table 3–4 for the values.

10 Repeat Step 7 through Step 9 until you have created all the options.

Note – You do not need to add these options to a Oracle Solaris client's `/etc/dhcp/inittab` file because they are already included in that file.

Next Steps You can now create macros to pass the options to network installation clients, as explained in the following procedure.

▼ How to Create Macros to Support Oracle Solaris Installation (DHCP Manager)

Before You Begin Perform the following tasks before you create DHCP macros for your installation.

- Add the clients that you want to install with DHCP as install clients of your network installation server. For information about how to add a client to an install server, see Chapter 4, "Installing From the Network (Overview)."
- Configure your DHCP server. If you have not configured your DHCP server, see Chapter 13, "Planning for DHCP Service (Tasks)," in *Oracle Solaris Administration: IP Services*.
- Create the DHCP options that you want to use in your macro. For instructions about how to create DHCP options, see "How to Create Options to Support Oracle Solaris Installation (DHCP Manager)" on page 52.

1. **Select the Macros tab in DHCP Manager.**
2. **Choose Create from the Edit menu.**

   The Create Macro panel is displayed.
3. **Type the name of a macro.**

   See Table 3–7 for macro names you might use.
4. **Click the Select button.**

   The Select Option panel opens.
5. **Select Vendor in the Category list.**

   The vendor options you created are listed.
6. **Select an option that you want to add to the macro and click OK.**
7. **Type a value for the option.**

   See Table 3–3 and Table 3–4 for the option's data type and refer to the information that `add_install_client -d` reports.
8. **Repeat Step 6 through Step 7 for each option you want to include.**

   To include another macro, type **`Include`** as the option name and type the macro name as the option value.
9. **Click OK when the macro is complete.**

Next Steps If you plan to use DHCP in an installation over the network, you need to set up an installation server and add the system as an installation client. For more information, see Chapter 4, "Installing From the Network (Overview)."

If you plan to use DHCP in a WAN boot installation, you need to perform additional tasks. For more information, see Chapter 10, "WAN Boot (Overview)."

If you plan to use DHCP in a JumpStart installation, you need to create a profile and a `rules.ok` file. For more information, see Chapter 2, "JumpStart (Overview)," in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

See Also For more information about DHCP, see Part III, "DHCP," in *Oracle Solaris Administration: IP Services*.

Writing a Script That Uses dhtadm to Create Options and Macros

You can create a Korn shell script by adapting the example in Example 3–1 to create all the options listed in Table 3–3 and Table 3–4 and some useful macros. Be sure to change all IP addresses and values contained in quotes to the correct IP addresses, server names, and paths for your network. You should also edit the `Vendor=` key to indicate the class of clients you have. Use the information that `add_install_client -d` reports to obtain the data that you need to adapt the script.

EXAMPLE 3–1 Sample Script to Support Network Installation

```
# Load the Solaris vendor specific options. We'll start out supporting
# the Sun-Blade-1000, Sun-Fire-880, and i86 platforms. Note that the
# SUNW.i86pc option only applies for the Solaris 10 3/05 release.
# Changing -A to -M would replace the current values, rather than add them.
dhtadm -A -s SrootOpt -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,1,ASCII,1,0'
dhtadm -A -s SrootIP4 -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,2,IP,1,1'
dhtadm -A -s SrootNM -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,3,ASCII,1,0'
dhtadm -A -s SrootPTH -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,4,ASCII,1,0'
dhtadm -A -s SswapIP4 -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,5,IP,1,0'
dhtadm -A -s SswapPTH -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,6,ASCII,1,0'
dhtadm -A -s SbootFIL -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,7,ASCII,1,0'
dhtadm -A -s Stz -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,8,ASCII,1,0'
dhtadm -A -s SbootRS -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,9,NUMBER,2,1'
dhtadm -A -s SinstIP4 -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,10,IP,1,1'
dhtadm -A -s SinstNM -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,11,ASCII,1,0'
dhtadm -A -s SinstPTH -d \
```

EXAMPLE 3–1 Sample Script to Support Network Installation *(Continued)*

```
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,12,ASCII,1,0'
dhtadm -A -s SsysidCF -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,13,ASCII,1,0'
dhtadm -A -s SjumpsCF -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,14,ASCII,1,0'
dhtadm -A -s Sterm -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,15,ASCII,1,0'
dhtadm -A -s SbootURI -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,16,ASCII,1,0'
dhtadm -A -s SHTTPproxy -d \
'Vendor=SUNW.Sun-Blade-1000 SUNW.Sun-Fire-880 SUNW.i86pc,17,ASCII,1,0'
# Load some useful Macro definitions.
# Define all Solaris-generic options under this macro named Solaris.
dhtadm -A -m Solaris -d \
':SrootIP4=10.21.0.2:SrootNM="blue2":SinstIP4=10.21.0.2:SinstNM="red5":'
# Define all sparc-platform specific options under this macro named sparc.
dhtadm -A -m sparc -d \
':SrootPTH="/export/sparc/root":SinstPTH="/export/sparc/install":'
# Define all sun4u architecture-specific options under this macro named sun4u.
#  (Includes Solaris and sparc macros.)
dhtadm -A -m sun4u -d ':Include=Solaris:Include=sparc:'
# Solaris on IA32-platform-specific parameters are under this macro named i86pc.
# Note that this macro applies only for the Solaris 10 3/05 release.
dhtadm -A -m i86pc -d \
':Include=Solaris:SrootPTH="/export/i86pc/root":SinstPTH="/export/i86pc/install"\
:SbootFIL="/platform/i86pc/kernel/unix":'
# Solaris on IA32 machines are identified by the "SUNW.i86pc" class. All
# clients identifying themselves as members of this class will see these
# parameters in the macro called SUNW.i86pc, which includes the i86pc macro.
# Note that this class only applies for the Solaris 10 3/05 release.
dhtadm -A -m SUNW.i86pc -d ':Include=i86pc:'
# Sun-Blade-1000 platforms identify themselves as part of the
# "SUNW.Sun-Blade-1000" class.
# All clients identifying themselves as members of this class
#  will see these parameters.
dhtadm -A -m SUNW.Sun-Blade-1000 -d \
':SbootFIL="/platform/sun4u/kernel/sparcv9/unix":\
Include=sun4u:'
# Sun-Fire-880 platforms identify themselves as part of the "SUNW.Sun-Fire-880" class.
# All clients identifying themselves as members of this class will see these parameters.
dhtadm -A -m SUNW.Sun-Fire-880 -d \
':SbootFIL="/platform/sun4u/kernel/sparcv9/unix":Include=sun4u:'
# Add our boot server IP to each of the network macros for our topology served by our
# DHCP server. Our boot server happens to be the same machine running our DHCP server.
dhtadm -M -m 10.20.64.64 -e BootSrvA=10.21.0.2
dhtadm -M -m 10.20.64.0 -e BootSrvA=10.21.0.2
dhtadm -M -m 10.20.64.128 -e BootSrvA=10.21.0.2
dhtadm -M -m 10.21.0.0 -e BootSrvA=10.21.0.2
dhtadm -M -m 10.22.0.0    -e BootSrvA=10.21.0.2
# Make sure we return host names to our clients.
dhtadm -M -m DHCP-servername -e Hostname=_NULL_VALUE_
# Create a macro for PXE clients that want to boot from our boot server.
# Note that this macro applies for the Solaris 10 3/05 release.
dhtadm -A -m PXEClient:Arch:00000:UNDI:002001 -d \
:BootFile=nbp.i86pc:BootSrvA=10.21.0.2:
# Create a macro for PXE clients that want to boot from our boot server.
```

EXAMPLE 3–1 Sample Script to Support Network Installation *(Continued)*

```
# Note that this macro applies for the Solaris 10 2/06 release.
dhtadm -A -m PXEClient:Arch:00000:UNDI:002001 -d \
:BootFile=i86pc:BootSrvA=10.21.0.2:
# Create a macro for the x86 based client with the Ethernet address 00:07:e9:04:4a:bf
# to install from the network by using PXE.
dhtadm -A -m 010007E9044ABF -d :BootFile=010007E9044ABF:BootSrvA=10.21.0.2:
# The client with this MAC address is a diskless client. Override the root settings
# which at the network scope setup for Install with our client's root directory.
dhtadm -A -m 0800201AC25E -d \
':SrootIP4=10.23.128.2:SrootNM="orange-svr-2":SrootPTH="/export/root/10.23.128.12":'
```

As superuser, execute `dhtadm` in batch mode. Specify the name of the script to add the options and macros to your `dhcptab`. For example, if your script is named `netinstalloptions`, type the following command.

```
# dhtadm -B netinstalloptions
```

Clients that have vendor client classes that are listed in the `Vendor=` string can now use DHCP to install over the network.

For more information about how to use the `dhtadm` command, see the `dhtadm(1M)` man page. For more information about the `dhcptab` file, see the `dhcptab(4)`man page.

PART II

Installing Over a Local Area Network

This part describes how to install a system that is on your local area network (LAN).

◆ ◆ ◆ CHAPTER 4

Installing From the Network (Overview)

This chapter provides an introduction on how to set up your local area network and systems to install the Oracle Solaris software from the network instead of from DVD or CD media. This chapter provides overview information on the following topics:

For information about how to install a client over a wide area network, see Chapter 10, "WAN Boot (Overview)."

Network Installation Introduction

This section provides you with information you might find helpful before you can perform an installation from the network. Network installations enable you to install the Oracle Solaris software from a system, called an install server, that has access to the current Oracle Solaris release disc images. You copy the contents of the current Oracle Solaris release DVD or CD media to the install server's hard disk. Then, you can install the Oracle Solaris software from the network by using any of the Oracle Solaris installation methods.

Required Servers for Network Installation

To install the Oracle Solaris OS from the network, the systems to be installed require the following servers to be present on the network:

- **Install server** – A networked system that contains the current Oracle Solaris release disc images from which you can install current Oracle Solaris release on other systems on the network. You create an install server by copying the images from the following media:
  - Oracle Solaris DVD
  - Oracle Solaris Software CDs

Note – Starting with the Oracle Solaris 10 9/10 release, only a DVD is provided. Oracle Solaris Software CDs are no longer provided.

After you copy the image from the Oracle Solaris Software CDs, you can also copy the image from the Oracle Solaris Languages CDs as necessary for your installation requirements.

You can enable a single install server to provide disc images for different Oracle Solaris releases and for multiple platforms by copying the images on to the install server's hard disk. For example, a single install server could contain the disc images for the SPARC platform and x86 platform.

For details about how to create an install server, refer to one of the following sections:

- "How to Create an Install Server With SPARC or x86 DVD Media" on page 67
- "SPARC: How to Create an Install Server With SPARC or x86 CD Media" on page 88

- **Boot server –** A server system that provides client systems on the same network subnet with the information that they need to boot in order to install the OS. A boot server and install server are typically the same system. However, if the system on which the current Oracle Solaris release is to be installed is located on a different subnet than the install server and you are not using DHCP, a boot server is required on that subnet.

  A single boot server can provide current Oracle Solaris release boot software for multiple releases, including the current Oracle Solaris release boot software for different platforms. For example, a SPARC boot server can provide the Solaris 9 and current Oracle Solaris release boot software for SPARC based systems. The same SPARC boot server can also provide the current Oracle Solaris release boot software for x86 based systems.

  Note – When using DHCP, you do not need to create a separate boot server. For more information, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

  For details about how to create a boot server, refer to one of the following sections:

  - "Creating a Boot Server on a Subnet With a DVD Image" on page 70
  - "Creating a Boot Server on a Subnet With a CD Image" on page 91

- **(Optional) DHCP server –** A server that uses the Dynamic Host Configuration Protocol (DHCP) to provide the network parameters that are necessary for installation. You can configure a DHCP server to configure and install specific clients, all clients on a specific network, or an entire class of clients. When using DHCP, you do not need to create a separate boot server.

  After you have created the install server, you add clients to the network with the `add_install_client -d` command. The `-d` option enables you to set up client systems for Oracle Solaris installation from the network by using DHCP.

For information about DHCP options for installation parameters, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

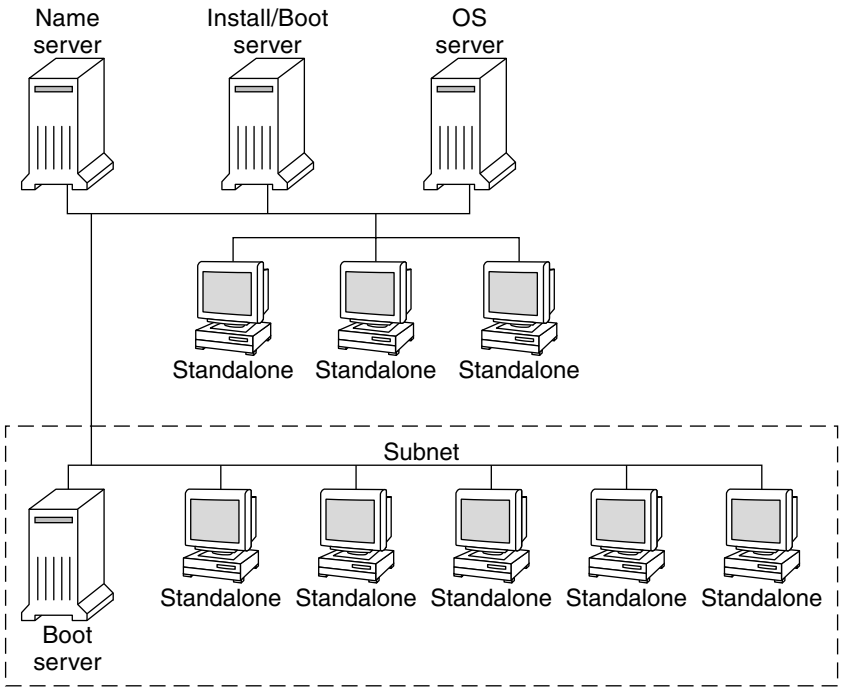
- **(Optional) Name server** – A system that manages a distributed network database, such as DNS, NIS, NIS+, or LDAP, that contains information about systems on the network.

  For details about how to create a name server, refer to *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*.

Note – The install server and name server can be the same or different systems.

The following figure illustrates the servers that are typically used for network installation. Note that this sample network does not include a DHCP server.

FIGURE 4–1 Network Installation Servers



x86: Overview of Booting and Installing Over the Network With PXE

A Preboot Execution Environment (PXE) network boot is a direct network boot. No boot media is required on the client system. With PXE, you can install an x86 based client over the network by using DHCP.

A PXE network boot is available only for devices that implement the Intel Preboot Execution Environment specification. To determine whether your system supports PXE network booting, see your hardware manufacturer's documentation.

To boot over the network by using PXE, you need the following systems:

- An install server
- A DHCP server
- An x86 client that supports PXE

When you are preparing to use PXE to install a client over the network, consider the following issues.

- Set up only one DHCP server on the subnet that includes the client system that you want to install. The PXE network boot does not work properly over subnets that include multiple DHCP servers.
- Some early versions of PXE firmware have a variety of shortcomings. If you experience difficulty with a particular PXE adapter, obtain firmware upgrade information from the adapter manufacturer's web site. Refer to the `elxl(7D)` and `iprb(7D)` man pages for more information.

◆ ◆ ◆ CHAPTER 5

Installing From the Network With DVD Media (Tasks)

This chapter describes how to use DVD media to set up your network and systems to install the Oracle Solaris software from the network.

This chapter covers the following topics:

About Installing From the Network

Network installations enable you to install the Oracle Solaris software from a system that has access to the current Oracle Solaris release disc images, called an install server, to other systems on the network. You copy the contents of the current Oracle Solaris release DVD media to the install server's hard disk. Then, you can install the Oracle Solaris software from the network by using any of the Oracle Solaris installation methods.

Starting with the Solaris 10 11/06 release, you have the option during an initial installation to change the network security settings so that all network services except secure shell are disabled or restricted to respond to local requests only. This security option is available only during an initial installation, not during an upgrade. An upgrade maintains any previously set services. If necessary, you can restrict network services after an upgrade by using the `netservices` command. See "Planning Network Security" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

The network services can be enabled after installation by using the `netservices open` command or by enabling individual services by using SMF commands. See "Revising Security Settings After Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

Starting with the Solaris 10 10/08 release, the structure of the Oracle Solaris DVD and Oracle Solaris Software - 1 CD has changed for the SPARC platform. Slice 0 is no longer at the top of the directory structure. Therefore, the structure of the x86 and SPARC DVDs and Oracle Solaris Software - 1 CD are the same. This change in structure makes setting up an install server easier if you have a mix of platforms, such as a SPARC install server and x86 media.

Task Map: Installing From the Network With DVD Media

TABLE 5–1 Task Map: Setting Up an Install Server With DVD Media

Task	Description	For More Information
x86 only: Verify that your system supports PXE.	If you want to install an x86 based system over the network, confirm that your machine can use PXE to boot without local boot media. If your x86 based system does not support PXE, you must boot the system from a local DVD or CD.	Check your hardware manufacturer's documentation or the system BIOS.
Choose an installation method.	The Oracle Solaris OS provides several methods for installation or upgrade. Choose the installation method that is most appropriate for your environment.	"Choosing an Oracle Solaris Installation Method" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*
Gather information about your system.	Use the checklist and complete the worksheet to collect all of the information that you need to install or upgrade.	Chapter 4, "Gathering Information Before an Installation or Upgrade," in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*
(Optional) Preconfigure system information.	You can preconfigure system information to avoid being prompted for the information during the installation or upgrade.	Chapter 2, "Preconfiguring System Configuration Information (Tasks)"
Create an install server.	Use the `setup_install_server(1M)` command to copy the Oracle Solaris DVD to the install server's hard disk.	"Creating an Install Server With DVD Media" on page 67
(Optional) Create boot servers.	If you want to install systems from the network that are not on the same subnet as the install server, you must create a boot server on the subnet to boot the systems. Use the `setup_install_server` command with the `-b` option to set up a boot server. If you are using DHCP, a boot server is not necessary.	"Creating a Boot Server on a Subnet With a DVD Image" on page 70

TABLE 5–1 Task Map: Setting Up an Install Server With DVD Media *(Continued)*

Task	Description	For More Information
Add systems to be installed from the network.	Use the `add_install_client` command to set up each system that you want to install from the network. Each system that you want to install needs to find the install server, the boot server if required, and configuration information on the network.	"Adding Systems to Be Installed From the Network With a DVD Image" on page 72
(Optional) Configure the DHCP server.	If you want to use DHCP to provide system configuration and installation parameters, first configure the DHCP server, then create the appropriate options and macros for your installation. **Note –** If you want to install an x86 based system from the network with PXE, you must configure a DHCP server.	Chapter 13, "Planning for DHCP Service (Tasks)," in *Oracle Solaris Administration: IP Services* "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45
Install the system over the network.	Begin the installation by booting the system from the network.	"Installing the System From the Network With a DVD Image" on page 77

Creating an Install Server With DVD Media

The install server contains the installation image needed to install systems from the network. You must create an install server to install the Oracle Solaris software on a system from the network. You do not always need to set up a boot server.

- If you are using DHCP to set installation parameters or your install server and client are on the same subnet, you do not need a boot server.
- If your install server and your client are not on the same subnet and you are not using DHCP, you must create separate boot servers for each subnet. You could create an install server for each subnet. However, install servers require more disk space.

▼ How to Create an Install Server With SPARC or x86 DVD Media

Note – This procedure assumes that the system is running Solaris Volume Manager. If you are not using Solaris Volume Manager to manage media, refer to *System Administration Guide: Devices and File Systems*.

Before You Begin The system must include a DVD-ROM drive and be part of the site's network and naming service. If you use a naming service, the system must already be in a service, such as NIS, NIS+, DNS, or LDAP. If you do not use a naming service, you must distribute information about this system by following your site's policies.

1 **On the system that is to become the install server, become superuser or assume an equivalent role.**

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

2 **Insert the Oracle Solaris DVD in the system's drive.**

3 **Create a directory to contain the DVD image.**

```
# mkdir -p install-dir
```

install-dir specifies the directory where the DVD image is to be copied.

4 **Change to the `Tools` directory on the mounted disc.**

```
# cd /cdrom/cdrom0/Solaris_10/Tools
```

5 **Copy the DVD image in the drive to the install server's hard disk.**

```
# ./setup_install_server install-dir
```

Note – The `setup_install_server` command indicates whether you have enough disk space available for the Oracle Solaris Software disc images. To determine available disk space, use the `df -kl` command.

---

6 **If the install server is not on the same subnet as the system to be installed and you are not using DHCP, verify that the path to the install server's image is shared appropriately.**

```
# share | grep install-dir
```

- **If the path to the install server's directory is displayed and anon=0 is displayed in the options, proceed to Step 7.**
- **If the path to the install server's directory is not displayed or you do not have anon=0 in the options:**

  a. **Make the install server available to the boot server.**

  Using the `share` command, add this entry to the `/etc/dfs/dfstab` file.

  ```
  share -F nfs -o ro,anon=0 -d "install server directory" install-dir
  ```

b. **Verify that the `nfsd` daemon is running.**

- **If the install server is running the current Oracle Solaris release, or a compatible version, type the following command:**

  ```
  # svcs -l svc:/network/nfs/server:default
  ```

  - **If the `nfsd` daemon is online, continue.**
  - **If the `nfsd` daemon is not online, start it.**

    ```
    # svcadm enable svc:/network/nfs/server
    ```

- **If the install server is running the Solaris 9 OS, or compatible version, type the following command.**

  ```
  # ps -ef | grep nfsd
  ```

  - **If the `nfsd` daemon is running, continue.**
  - **If the `nfsd` daemon is not running, start it.**

    ```
    # /etc/init.d/nfs.server start
    ```

c. **Share the install server.**

```
# shareall
```

7 **Change directories to root (`/`).**

```
# cd /
```

8 **Eject the Oracle Solaris DVD.**

9 **(Optional) Patch the files that are located in the miniroot on the net install image that was created by `setup_install_server`.**

Patching a file might be necessary if a boot image has problems. For step-by-step procedures, see Chapter 7, "Patching the Miniroot Image (Tasks)."

10 **Decide if you need to create a boot server.**

Example 5–1 SPARC: Creating an Install Server With a DVD

The following example illustrates how to create an install server by copying the Oracle Solaris DVD to the install server's `/export/home/dvd` directory. This example assumes that the install server is running the current Oracle Solaris release.

```
# mkdir -p /export/home/dvd
# cd /cdrom/cdrom0/Solaris_10/Tools
# ./setup_install_server /export/home/dvd
```

If you need a separate boot server, make the install server available to the boot server.

Using the `share` command, add this entry to the `/etc/dfs/dfstab` file.

```
share -F nfs -o ro,anon=0 -d "install server directory" /export/home/dvdsparc
```

Check whether the `nfsd` daemon is online. If the `nfsd` daemon is not online, start it and share it.

```
# svcs -l svc:/network/nfs/server:default
# svcadm enable svc:/network/nfs/server
# shareall
# cd /
```

Next Steps If you are using DHCP or the install server is on the same subnet as the system to be installed, you do not need to create a boot server. Proceed to "Adding Systems to Be Installed From the Network With a DVD Image" on page 72.

If you are *not* using DHCP and the install server and the client are on a different subnet, you must create a boot server. Proceed to "Creating a Boot Server on a Subnet With a DVD Image" on page 70.

See Also For additional information about the `setup_install_server` and the `add_to_install_server` commands, see `install_scripts(1M)`.

Creating a Boot Server on a Subnet With a DVD Image

You must create an install server to install the Oracle Solaris software on a system from the network. You do not always need to set up a boot server. A boot server contains enough of the boot software to boot systems from the network, and then the install server completes the installation of the Oracle Solaris software.

If you are using DHCP to set installation parameters or your install server or client is on the same subnet as the install server, you do not need a boot server. Proceed to "Adding Systems to Be Installed From the Network With a DVD Image" on page 72.

▼ How to Create a Boot Server on a Subnet With a DVD Image

Before You Begin If your install server and your client are not on the same subnet and you are not using DHCP, you must create separate boot servers for each subnet. You could create an install server for each subnet; however, install servers require more disk space.

The system must have access to a remote current Oracle Solaris release disc image, which is normally the install server. If you use a naming service, the system should also be in a naming service. If you do not use a naming service, you must distribute information about this system by following your site's policies.

1 **On the system you intend to make the boot server for the subnet, log in and become superuser or assume an equivalent role.**

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

2 **Mount the Oracle Solaris DVD from the install server.**

```
# mount -F nfs -o ro server-name:path /mnt
```

server-name:*path* — The install server name and absolute path to the disc image

3 **Create a directory for the boot image.**

```
# mkdir -p boot-dir-path
```

boot_dir_path — Specifies the directory where the boot software is to be copied

4 **Change to the `Tools` directory on the Oracle Solaris DVD image.**

```
# cd /mnt/Solaris_10/Tools
```

5 **Copy the boot software to the boot server.**

```
# ./setup_install_server -b boot-dir-path
```

Note – The `setup_install_server` command indicates whether you have enough disk space available for the images. To determine available disk space, use the `df -kl` command.

---

6 **Change directories to root (`/`).**

```
# cd /
```

7 **Unmount the installation image.**

```
# umount /mnt
```

You are now ready to set up systems to be installed from the network. See "Adding Systems to Be Installed From the Network With a DVD Image" on page 72.

Example 5–2 Creating a Boot Server on a Subnet (DVD)

The following example illustrates how to create a boot server on a subnet. These commands copy the boot software from the Oracle Solaris DVD image to `/export/home/dvdsparc` on the local disk of a boot server named `crystal`.

```
# mount -F nfs -o ro crystal:/export/home/dvdsparc /mnt
# mkdir -p  /export/home/dvdsparc
# cd /mnt/Solaris_10/Tools
# ./setup_install_server -b /export/home/dvdsparc
# cd /
# umount /mnt
```

Next Steps After you set up the boot server, you must add the client as an installation client. For information about how to add client systems to install over the network, see "Adding Systems to Be Installed From the Network With a DVD Image" on page 72.

See Also For additional information about the `setup_install_server` command, see the `install_scripts(1M)` man page.

Adding Systems to Be Installed From the Network With a DVD Image

After you create an install server and, if necessary, a boot server, you must set up each system that you want to install from the network. Use the procedure in this section for setting up install servers and clients. Also, see the following example procedures.

- If you are using DHCP to set installation parameters for a SPARC client, see Example 5–3.
- If your install server and client are on the same subnet, see Example 5–4.
- If your install server and your client are not on the same subnet and you are not using DHCP, see Example 5–5.
- If you are using DHCP to set installation parameters for x86 clients, see Example 5–6.
- If you want to use a specific serial port to display output during the installation of an x86 based system, see Example 5–7.

For more options to use with this command, see the `add_install_client(1M)` man page.

▼ How to Add Systems to Be Installed From the Network With `add_install_client` (DVD)

After you create an install server, you must set up each x86 system that you want to install from the network.

Before You Begin If you have a boot server, make sure you have shared the install server installation image and started the appropriate services. See "To Create a SPARC Install Server With SPARC or x86 DVD Media" Step 6.

Each system that you want to install needs to find the following items.

- An install server
- A boot server if one is required
- The `sysidcfg` file if you use a `sysidcfg` file to preconfigure system information
- A name server if you use a naming service to preconfigure system information
- The profile in the JumpStart directory on the profile server if you are using the JumpStart installation method

1 On the install server or boot server, become superuser or assume an equivalent role.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

2 If you use the NIS, NIS+, DNS, or LDAP naming service, verify that the following information about the system to be installed has been added to the naming service:

- Host name
- IP address
- Ethernet address

For more information on naming services, see *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*.

3 Add the client to the install server's `/etc/ethers` file.

a. On the client, find the `ethers` address. The `/etc/ethers` map is taken from the local file.

```
# ifconfig -a grep ether
ether 8:0:20:b3:39:1d
```

b. On the install server, add the address to the list in the `/etc/ethers` file.

4 Change to the `Tools` directory on the Oracle Solaris DVD image:

```
# cd /install-dir-path/Solaris_10/Tools
```

install-dir-path Specifies the path to the `Tools` directory

5 Set up the client system so it can be installed from the network.

```
# ./add_install_client -d -s install-server:install-dir \
-c JumpStart-server:JumpStart-dir  -p sysid-server:path \
-t boot-image-path -b "boot-property=value" \
-e Ethernet-address client-name platform-group
```

`-d`
Specifies that the client is to use DHCP to obtain the network install parameters. If you use only the `-d` option, the `add_install_client` command sets up the installation information for client systems of the same class, for example, all SPARC client machines. To set up the installation information for a specific client, use `-d` with the `-e` option.

For x86 clients, use this option to boot the systems from the network by using PXE network boot. The output of this option lists the DHCP options you need to create on the DHCP server.

For more information about class-specific installations by using DHCP, see "Creating DHCP Options and Macros for Oracle Solaris Installation Parameters" on page 46.

`-s` *install-server:install-dir*
Specifies the name and absolute path to the Oracle Solaris DVD image to the install server.

`-c` *JumpStart-server*`:` *JumpStart-dir*
Specifies a JumpStart directory for JumpStart installations. *JumpStart-server* is the host name of the server on which the JumpStart directory is located. *JumpStart-dir* is the absolute path to the JumpStart directory.

`-p` *sysid-server*`:` *path*
Specifies the path to the `sysidcfg` file for preconfiguring system information. *sysid_server* is either a valid host name or an IP address for the server that contains the file. *path* is the absolute path to the directory containing the `sysidcfg` file.

`-t` *boot-image-path*
Specifies the path to an alternate boot image if you want to use a boot image other than the one in the `Tools` directory on the current Oracle Solaris release net installation image, CD, or DVD.

`-b` "*boot-property=value*"
x86 based systems only: Enables you to set the value of a boot property variable that you want to use to boot the client from the network. The `-b` option must be used with the `-e` option.

See the `eeprom(1M)` man page for descriptions of boot properties.

`-e` *Ethernet-address*
Specifies the Ethernet address of the client that you want to install. This option enables you to set up the installation information to use for a specific client, including a boot file for that client.

The `nbp.` prefix is not used in boot file names. For example, if you specify `-e 00:07:e9:04:4a:bf` for an x86 based client, the command creates the boot file `010007E9044ABF.i86pc` in the `/tftpboot` directory. However, the current Oracle Solaris release supports the use of legacy boot files with the `nbp.` prefix.

For more information about client-specific installations by using DHCP, see "Creating DHCP Options and Macros for Oracle Solaris Installation Parameters" on page 46.

client-name
The name of the system to be installed from the network. This name is *not* the host name of the install server.

platform-group
The platform group of the system to be installed. For more information, see "Platform Names and Groups" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

Example 5–3 SPARC: Adding a SPARC Install Client on a SPARC Install Server When Using DHCP (DVD)

The following example illustrates how to add an install client when you are using DHCP to set installation parameters on the network. The install client is named `basil`, which is an Ultra 5 system. The file system `/export/home/dvdsparc/Solaris_10/Tools` contains the `add_install_client` command.

For more information about how to use DHCP to set installation parameters for network installations, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

```
mysparcinstallserver# cd /export/home/dvdsparc/Solaris_10/Tools
mysparcinstallserver# ./add_install_client -d basil sun4u
```

Example 5–4 Adding an Install Client That Is On the Same Subnet As Its Server (DVD)

The following example illustrates how to add an install client that is on the same subnet as the install server. The install client is named `basil`, which is an Ultra 5 system. The file system `/export/home/dvdsparc/` contains the `add_install_client` command.

```
myinstallserver# cd /export/home/dvdsparc/Solaris_10/Tools
myinstallserver# ./add_install_client basil sun4u
```

Example 5–5 Adding an Install Client to a Boot Server (DVD)

The following example illustrates how to add an install client to a boot server. The install client is named `rose`, which is an Ultra 5 system. Run the command on the boot server. The `-s` option is used to specify an install server that is named `rosemary`, which contains Oracle Solaris Operating System for SPARC Platforms DVD image in `/export/home/dvdsparc`.

```
mybootserver# cd /export/home/dvdsparc/Solaris_10/Tools
mybootserver# ./add_install_client -s rosemary:/export/home/dvdsparc rose sun4u
```

Example 5–6 x86: Adding a Single x86 Install Client on an x86 Install Server When Using DHCP (DVD)

The following example illustrates how to add an x86 install client to an install server when you are using DHCP to set installation parameters on the network.

- The `-d` option specifies that clients are to use the DHCP protocol for configuration. If you plan to use PXE network boot, you must use the DHCP protocol.
- The `-e` option indicates that this installation will only occur on the client with the Ethernet address `00:07:e9:04:4a:bf`.
- The `-s` option is used to specify that the clients are to be installed from the install server that is named `rosemary`.

This server contains Oracle Solaris Operating System for x86 Platforms DVD image in `/export/home/dvdx86`.

```
myx86installserver# cd /export/boot/dvdx86/Solaris_10/Tools
myx86installserver ./add_install_client -d -e 00:07:e9:04:4a:bf \
-s rosemary:/export/home/dvdx86 i86pc
```

The previous commands set up the client with the Ethernet address `00:07:e9:04:4a:bf` as an installation client. The boot file `010007E9044ABF.i86pc` is created on the installation server. In previous releases, this boot file was named `nbp.010007E9044ABF.i86pc`.

For more information about how to use DHCP to set installation parameters for network installations, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

Example 5–7 x86: Specifying a Serial Console to Use During a Network Installation (DVD)

The following example illustrates how to add an x86 install client to an install server and specify a serial console to use during the installation. This example sets up the install client in the following manner.

- The `-d` option indicates that the client is set up to use DHCP to set installation parameters.
- The `-e` option indicates that this installation will occur only on the client with the Ethernet address `00:07:e9:04:4a:bf`.

- The `-b` option instructs the installation program to use the serial port `ttya` as an input and an output device.

Add the client:

```
myinstallserver# cd /export/boot/dvdx86/Solaris_10/Tools
myinstallserver# ./add_install_client -d -e "00:07:e9:04:4a:bf" \
-b "console=ttya" i86pc
```

For a complete description of the boot property variables and values you can use with the `-b` option, see the `eeprom(1M)` man page.

Next Steps If you are using a DHCP server to install the x86 based client over the network, configure the DHCP server and create the options and macros that are listed in the output of the `add_install_client -d` command. For instructions about how to configure a DHCP server to support network installations, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

x86 based systems: If you are not using a DHCP server, you must boot the system from a local Oracle Solaris OS DVD or CD.

See Also For additional information about the `add_install_client` command, see the `install_scripts(1M)` man page.

Installing the System From the Network With a DVD Image

After you add the system as an installation client, you can install the client from the network. This section describes the following tasks:

- "SPARC: How to Install the Client Over the Network (DVD)" on page 78 — instructions about how to boot and install SPARC based systems over the network.
- "x86: How to Install the Client Over the Network With GRUB (DVD)" on page 80 — instructions about how to boot and install x86 based systems over the network.

▼ SPARC: How to Install the Client Over the Network (DVD)

Before You Begin This procedure assumes that you have completed the following tasks.

- Set up an install server. For instructions about how to create an install server from DVD media, see "How to Create an Install Server With SPARC or x86 DVD Media" on page 67.
- Set up a boot server or a DHCP server, if necessary. If the system you want to install is on a different subnet than the installation server, you must set up a boot server, or use a DHCP server. For instructions about how to set up a boot server, see "Creating a Boot Server on a Subnet With a DVD Image" on page 70. For instructions about how to set up a DHCP server to support network installations, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.
- Gathered or preconfigured the information you need to install. You can perform this task in one or more of the following ways:
  - Gather the information in "Checklist for Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

    Note – If you have a system that contains non-global zones, Live Upgrade, a feature of Oracle Solaris, is the recommended upgrade program or program to add patches. Other upgrade programs might require extensive upgrade time because the time required to complete the upgrade increases linearly with the number of installed non-global zones.

    For information about upgrading with Live Upgrade, see Part I, "Upgrading With Live Upgrade," in *Oracle Solaris 10 1/13 Installation Guide: Live Upgrade and Upgrade Planning*.

  - Create a `sysidcfg` file if you use a `sysidcfg` file to preconfigure system information. For information about how to create a `sysidcfg` file, see "Preconfiguring With the `sysidcfg` File" on page 18.
  - Set up a name server if you use a naming service to preconfigure system information. For information about how to preconfigure information with a naming service, see "Preconfiguring With the Naming Service" on page 41.
  - Create a profile in the JumpStart directory on the profile server if you are using the JumpStart installation method. For information about how to set up a JumpStart installation, see Chapter 3, "Preparing JumpStart Installations (Tasks)," in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

1 Turn on the client system.

If the system is currently running, bring the system to run level 0.

The `ok` prompt is displayed.

2 **Boot the system from the network.**

- **To install with the Oracle Solaris interactive installation GUI, type the following command:**

  ```
  ok boot net
  ```

- **To install with the Oracle Solaris interactive text installer in a desktop session, type the following command:**

  ```
  ok boot net - text
  ```

- **To install with the Oracle Solaris interactive text installer in a console session, type the following command:**

  ```
  ok boot net - nowin
  ```

The system boots from the network.

3 **If you did not preconfigure all the system information, answer the system configuration questions.**

Use the "Checklist for Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade* to help you answer the configuration questions.

Note – If the keyboard is self-identifying, the keyboard layout automatically configures during installation. If the keyboard is not self-identifying, you can select from a list of supported keyboard layouts during installation.

PS/2 keyboards are not self-identifying. You will be asked to select the keyboard layout during the installation.

For further information, see "`keyboard` Keyword" on page 25.

If you are using the GUI, after you confirm the system configuration information, the Welcome to Oracle Solaris panel appears.

4 **If you did not preconfigure all the installation options, answer any additional questions to complete your installation.**

Use the "Checklist for Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade* to help you answer the installation questions.

See Also For information about how to complete an interactive installation with the Oracle Solaris installation GUI, see "To Install or Upgrade With the Oracle Solaris Installation Program With GRUB" in *Oracle Solaris 10 1/13 Installation Guide: Basic Installations*.

▼ x86: How to Install the Client Over the Network With GRUB (DVD)

The Oracle Solaris installation programs for x86 based systems use the GRUB boot loader. This procedure describes how to install an x86 based system over the network with the GRUB boot loader. For overview information about the GRUB boot loader, see Chapter 6, "SPARC and x86 Based Booting (Overview and Planning)," in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

To install the system over the network, you must instruct the client system to boot over the network. Enable network boot on the client system by using the BIOS setup program in the system BIOS, the network adapter BIOS, or both. On some systems, you must also adjust the boot device priority list so that network boot is attempted before booting from other devices. See the manufacturer's documentation for each setup program, or watch for setup program instructions during boot.

Before You Begin This procedure assumes that you have completed the following tasks:

- Set up an install server. For instructions about how to create an install server from DVD media, see "How to Create an Install Server With SPARC or x86 DVD Media" on page 67.
- Set up a boot server or a DHCP server, if necessary. If the system you want to install is on a different subnet than the installation server, you must set up a boot server, or use a DHCP server. For instructions about how to set up a boot server, see "Creating a Boot Server on a Subnet With a DVD Image" on page 70. For instructions about how to set up a DHCP server to support network installations, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.
- Gathered or preconfigured the information you need to install. You can perform this task in one or more of the following ways:
  - Gather the information in "Checklist for Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

Note – If you have a system that contains non-global zones, Live Upgrade is the recommended upgrade program or program to add patches. Other upgrade programs might require extensive upgrade time because the time required to complete the upgrade increases linearly with the number of installed non-global zones.

For information about upgrading with Live Upgrade, see Part I, "Upgrading With Live Upgrade," in *Oracle Solaris 10 1/13 Installation Guide: Live Upgrade and Upgrade Planning*.

- Create a `sysidcfg` file if you use a `sysidcfg` file to preconfigure system information. For information about how to create a `sysidcfg` file, see "Preconfiguring With the `sysidcfg` File" on page 18.
- Set up a name server if you use a naming service to preconfigure system information. For information about how to preconfigure information with a naming service, see "Preconfiguring With the Naming Service" on page 41.
- Create a profile in the JumpStart directory on the profile server if you are using the JumpStart installation method. For information about how to set up a JumpStart installation, see Chapter 3, "Preparing JumpStart Installations (Tasks)," in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

This procedure also assumes that your system can boot from the network.

1 **Turn on the system.**

2 **Type the appropriate keystroke combination to enter the system BIOS.**

Some PXE-capable network adapters have a feature that enables a PXE boot if you type a particular keystroke in response to a brief boot-time prompt.

3 **In the system BIOS, instruct the system to boot from the network.**

See your hardware documentation for information about how to set the boot priority in the BIOS.

4 **Exit the BIOS.**

The system boots from the network. The GRUB menu is displayed.

Note – The GRUB menu that is displayed on your system might vary from the following sample, depending on the configuration of your network installation server.

```
GNU GRUB version 0.95 (631K lower / 2095488K upper memory)
+-------------------------------------------------------------------------------------------------------------------+
| Solaris Oracle Solaris 10 1/13 /cdrom0
|                                                                                                                   |
|                                                                                                                   |
+-------------------------------------------------------------------------------------------------------------------+
Use the ^ and v keys to select which entry is highlighted.
Press enter to boot the selected OS, 'e' to edit the
commands before booting, or 'c' for a command-line.
```

5 Select the appropriate installation option.

- **To install the Oracle Solaris OS from the network, select the appropriate Oracle Solaris entry on the menu, then press Enter.**

  Select this entry if you want to install from the network installation server you set up in "How to Create an Install Server With SPARC or x86 DVD Media" on page 67.

- **To install the Oracle Solaris OS from the network with specific boot arguments, use the following steps.**

  You might need to set specific boot arguments if you want to modify the device configuration during the installation, and did not set these boot arguments previously with the `add_install_client` command as described in "How to Add Systems to Be Installed From the Network With `add_install_client` (DVD)" on page 73.

  a. On the GRUB menu, select the installation option you want to edit, then type e.

  Boot commands that are similar to the following text are displayed in the GRUB menu.

```
kernel /I86pc.Solaris_10/multiboot kernel/unix \
-B install_media=192.168.2.1:/export/cdrom0/boot \
module /platform/i86pc/boot_archive
```

  b. Use the arrow keys to select the boot entry that you want to edit, then type e.

  The boot command that you want to edit is displayed in the GRUB edit window.

  c. Edit the command by typing the boot arguments or options you want to use.

  The command syntax for the GRUB edit menu is as follows.

```
grub edit>kernel /image-directory/multiboot kernel/unix/ \
install [url|ask] -B options install_media=media-type
```

  For information about boot arguments and command syntax, see Table 9–1.

  d. To accept your edits and return to the GRUB menu, press Enter.

  Note – To cancel your edits and return to the GRUB menu, press Escape.

  The GRUB menu is displayed. The edits you made to the boot command are displayed.

  e. To begin the installation, type b in the GRUB menu.

The Oracle Solaris installation program checks the default boot disk for the requirements to install or upgrade the system. If the Oracle Solaris installation cannot detect the system configuration, the program prompts you for any missing information.

When the check is completed, the installation selection screen is displayed.

```
Select the type of installation you want to perform:

   1 Solaris Interactive
```

```
2 Custom JumpStart
3 Solaris Interactive Text (Desktop session)
4 Solaris Interactive Text (Console session)
5 Apply driver updates
6 Single user shell

Enter the number of your choice followed by the <ENTER> key.
Alternatively, enter custom boot arguments directly.

If you wait 30 seconds without typing anything,
an interactive installation will be started.
```

6 **To update drivers or install an install time update (ITU), insert the update media, type 5, then press Enter.**

You might need to update drivers or install an ITU to enable the Oracle Solaris OS to run on your system. Follow the instructions for your driver update or ITU to install the update.

7 **(Optional) To perform system administration tasks, type 6, then press Enter.**

You might want to launch a single user shell if you need to perform any system administration tasks on your system before you install. For information about system administration tasks you can perform prior to installation, see *Oracle Solaris Administration: Basic Administration*.

After you perform these system administration tasks, the list of installation options is displayed.

8 **(Optional) Select an installation type to install the Oracle Solaris OS:**

- **To install with the Oracle Solaris interactive installation GUI, type 1, then press Enter.**
- **To install with the interactive text installer in a desktop session, type 3, then press Enter.**
  Select this installation type to override the default GUI installer and run the text installer.
- **To install with the interactive text installer in a console session, type 4, then press Enter.**
  Select this installation type to override the default GUI installer and run the text installer.

For more information about unattended JumpStart installations (option 2), see *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

For detailed information about the Oracle Solaris installation GUI and text installer, see "System Requirements and Recommendations" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

The system configures the devices and interfaces, and searches for configuration files. The installation program begins.

9 **If you did not preconfigure all the system information, answer the system configuration questions.**

Use the "Checklist for Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade* to help you answer the configuration questions.

Note – If the keyboard is self-identifying, the keyboard layout automatically configures during installation. If the keyboard is not self-identifying, you can select from a list of supported keyboard layouts during installation.

For further information, see "`keyboard` Keyword" on page 25.

During installation, you can choose the default NFSv4 domain name or you can specify a custom NFSv4 domain name. For further information, see "`nfs4_domain` Keyword" on page 34.

If you are using the installation GUI, after you confirm the system configuration information, the Welcome to Oracle Solaris panel appears.

10 If you did not preconfigure all the installation options, answer any additional questions to complete your installation.

Use the "Checklist for Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade* to help you answer the installation questions.

11 After the system boots and installs over the network, instruct the system to boot from the disk drive on subsequent boots.

Note – When you boot the system after the installation, a GRUB menu lists the operating systems that are installed, including the newly-installed Oracle Solaris OS. Select the operating system you want to boot. The default selection loads if you do not make another selection.

Next Steps If you install multiple operating systems on your machine, you need to instruct the GRUB boot loader to recognize these operating systems in order to boot. For more information, see "Modifying Boot Behavior on x86 Based Systems" in *Oracle Solaris Administration: Basic Administration*.

See Also For information about how to complete an interactive installation with the Oracle Solaris installation GUI, see "To Install or Upgrade With the Oracle Solaris Installation Program With GRUB" in *Oracle Solaris 10 1/13 Installation Guide: Basic Installations*.

◆ ◆ ◆ CHAPTER 6

Installing From the Network With CD Media (Tasks)

Note – Starting with the Oracle Solaris 10 9/10 release, only a DVD is provided. Oracle Solaris Software CDs are no longer provided. See "Installing the System From the Network With a DVD Image" on page 77.

This chapter describes how to use CD media to set up your network and systems to install the Oracle Solaris software from the network. This chapter covers the following topics:

Network installations enable you to install the Oracle Solaris software from a system that has access to the current Oracle Solaris release disc images, called an install server, to other systems on the network. You copy the contents of the CD media to the install server's hard disk. Then, you can install the Oracle Solaris software from the network by using any of the Oracle Solaris installation methods.

- **Starting with the Solaris 10 11/06 release**, you have the option during an initial installation to change the network security settings so that all network services except secure shell, are disabled or restricted to respond to local requests only. This security option is available only during an initial installation, not during an upgrade. An upgrade maintains any previously set services. If necessary, you can restrict network services after an upgrade by using the `netservices` command. See "Planning Network Security" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

  The network services can be enabled after installation by using the `netservices open` command or by enabling individual services by using SMF commands. See "Revising Security Settings After Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

- **Starting with the Solaris 10 10/08 release**, the structure of the Oracle Solaris DVD and Oracle Solaris Software - 1 CD has changed for the SPARC platform. Slice 0 is no longer at the top of the directory structure. Therefore the structure of the x86 and SPARC DVDs and Oracle Solaris Software - 1 CD are the same. This change in structure makes setting up an install server easier if you have a mix of platforms, such as a SPARC install server and x86 media.

Task Map: Installing From the Network With CD Media

TABLE 6–1 Task Map: Setting Up an Install Server With CD Media

Task	Description	For More Information
x86 only: Verify that your system supports PXE.	If you want to install an x86 based system over the network, confirm that your machine can use PXE to boot without local boot media. If your x86 based system does not support PXE, you must boot the system from a local DVD or CD.	Check your hardware manufacturer's documentation or the system BIOS.
Choose an installation method.	The Oracle Solaris OS provides several methods for installation or upgrade. Choose the installation method that is most appropriate for your environment.	"Choosing an Oracle Solaris Installation Method" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*
Gather information about your system.	Use the checklist and complete the worksheet to collect all of the information that you need to install or upgrade.	Chapter 4, "Gathering Information Before an Installation or Upgrade," in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*
(Optional) Preconfigure system information.	You can preconfigure system information to avoid being prompted for the information during the installation or upgrade.	Chapter 2, "Preconfiguring System Configuration Information (Tasks)"
Create an install server.	Use the `setup_install_server(1M)` command to copy the Oracle Solaris Software - 1 CD to the install server's hard disk. Use the `add_to_install_server(1M)` command to copy additional Oracle Solaris Software CDs and the Oracle Solaris Languages CDs to the install server's hard disk.	"Creating an Install Server With SPARC or x86 CD Media" on page 87

TABLE 6–1 Task Map: Setting Up an Install Server With CD Media *(Continued)*

Task	Description	For More Information
(Optional) Create boot servers.	If you want to install systems from the network that are not on the same subnet as the install server, you must create a boot server on the subnet to boot the systems. Use the `setup_install_server` command with the `-b` option to set up a boot server. If you are using DHCP, a boot server is not necessary.	"Creating a Boot Server on a Subnet With a CD Image" on page 91
Add systems to be installed from the network.	Use the `add_install_client` command to set up each system that you want to install from the network. Each system that you want to install needs to find the install server, the boot server if required, and configuration information on the network.	"Adding Systems to Be Installed From the Network With a CD Image" on page 93
(Optional) Configure the DHCP server.	If you want to use DHCP to provide system configuration and installation parameters, first configure the DHCP server, then create the appropriate options and macros for your installation. **Note –** If you want to install an x86 based system from the network with PXE, you must configure a DHCP server.	Chapter 13, "Planning for DHCP Service (Tasks)," in *Oracle Solaris Administration: IP Services* "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45
Install the system over the network.	Begin the installation by booting the system from the network.	"Installing the System From the Network With a CD Image" on page 98

Creating an Install Server With SPARC or x86 CD Media

The install server contains the installation image needed to install systems from the network. You must create an install server to install the Oracle Solaris software on a system from the network. You do not always need to set up a separate boot server.

Note – Starting with the Oracle Solaris 10 9/10 release, only a DVD is provided. Oracle Solaris Software CDs are no longer provided.

See "Installing the System From the Network With a DVD Image" on page 77.

- If you are using DHCP to set installation parameters or your install server and client are on the same subnet, you do not need a separate boot server.
- If your install server and your client are not on the same subnet and you are not using DHCP, you must create separate boot servers for each subnet. You could create an install server for each subnet; however, install servers require more disk space.

▼ SPARC: How to Create an Install Server With SPARC or x86 CD Media

The system must include a CD-ROM drive and be part of the site's network and naming service. If you use a naming service, the system must already be in a naming service, such as NIS, NIS+, DNS, or LDAP. If you do not use a naming service, you must distribute information about this system by following your site's policies.

Note – This procedure assumes that the system is running Solaris Volume Manager. If you are not using Solaris Volume Manager to manage media, refer to *System Administration Guide: Devices and File Systems*.

---

1 On the system that is to become the install server, become superuser or assume an equivalent role.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

2 Insert the Oracle Solaris Software - 1 CD in the system's drive.

3 Create a directory for the CD image.

```
# mkdir -p install-dir
```

install-dir Specifies the directory where the CD image is to be copied

4 Change to the `Tools` directory on the mounted disc.

```
# cd /cdrom/cdrom0/Solaris_10/Tools
```

5 Copy the image in the drive to the install server's hard disk.

```
# ./setup_install_server install-dir-path
```

Note – The `setup_install_server` command indicates whether you have enough disk space available for the Oracle Solaris Software disc images. To determine available disk space, use the `df -kl` command.

---

6 If the install server is not on the same subnet as the system to be installed and you are not using DHCP, verify that the path to the install server's image is shared appropriately.

```
# share | grep install-dir-path
```

- **If the path to the install server's directory is displayed and anon=0 is displayed in the options, proceed to Step 7.**

- **If the path to the install server's directory is not displayed or you do not have anon=0 in the options:**

  a. **Make the install server available to the boot server.**

     Using the `share` command, add this entry to the `/etc/dfs/dfstab` file.

     ```
     share -F nfs -o ro,anon=0 -d "install server directory" install-dir-path
     ```

  b. **Verify that the `nfsd` daemon is running.**

     - **If the install server is running the current Oracle Solaris release or a compatible version, type the following command:**

       ```
       # svcs -l svc:/network/nfs/server:default
       ```

       - **If the `nfsd` daemon is online, continue.**
       - **If the `nfsd` daemon is not online, start it.**

         ```
         # svcadm enable svc:/network/nfs/server
         ```

     - **If the install server is running the Solaris 9 OS, or compatible version, type the following command.**

       ```
       # ps -ef | grep nfsd
       ```

       - **If the `nfsd` daemon is running, continue.**
       - **If the `nfsd` daemon is not running, start it.**

         ```
         # /etc/init.d/nfs.server start
         ```

  c. **Share the install server.**

     ```
     # shareall
     ```

7. **Change directories to root (`/`).**

   ```
   # cd /
   ```

8. **Eject the Oracle Solaris Software - 1 CD.**

9. **Insert the Oracle Solaris Software - 2 CD in the system's CD-ROM drive.**

10. **Change to the `Tools` directory on the mounted CD.**

    ```
    # cd /cdrom/cdrom0/Solaris_10/Tools
    ```

11. **Copy the CD in the CD-ROM drive to the install server's hard disk.**

    ```
    # ./add_to_install_server install-dir-path
    ```

12 **Change directories to root (`/`).**

```
# cd /
```

13 **Eject the Oracle Solaris Software - 2 CD.**

14 **Repeat Step 9 through Step 13 for each Oracle Solaris Software CD that you want to install.**

15 **Insert the first Oracle Solaris Languages CD in the system's CD-ROM drive.**

16 **Change to the `Tools` directory on the mounted CD.**

```
# cd /cdrom/cdrom0/Solaris_10/Tools
```

17 **Copy the CD in the CD-ROM drive to the install server's hard disk.**

```
# ./add_to_install_server install-dir-path
```

18 **Eject the CD.**

19 **Repeat Step 15 through Step 18 for the second Oracle Solaris Languages CD.**

20 **Change directories to root (`/`).**

```
# cd /
```

21 **(Optional) Patch the files that are located in the miniroot on the net install image that was created by `setup_install_server`.**

Patching a file might be necessary if a boot image has problems. For step-by-step procedures, see Chapter 7, "Patching the Miniroot Image (Tasks)."

More Information

Continuing the Installation

After you set up the install server, you must add the client as an installation client. For information about how to add client systems to install over the network, see "Adding Systems to Be Installed From the Network With a CD Image" on page 93.

If you are not using DHCP, and your client system is on a different subnet than your install server, you must create a boot server. For more information, see "Creating a Boot Server on a Subnet With a CD Image" on page 91.

Next Steps

- If you are using DHCP or the install server is on the same subnet as the system to be installed, you do not need to create a boot server. Proceed to "Adding Systems to Be Installed From the Network With a CD Image" on page 93.

- If you are *not* using DHCP and the install server and the client are on a different subnet, you must create a boot server. Proceed to "Creating a Boot Server on a Subnet With a CD Image" on page 91.

See Also For additional information about the `setup_install_server` and the `add_to_install_server` commands, see `install_scripts(1M)`.

Creating a Boot Server on a Subnet With a CD Image

You must create an install server to install the Oracle Solaris software on a system from the network. You do not always need to set up a boot server. A boot server contains enough of the boot software to boot systems from the network, and then the install server completes the installation of the Oracle Solaris software.

Note – Starting with the Oracle Solaris 10 9/10 release, only a DVD is provided. Oracle Solaris Software CDs are no longer provided.

See "Installing the System From the Network With a DVD Image" on page 77.

If you are using DHCP to set installation parameters or your install server and client are on the same subnet, you do not need a boot server. Proceed to "Adding Systems to Be Installed From the Network With a CD Image" on page 93.

▼ To Create a Boot Server on a Subnet With a CD Image

Before You Begin If your install server and your client are not on the same subnet and you are not using DHCP, you must create separate boot servers for each subnet. You could create an install server for each subnet; however, install servers require more disk space.

The system must include a local CD-ROM drive or have access to the remote current Oracle Solaris release disc images, which are normally on the install server. If you use a naming service, the system should be in the naming service. If you do not use a naming service, you must distribute information about this system by following your site's policies.

1 On the system you intend to make the boot server for the subnet, log in and become superuser or assume an equivalent role.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

2 **Mount the Oracle Solaris Software - 1 CD image from the install server.**

```
# mount -F nfs -o ro server-name:path /mnt
```

server-name:*path* The install server name and absolute path to the disc image

3 **Create a directory for the boot image.**

```
# mkdir -p boot-dir-path
```

boot-dir-path Specifies the directory where the boot software is to be copied

4 **Change to the `Tools` directory on the Oracle Solaris Software - 1 CD image.**

```
# cd /mnt/Solaris_10/Tools
```

5 **Copy the boot software to the boot server.**

```
# ./setup_install_server -b boot-dir-path
```

`-b` Specifies to set up the system as a boot server

Note – The `setup_install_server` command indicates whether you have enough disk space available for the images. To determine available disk space, use the `df -kl` command.

---

6 **Change directories to root (`/`).**

```
# cd /
```

7 **Unmount the installation image.**

```
# umount /mnt
```

Example 6–1 Creating a Boot Server on a Subnet With CD Media

The following example illustrates how to create a boot server on a subnet. These commands copy the boot software from the Oracle Solaris Software for SPARC Platforms - 1 CD image to `/export/install/boot` on the system's local disk.

```
# mount -F nfs -o ro crystal:/export/install/boot /mnt
# mkdir -p /export/install/boot
# cd /mnt/Solaris_10/Tools
# ./setup_install_server -b /export/install/boot
# cd /
# umount /mnt
```

In this example, the disc is inserted and automatically mounted before the command. After the command, the disc is removed.

Next Steps After you set up the boot server, you must add the client as an installation client. For information about how to add client systems to install over the network, see "Adding Systems to Be Installed From the Network With a CD Image" on page 93.

See Also For additional information about the `setup_install_server` command, see the`install_scripts(1M)` man page.

Adding Systems to Be Installed From the Network With a CD Image

After you create an install server and, if necessary, a boot server, you must set up each system that you want to install from the network. Use the procedure in this section to set up install servers and clients.

For more options to use with this command, see the `add_install_client(1M)`man page.

▼ How to Add Systems to Be Installed From the Network With `add_install_client` (CDs)

After you create an install server, you must set up each system that you want to install from the network.

Before You Begin If you have a boot server, make sure you have shared the install server installation image. See the procedure "To Create an Install Server," Step 6.

Each system that you want to install needs to find the following items:

- An install server
- A boot server if it is required
- The `sysidcfg` file if you use a `sysidcfg` file to preconfigure system information
- A name server if you use a naming service to preconfigure system information
- The profile in the JumpStart directory on the profile server if you are using the JumpStart installation method

1 On the install server or boot server, become superuser or assume an equivalent role.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 If you use the NIS, NIS+, DNS, or LDAP naming service, verify that the following information about the system to be installed has been added to the naming service:

- Host name
- IP address
- Ethernet address

For more information about naming services, see *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*.

3 Change to the `Tools` directory on the current Oracle Solaris release CD image on the install server:

```
# cd /install-dir-path/Solaris_10/Tools
```

install-dir-path Specifies the path to the `Tools` directory

4 Add the client to the install server's `/etc/ethers` file.

a. On the client, find the `ethers` address. The `/etc/ethers` map is taken from the local file.

```
# ifconfig -a grep ether
ether 8:0:20:b3:39:1d
```

b. On the install server, add the address to the list in the `/etc/ethers` file.

5 Set up the client system to be installed from the network.

```
# ./add_install_client -d -s install-server:install-dir-path \
-c JumpStart-server:JumpStart-dir-path    -p sysid-server:path \
  -t boot-image-path -b "network-boot-variable=value" \
-e Ethernet-address client-name platform-group
```

`-d`

Specifies that the client is to use DHCP to obtain the network install parameters. If you use only the `-d` option, the `add_install_client` command sets up the installation information for client systems of the same class, for example, all SPARC client machines. To set up the installation information for a specific client, use `-d` with the `-e` option.

For x86 clients, use this option to boot the systems from the network by using PXE network boot. The output of this option lists the DHCP options you need to create on the DHCP server.

For more information about class-specific installations by using DHCP, see "Creating DHCP Options and Macros for Oracle Solaris Installation Parameters" on page 46.

`-s` *install-server*:*install-dir-path*
Specifies the name and path to the install server.

- *install-server* is the host name of the install server
- *install-dir-path* is the absolute path to the current Oracle Solaris release CD image

`-c` *Jumpstart-server*:*JumpStart-dir-path*
Specifies a JumpStart directory for JumpStart installations. *JumpStart-server* is the host name of the server on which the JumpStart directory is located. *JumpStart-dir-path* is the absolute path to the JumpStart directory.

`-p` *sysid-server*:*path*
Specifies the path to the `sysidcfg` file for preconfiguring system information. *sysid-server* is either a valid host name or an IP address for the server that contains the file. *path* is the absolute path to the directory containing the `sysidcfg` file.

`-t` *boot-image-path*
Specifies the path to an alternate boot image if you want to use a boot image other than the one in the Tools directory on the current Oracle Solaris release net installation image, CD, or DVD.

`-b` "*boot-property=value*"
x86 based systems only: Enables you to set the value of a boot property variable that you want to use to boot the client from the network. The `-b` must be used with the `-e` option.

See the `eeprom(1M)` man page for descriptions of boot properties.

`-e` *Ethernet-address*
Specifies the Ethernet address of the client that you want to install. This option enables you to set up the installation information to use for a specific client, including a boot file for that client.

The `nbp.` prefix is not used in boot file names. For example, if you specify `-e 00:07:e9:04:4a:bf` for an x86 based client, the command creates the boot file `010007E9044ABF.i86pc` in the `/tftpboot` directory. However, the current Oracle Solaris release supports the use of legacy boot files with the `nbp.` prefix.

For more information about client-specific installations by using DHCP, see "Creating DHCP Options and Macros for Oracle Solaris Installation Parameters" on page 46.

client-name
The name of the system to be installed from the network. This name is *not* the host name of the install server.

platform-group
The platform group of the system to be installed. A detailed list of platform groups appears in "Platform Names and Groups" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

Example 6–2 SPARC: Adding a SPARC Install Client on a SPARC Install Server When Using DHCP (CDs)

The following example illustrates how to add an install client when you are using DHCP to set installation parameters on the network. The install client is named `basil`, which is an Ultra 5 system. The file system `/export/home/cdsparc/Solaris_10/Tools` contains the `add_install_client` command.

For more information about how to use DHCP to set installation parameters for network installations, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

```
mysparcinstallserver# cd /export/home/cdsparc/Solaris_10/Tools
mysparcinstallserver# ./add_install_client -d basil sun4u
```

Example 6–3 Adding an Install Client That Is on the Same Subnet as Its Server (CDs)

The following example illustrates how to add an install client that is on the same subnet as the install server. The install client is named `basil`, which is an Ultra 5 system. The file system `/export/home/cdsparc/Solaris_10/Tools` contains the `add_install_client` command.

```
myinstallserver# cd /export/home/cdsparc/Solaris_10/Tools
myinstallserver# ./add_install_client basil sun4u
```

Example 6–4 Adding an Install Client to a Boot Server (CDs)

The following example illustrates how to add an install client to a boot server. The install client is named `rose`, which is an Ultra 5 system. Run the command on the boot server. The `-s` option is used to specify an install server that is named `rosemary`, which contains a current Oracle Solaris release CD image in `/export/home/cdsparc`.

```
mybootserver# cd /export/home/cdsparc/Solaris_10/Tools
mybootserver# ./add_install_client -s rosemary:/export/home/cdsparc rose sun4u
```

Example 6–5 x86: Adding a Single x86 Install Client on an x86 Install Server When Using DHCP (CD)

The GRUB bootloader does not use the `SUNW.i86pc` DHCP class name. The following example illustrates how to add an x86 install client to an install server when you are using DHCP to set installation parameters on the network.

- The `-d` option specifies that clients are to use the DHCP protocol for configuration. If you plan to use PXE network boot, you must use the DHCP protocol.
- The `-e` option indicates that this installation will only occur on the client with the Ethernet address `00:07:e9:04:4a:bf`.
- The `-s` option is used to specify that the clients are to be installed from the install server that is named `rosemary`.

This server contains Oracle Solaris Operating System for x86 Platforms DVD image in `/export/home/cdx86`.

```
myx86installserver# cd /export/boot/cdx86/Solaris_10/Tools
myx86installserver# ./add_install_client -d -e 00:07:e9:04:4a:bf \
-s rosemary:/export/home/cdx86 i86pc
```

The previous commands set up the client with the Ethernet address 00:07:e9:04:4a:bf as an installation client. The boot file `010007E9044ABF.i86pc` is created on the installation server. In previous releases, this boot file was named `nbp.010007E9044ABF.i86pc`.

For more information about how to use DHCP to set installation parameters for network installations, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

Example 6–6 x86: Specifying a Serial Console to Use During a Network Installation (CDs)

The following example illustrates how to add an x86 install client to an install server and specify a serial console to use during the installation. This example sets up the install client in the following manner.

- The `-d` option indicates that the client is set up to use DHCP to set installation parameters.
- The `-e` option indicates that this installation will occur only on the client with the Ethernet address `00:07:e9:04:4a:bf`.
- The `-b` option instructs the installation program to use the serial port `ttya` as an input and an output device.

Add the client.

```
myinstallserver# cd /export/boot/cdx86/Solaris_10/Tools
myinstallserver# ./add_install_client -d -e "00:07:e9:04:4a:bf" \
-b "console=ttya" i86pc
```

For a complete description of the boot property variables and values you can use with the `-b` option, see the `eeprom(1M)` man page.

Next Steps If you are using a DHCP server to install the x86 based client over the network, configure the DHCP server and create the options and macros that are listed in the output of the `add_install_client -d` command. For instructions about how to configure a DHCP server to support network installations, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

x86 based systems: If you are not using a DHCP server, you must boot the system from a local Oracle Solaris OS DVD or CD.

See Also For additional information about the `add_install_client` command, see the `install_scripts(1M)` man page.

Installing the System From the Network With a CD Image

Note – Starting with the Oracle Solaris 10 9/10 release, only a DVD is provided. Oracle Solaris Software CDs are no longer provided.

See "Installing the System From the Network With a DVD Image" on page 77.

After you add the system as an installation client, you can install the client from the network. This section describes the following tasks:

- "SPARC: How to Install the Client Over the Network (CDs)" on page 98 — instructions about how to boot and install SPARC based systems over the network.
- "x86: How to Install the Client Over the Network With GRUB (CDs)" on page 100 — instructions about how to boot and install x86 based systems over the network.

▼ SPARC: How to Install the Client Over the Network (CDs)

Before You Begin This procedure assumes that you have completed the following tasks.

- Set up an install server. For instructions about how to create an install server from CD media, see "SPARC: How to Create an Install Server With SPARC or x86 CD Media" on page 88.
- Set up a boot server or a DHCP server, if necessary. If the system you want to install is on a different subnet than the installation server, you must set up a boot server, or use a DHCP server. For instructions about how to set up a boot server, see "Creating a Boot Server on a Subnet With a CD Image" on page 91. For instructions about how to set up a DHCP server to support network installations, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.
- Gathered or preconfigured the information you need to install. You can perform this task in one or more of the following ways:
  - Gather the information in "Checklist for Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.
  - Create a `sysidcfg` file if you use a `sysidcfg` file to preconfigure system information. For information about how to create a `sysidcfg` file, see "Preconfiguring With the `sysidcfg` File" on page 18.
  - Set up a name server if you use a naming service to preconfigure system information. For information about how to preconfigure information with a naming service, see "Preconfiguring With the Naming Service" on page 41.

- Create a profile in the JumpStart directory on the profile server if you are using the JumpStart installation method. For information about how to set up a JumpStart installation, see Chapter 3, "Preparing JumpStart Installations (Tasks)," in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

1 Turn on the client system.

If the system is currently running, bring the system to run level 0.

The `ok` prompt is displayed.

2 Boot the system from the network.

- **To install with the Oracle Solaris interactive installation GUI, type the following command:**

  ```
  ok boot net
  ```

- **To install with the Oracle Solaris interactive text installer in a desktop session, type the following command:**

  ```
  ok boot net - text
  ```

- **To install with the Oracle Solaris interactive text installer in a console session, type the following command:**

  ```
  ok boot net - nowin
  ```

The system boots from the network.

3 If you did not preconfigure all the system information, answer the system configuration questions.

Use the "Checklist for Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*to help you answer the configuration questions.

Note – If the keyboard is self-identifying, the keyboard layout automatically configures during installation. If the keyboard is not self-identifying, you can select from a list of supported keyboard layouts during installation.

PS/2 keyboards are not self-identifying. You will be asked to select the keyboard layout during the installation.

For further information, see "`keyboard` Keyword" on page 25.

During installation, you can choose the default NFSv4 domain name or specify a custom NFSv4 domain name.

If you are using the GUI, after you confirm the system configuration information, the Welcome to Oracle Solaris panel appears.

4 **If you did not preconfigure all the installation options, answer any additional questions to complete your installation.**

Use the "Checklist for Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade* to help you answer the installation questions.

See Also For information about how to complete an interactive installation with the Solaris installation GUI, see "To Install or Upgrade With the Oracle Solaris Installation Program With GRUB" in *Oracle Solaris 10 1/13 Installation Guide: Basic Installations*.

▼ x86: How to Install the Client Over the Network With GRUB (CDs)

Note – Starting with the Oracle Solaris 10 9/10 release, only a DVD is provided. Oracle Solaris Software CDs are no longer provided.

See "Installing the System From the Network With a DVD Image" on page 77.

The Oracle Solaris installation programs for x86 based systems use the GRUB boot loader. This procedure describes how to install an x86 based system over the network with the GRUB boot loader. For overview information about the GRUB boot loader, see Chapter 6, "SPARC and x86 Based Booting (Overview and Planning)," in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

To install the system over the network, you must instruct the client system to boot over the network. Enable network boot on the client system by using the BIOS setup program in the system BIOS, the network adapter BIOS, or both. On some systems, you must also adjust the boot device priority list so that network boot is attempted before booting from other devices. See the manufacturer's documentation for each setup program, or watch for setup program instructions during boot.

Before You Begin This procedure assumes that you have completed the following tasks:

- Set up an install server. For instructions about how to create an install server from CD media, see "How to Create an Install Server With SPARC or x86 DVD Media" on page 67.
- Set up a boot server or a DHCP server, if necessary. If the system you want to install is on a different subnet than the installation server, you must set up a boot server, or use a DHCP server. For instructions about how to set up a boot server, see "Creating a Boot Server on a Subnet With a DVD Image" on page 70. For instructions about how to set up a DHCP server to support network installations, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

- Gathered or preconfigured the information you need to install. You can perform this task in one or more of the following ways:
  - Gather the information in "Checklist for Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.
  - Create a `sysidcfg` file if you use a `sysidcfg` file to preconfigure system information. For information about how to create a `sysidcfg` file, see "Preconfiguring With the `sysidcfg` File" on page 18.
  - Set up a name server if you use a naming service to preconfigure system information. For information about how to preconfigure information with a naming service, see "Preconfiguring With the Naming Service" on page 41.
  - Create a profile in the JumpStart directory on the profile server if you are using the JumpStart installation method. For information about how to set up a JumpStart installation, see Chapter 3, "Preparing JumpStart Installations (Tasks)," in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

This procedure also assumes that your system can boot from the network.

1 **Turn on the system.**

2 **Type the appropriate keystroke combination to enter the system BIOS.**

Some PXE-capable network adapters have a feature that enables a PXE boot if you type a particular keystroke in response to a brief boot-time prompt.

3 **In the system BIOS, instruct the system to boot from the network.**

See your hardware documentation for information about how to set the boot priority in the BIOS.

4 **Exit the BIOS.**

The system boots from the network. The GRUB menu is displayed.

Note – The GRUB menu that is displayed on your system might vary from the following sample, depending on the configuration of your network installation server.

```
GNU GRUB version 0.95 (631K lower / 2095488K upper memory)
+-------------------------------------------------------------------------------------------------------------------+
| Solaris Oracle Solaris 10 1/13  /cdrom0
|                                                                                                                   |
|                                                                                                                   |
+-------------------------------------------------------------------------------------------------------------------+
Use the ^ and v keys to select which entry is highlighted.
Press enter to boot the selected OS, 'e' to edit the
commands before booting, or 'c' for a command-line.
```

5 Select the appropriate installation option.

- **To install the Oracle Solaris OS from the network, select the appropriate Oracle Solaris entry on the menu, then press Enter.**

  Select this entry if you want to install from the network installation server you set up in "How to Create an Install Server With SPARC or x86 DVD Media" on page 67.

- **To install the Oracle Solaris OS from the network with specific boot arguments, use the following steps.**

  You might need to set specific boot arguments if you want to modify the device configuration during the installation, and did not set these boot arguments previously with the `add_install_client` command as described in "How to Add Systems to Be Installed From the Network With `add_install_client` (DVD)" on page 73.

  a. On the GRUB menu, select the installation option you want to edit, then type e.

  Boot commands that are similar to the following text are displayed in the GRUB menu.

```
kernel /I86pc.Solaris_10/multiboot kernel/unix \
-B install_media=192.168.2.1:/export/cdrom0/boot \
module /platform/i86pc/boot_archive
```

  b. Use the arrow keys to select the boot entry that you want to edit, then type e.

  The boot command that you want to edit is displayed in the GRUB edit window.

  c. Edit the command by typing the boot arguments or options you want to use.

  The command syntax for the GRUB edit menu is as follows.

```
grub edit>kernel /image-directory/multiboot kernel/unix/ \
install [url|ask] -B options install_media=media-type
```

  For information about boot arguments and command syntax, see Table 9–1.

  d. To accept your edits and return to the GRUB menu, press Enter.

  The GRUB menu is displayed. The edits you made to the boot command are displayed.

  e. To begin the installation, type b in the GRUB menu.

The Oracle Solaris installation program checks the default boot disk for the requirements to install or upgrade the system. If the Oracle Solaris installation cannot detect the system configuration, the program prompts you for any missing information.

When the check is completed, the installation selection screen is displayed.

```
Select the type of installation you want to perform:

   1 Solaris Interactive
   2 Custom JumpStart
   3 Solaris Interactive Text (Desktop session)
   4 Solaris Interactive Text (Console session)
```

```
5 Apply driver updates
6 Single user shell

Enter the number of your choice followed by the <ENTER> key.
Alternatively, enter custom boot arguments directly.

If you wait 30 seconds without typing anything,
an interactive installation will be started.
```

6 **(Optional) To update drivers or install an install time update (ITU), insert the update media, type 5, then press Enter.**

You might need to update drivers or install an ITU to enable the Oracle Solaris OS to run on your system. Follow the instructions for your driver update or ITU to install the update.

7 **(Optional) To perform system administration tasks, type 6, then press Enter.**

You might want to launch a single user shell if you need to perform any system administration tasks on your system before you install. For information about system administration tasks you can perform prior to installation, see *Oracle Solaris Administration: Basic Administration*.

After you perform any system administration tasks, the list of installation options is displayed.

8 **(Optional) Select the installation type to install the Oracle Solaris OS.**

- **To install with the Oracle Solaris interactive installation GUI, type 1, then press Enter.**
- **To install with the interactive text installer in a desktop session, type 3, then press Enter.**

  Select this installation type to override the default GUI installer and run the text installer.
- **To install with the interactive text installer in a console session, type 4, then press Enter.**

  Select this installation type to override the default GUI installer and run the text installer.

For more information about unattended JumpStart installations (option 2), see *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

For detailed information about the Oracle Solaris installation GUI and text installer, see "System Requirements and Recommendations" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

The system configures the devices and interfaces, and searches for configuration files. The installation program begins.

9 **If you did not preconfigure all the system information, answer the system configuration questions.**

Use the "Checklist for Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade* to help you answer the configuration questions.

Note – If the keyboard is self-identifying, the keyboard layout automatically configures during installation. If the keyboard is not self-identifying, you can select from a list of supported keyboard layouts during installation.

For further information, see "`keyboard` Keyword" on page 25.

During installation, you can choose the default NFSv4 domain name or you can specify a custom NFSv4 domain name.

If you are using the installation GUI, after you confirm the system configuration information, the Welcome to Oracle Solaris panel appears.

10 If you did not preconfigure all the installation options, answer any additional questions to complete your installation.

Use the "Checklist for Installation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade* to help you answer the installation questions.

11 After the system boots and installs over the network, instruct the system to boot from the disk drive on subsequent boots.

Note – When you boot the system after the installation, a GRUB menu lists the operating systems that are installed, including the newly installed Oracle Solaris OS. Select the operating system you want to boot. The default selection loads if you do not make another selection.

Next Steps If you install multiple operating systems on your machine, you need to instruct the GRUB boot loader to recognize these operating systems in order to boot. For more information, see "Modifying Boot Behavior by Editing the GRUB Menu at Boot Time" in *Oracle Solaris Administration: Basic Administration*.

See Also For information about how to complete an interactive installation with the Oracle Solaris installation GUI, see "To Install or Upgrade With the Oracle Solaris Installation Program With GRUB" in *Oracle Solaris 10 1/13 Installation Guide: Basic Installations*.

◆ ◆ ◆ CHAPTER 7

Patching the Miniroot Image (Tasks)

This chapter provides a step-by-step procedure and an example to patch the miniroot image when you are setting up an install server.

This chapter covers the following topics:

Patching the Miniroot Image (Tasks)

You might need to patch the files that are located in the miniroot on the network installation image that was created by `setup_install_server`.

About the Miniroot Image (Overview)

The miniroot is a minimal, bootable root (`/`) file system that resides on the Oracle Solaris installation media. A miniroot consists of all the Oracle Solaris software that is required to boot the system to either install or upgrade the system. The miniroot software is used by the installation media to perform a full installation of the Oracle Solaris OS. The miniroot runs only during the installation process.

You might need to patch the miniroot before installation if the boot image has problems booting or if you need to add driver and hardware support. When you patch the miniroot image, the patch is not installed on the system where the Oracle Solaris OS installation occurs or on the system that the `patchadd` command is run. Patching the miniroot image is strictly used for adding driver and hardware support to the process that performs the actual installation of the Oracle Solaris OS.

▼ How to Patch the Miniroot Image

Note – This procedure is only for patching the miniroot, not for patching the complete network installation image. If you need to patch the network installation image, perform the task after the installation completes.

Before You Begin These steps assume that you have a system on your network that is running the current Oracle Solaris release, and that system is accessible over the network.

1 On a system that is running the current Oracle Solaris release, log in as superuser or assume an equivalent role.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Change to the `Tools` directory of the installation image you created in "How to Create an Install Server With SPARC or x86 DVD Media" on page 67.

```
# cd install-server-path/install-dir-path/Solaris_10/Tools
```

install-server-path Specifies the path to the install server system on your network, for example, `/net/installserver-1`.

3 Create a new installation image, and place that image on the system that is running the current Oracle Solaris release.

```
# ./setup_install_server remote-install-dir-path
```

remote-install-dir-path Specifies the path on the current Oracle Solaris release in which to create the new installation image.

This command creates a new installation image on the current Oracle Solaris release. In order to patch this image, you must temporarily place this image on a system that is running the current Oracle Solaris release.

4 On the current Oracle Solaris release, unpack the network installation boot archive.

```
# /boot/solaris/bin/root_archive unpackmedia remote-install-dir-path \
  destination-dir
```

destination-dir Specifies the path to the directory to contain the unpacked boot archive.

5 Set the `PKG_NONABI_SYMLINKS` environment variable:

```
PKG_NONABI_SYMLINKS="true"
export PKG_NONABI_SYMLINKS
```

6 On the current Oracle Solaris release, patch the unpacked boot archive.

```
# patchadd -C destination-dir path/patch-ID
```

path Specifies the path to the patch that you want to add, for example, `/var/sadm/spool`.

patch-ID Specifies the patch ID that you want to apply.

You can specify multiple patches with the `patchadd -M` option. For more information, see the `patchadd(1M)` man page.

Caution – Don't use the `patchadd -C` command unless you have read the `Patch README` instructions or have contacted your local Oracle support office.

7 On the current Oracle Solaris release, pack the boot archive.

```
# /boot/solaris/bin/root_archive packmedia remote-install-dir-path \
  destination-dir
```

8 Copy the patched archives to the installation image on the install server.

```
# cd remote-install-dir-path
# find boot Solaris_10/Tools/Boot | cpio -pdum \
  install-server-path/install-dir-path
```

Next Steps After you have set up the install server and patched the miniroot, you might need to set up a boot server or add systems to be installed from the network.

- If you are using DHCP or the install server is on the same subnet as the system to be installed, you do not need to create a boot server. Proceed to "Adding Systems to Be Installed From the Network With a DVD Image" on page 72.
- If you are *not* using DHCP and the install server and the client are on a different subnet, you must create a boot server. Proceed to "Creating a Boot Server on a Subnet With a DVD Image" on page 70.

Patching the Miniroot Image (Example)

This example describes the steps to patch a miniroot image to create a modified miniroot.

In this example, you perform the unpacking and packing of the miniroot on a system that is running the current release.

▼ How to Modify the Miniroot (Example)

This procedure shows how to install a Kernel Update (KU) patch on an Oracle Solaris 10 1/13 miniroot image on a system that is running the Oracle Solaris 10 OS. Note these details:

- `jmp-start1` – A network installation server that is running the Solaris 9 OS
- `v20z-1` – A system that is running the Oracle Solaris 10 OS, with GRUB implemented
- `v20z-1:/export/mr` – The unpacked miniroot location
- `v20z-1:/export/u1` – The installation image that was created, so it could be modified

The network installation image is located at `/net/jmpstart1/export/images/solaris_10_u1/Solaris_10/Tools`.

1 On a system that is running the current Oracle Solaris release, log in as superuser or assume an equivalent role.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

2 Change to the directory where you want to unpack the miniroot and place the network installation image.

```
# cd /net/server-1/export
```

3 Create the installation and miniroot directories.

```
# mkdir /export/u1 /export/mr
```

4 Change directories to the Tools directory where the Oracle Solaris 10 1/13 installation images are located.

```
# cd /net/jmp-start1/export/images/solaris_10/Solaris_10/Tools
```

5 Create a new installation image, and place the image on the system that is running the current Oracle Solaris release.

```
# ./setup_install_server /export/u1
Verifying target directory...
Calculating the required disk space for the Solaris_10 product
Calculating space required for the installation boot image
Copying the CD image to disk...
Copying Install Boot Image hierarchy...
Copying /boot  netboot hierarchy...
Install Server setup complete
```

The installation server setup is now complete.

6 Unpack the miniroot.

```
 # /boot/solaris/bin/root_archive unpackmedia /export/u1 /export/mr
```

7 Change directories.

```
# cd  /export/mr/sbin
```

8 Make a copy of the `rc2` and the `sulogin` files.

```
# cp rc2 rc2.orig
# cp sulogin sulogin.orig
```

9 Apply all required patches to the miniroot.

```
patchadd -C /export/mr /export patch-ID
```

patch-ID specifies the patch ID that you want to apply.

In this example, five patches are applied to the miniroot.

```
# patchadd -C /export/mr /export/118344-14
# patchadd -C /export/mr /export/122035-05
# patchadd -C /export/mr /export/119043-10
# patchadd -C /export/mr /export/123840-04
# patchadd -C /export/mr /export/118855-36
```

10 Export the `SVCCFG_REPOSITORY` variable.

```
# export SVCCFG_REPOSITORY=/export/mr/etc/svc/repository.db
```

Caution – The `SVCCFG_REPOSITORY` variable must point to the location of the unpacked miniroot's `repository.db` file. In this example, that location is the `/export/mr/etc/svc` directory. The `repository.db` file is located in the directory `/etc/svc` under the unpacked miniroot. Failure to export this variable results in the modification of the live repository, which prevents the live system from booting.

11 Modify the miniroot's `repository.db` file.

```
# svccfg -s system/manifest-import setprop start/exec = :true
# svccfg -s system/filesystem/usr setprop start/exec = :true
# svccfg -s system/identity:node setprop start/exec = :true
# svccfg -s system/device/local setprop start/exec = :true
# svccfg -s network/loopback:default setprop start/exec = :true
# svccfg -s network/physical:default setprop start/exec = :true
# svccfg -s milestone/multi-user setprop start/exec = :true
```

For more information, see the `svccfg(1M)` man page.

12 Change directories and restore the original copies of the `rc2.orig` and `sulogin.orig` files.

```
# cd /export/mr/sbin
# mv rc2.orig rc2
# mv sulogin.orig sulogin
```

13 Pack the modified miniroot that contains the changes you made. Place the modified miniroot in the `/export/u1` directory.

```
# /boot/solaris/bin/root_archive packmedia /export/u1 /export/mr
```

This step essentially replaces `/export/u1/boot/miniroot` directory, along with some other necessary files.

◆ ◆ ◆ CHAPTER 8

Installing Over the Network (Examples)

This chapter provides examples that illustrate how to use DVD or CD media to install the Oracle Solaris OS over the network.

All examples in this chapter have the following conditions.

- The install server
  - Is a network installation image.
  - Runs the current Oracle Solaris release.
  - Is already part of the site's network and naming service.
- You have already gathered or preconfigured the information that you need in order to install. For further information, see Chapter 4, "Gathering Information Before an Installation or Upgrade," in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*.

Choose an example from one of the following additional options.

- "Network Installation Over the Same Subnet (Examples)" on page 112
  - The install client is on the same subnet as the install server. Therefore, you do not need to create a boot server.
  - The network installation uses a graphical user interface (GUI) in a desktop session.
- **Network Installation Over a Different Subnet (Examples TBD)**
  - The install client is on the different subnet from the install server. Therefore, you must create a boot server.
  - The network installation uses a text installer in a desktop session

Network Installation Over the Same Subnet (Examples)

This section includes the following examples.

- Example 8–1: **SPARC: Install on the Same Subnet (With DVD Media)**
- Example 8–2: **SPARC: Install on the Same Subnet (With CD Media)**
- Example 8–3: **x86: Install on the Same Subnet (With DVD Media)**
- Example 8–4: **x86: Install on the Same Subnet (With CD Media)**

EXAMPLE 8–1 SPARC: **Install Over the Same Subnet (With DVD Media)**

This example creates a SPARC install server with SPARC DVD media.

This example has the following conditions:

- The install client is on the same subnet as the install server.
- The network installation uses a graphical user interface (GUI) in a desktop session.
- General conditions for this example are listed at Chapter 8, "Installing Over the Network (Examples)."

1. **Create and set up a SPARC install server.**

   This example creates an install server by copying the Oracle Solaris DVD to the install server's `/export/home/dvdsparc` directory.

   a. Insert the Oracle Solaris DVD in the SPARC system's drive.

   b. Use the following command to create a directory to contain the DVD image. This command also changes to the `Tools` directory on the mounted disc. Then the command copies the DVD image in the drive to the install server's hard disk.

   ```
   # mkdir -p /export/home/dvdsparc
   # cd /cdrom/cdrom0/Solaris_10/Tools
   # ./setup_install_server /export/home/dvdsparc
   ```

2. **Install the system with a network installation image.**

   In this example, you install with the Oracle Solaris interactive installation GUI.

   a. Boot the system from the network.

   b. To install with the Oracle Solaris interactive installation GUI, type the following command.

   ```
   ok bootnet - install
   ```

   The system installs from the network.

   c. If you are prompted, answer the system configuration questions. If you preconfigured all of the system information, the installation program does not prompt you to enter any configuration information.

   After you confirm the system configuration information, the Welcome to Solaris panel appears. The installation is complete.

EXAMPLE 8–1 SPARC: **Install Over the Same Subnet (With DVD Media)** *(Continued)*

For a more detailed explanation about the network installation procedures that are used in this example, see Chapter 5, "Installing From the Network With DVD Media (Tasks)."

EXAMPLE 8–2 SPARC: **Install Over the Same Subnet (With CD Media)**

This example creates a SPARC install server with SPARC CD media.

This example has the following conditions:

- The install client is on the same subnet as the install server.
- The network installation uses a graphical user interface (GUI) in a desktop session.
- General conditions for this example are listed at Chapter 8, "Installing Over the Network (Examples)."

1. **Create and set up a SPARC install Server.**

   The following example illustrates how to create an install server by copying the CD media to the install server's `/export/home/cdsparc` directory.

   a. Insert the Oracle Solaris Software for SPARC Platforms - 1 CD in the system's CD-ROM drive.

   b. Use the following command to create a directory for the CD image. This command also changes to the `Tools` directory on the mounted disc, and copies the image in the drive to the install server's hard disk.

   ```
   # mkdir -p /export/home/cdsparc
   # cd /cdrom/cdrom0/Solaris_10/Tools
   # ./setup_install_server /export/home/cdsparc
   # cd /
   ```

2. **Add systems to be installed from the network.**

   a. Insert the Oracle Solaris Software for SPARC Platforms - 2 CD in the CD-ROM drive.

   b. Use the following command. This command changes to the `Tools` directory on the mounted CD. The command copies the CD in the CD-ROM drive to the install server's hard disk. Then the command changes to the root (`/`) directory.

   ```
   # cd /cdrom/cdrom0/Solaris_10/Tools
   # ./add_to_install_server /export/home/cdsparc
   # cd /
   ```

   c. Repeat the previous commands for each Oracle Solaris Software CD that you want to install.

   d. Insert the first Oracle Solaris Languages for SPARC Platforms CD in the CD-ROM drive.

   ```
   # cd /cdrom/cdrom0/Solaris_10/Tools
   # ./add_to_install_server /export/home/cdsparc
   ```

   e. Eject the CD.

EXAMPLE 8–2 SPARC: **Install Over the Same Subnet (With CD Media)** *(Continued)*

f. Repeat the previous commands for each Oracle Solaris Languages for SPARC Platforms CD CD that you want to install.

3. **Install the system with a network installation image.**

a. Boot the system from the network.

b. To install with the Oracle Solaris interactive installation GUI, type the following command.

```
ok boot net
```

The system installs from the network.

c. If you are prompted, answer the system configuration questions.

After you confirm the system configuration information, the Welcome to Oracle Solaris panel appears. The installation is complete.

For a more detailed explanation about the network installation procedures that are used in this example, see Chapter 6, "Installing From the Network With CD Media (Tasks)."

EXAMPLE 8–3 x86: **Install Over the Same Subnet (With DVD Media)**

This example creates an x86 install server with x86 DVD media.

This example has the following conditions:

- The install client is on the same subnet as the install server.
- The network installation uses a graphical user interface (GUI) in a desktop session.
- General conditions for this example are listed at Chapter 8, "Installing Over the Network (Examples)."

1. **Create and set up an x86 install server.**

The following examples illustrate how to create an x86 install server by copying the Oracle Solaris Operating System for x86 Platforms DVD to the install server's `/export/home/dvdx86` directory.

a. Insert the Oracle Solaris DVD into the system's drive.

b. Use the following command. This command creates a directory to contain the boot image. Then this command changes to the `Tools` directory on the mounted disc. Also, the command copies the disc in the drive to the install server's hard disk by using the `setup_install_server` command:

```
# mkdir -p /export/home/dvdx86
# cd /cdrom/cdrom0/Solaris_10/Tools
# ./setup_install_server /export/home/dvdx86
```

c. Make the install server available to the boot server.

Using the `share` command, add this entry to the `/etc/dfs/dfstab` file.

EXAMPLE 8–3 x86: **Install Over the Same Subnet (With DVD Media)** *(Continued)*

```
share -F nfs -o ro,anon=0 -d "install server directory" install_dir_path
```

d. Check if the `nfsd` daemon is online. If the `nfsd` daemon is not online, start it and share it.

```
# svcs -l svc:/network/nfs/server:default
# svcadm enable svc:/network/nfs/server
# shareall
# cd /
```

Note – If the install server was running the Solaris 9 OS, or compatible version, you would type the following command instead.

```
# ps -ef | grep nfsd
```

For this older release, if the `nfsd` daemon was running, you would continue to the next step. If the `nfsd` daemon was not running, you would start it.

```
# /etc/init.d/nfs.server start
```

---

2. **Add systems to be installed from the network.**

   The file system `/export/home/dvdx86/` contains the `add_install_client` command. The install client is named `basil`, which is an x86 system.

   a. Add the client to the install server's `/etc/ethers` file.

      On the client, find the ethers address. The `/etc/ethers` map is taken from the local file.

      ```
      # ifconfig -a grep ether
      ether 8:0:20:b3:39:1d
      ```

      On the install server, open the `/etc/ethers` file in an editor. Add the address to the list.

   b. Use the following command. This command changes to the `Tools` directory on the Oracle Solaris DVD image. Then, this command sets up the client system so that it can be installed from the network.

      ```
      install_server# cd /export/home/dvdx86/Solaris_10/Tools
      install_server# ./add_install_client basil i86pc
      ```

3. **Install the system with a network installation image.**

   The Oracle Solaris installation programs for x86 based systems use the GRUB, a feature of Oracle Solaris, boot loader. This example installs an x86 based system over the network with the GRUB boot loader.

   a. In the system BIOS, instruct the system to boot from the network.

      After you exit BIOS, the system installs from the network. The GRUB menu is displayed.

   b. To install the Oracle Solaris OS from the network, select the appropriate Oracle Solaris entry on the menu, then press Enter.

EXAMPLE 8–3 x86: **Install Over the Same Subnet (With DVD Media)** *(Continued)*

The installation selection screen is displayed.

c. To install with the Oracle Solaris interactive installation GUI, type 1, then press Enter.

The installation program begins.

d. If you are prompted, answer the system configuration questions.

After you confirm the system configuration information, the Welcome to Oracle Solaris panel appears.

After the system boots and installs over the network, instruct the system to boot from the disk drive on subsequent boots.

Note – When you boot the system after the installation, a GRUB menu lists the operating systems that are installed, including the newly-installed Oracle Solaris OS. Select which operating system you want to boot. The default selection loads if you do not make another selection.

For further information, see the following references.

Procedure	Reference
For a more detailed explanation about the network installation procedures that are used in this example	Chapter 5, "Installing From the Network With DVD Media (Tasks)"
For information about how to complete an interactive installation with the Oracle Solaris installation GUI	"To Install or Upgrade With the Oracle Solaris Installation Program With GRUB" in *Oracle Solaris 10 1/13 Installation Guide: Basic Installations*
For overview information about the GRUB boot loader	Chapter 6, "SPARC and x86 Based Booting (Overview and Planning)," in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*

EXAMPLE 8–4 x86: **Install Over the Same Subnet (With CD Media)**

This example creates an x86 install server with x86 CD media.

This example has the following conditions:

- The install client is on the same subnet as the install server.
- The network installation uses a graphical user interface (GUI) in a desktop session.
- General conditions for this example are listed at Chapter 8, "Installing Over the Network (Examples)."

1. **Create and set up an x86 install server.**

EXAMPLE 8–4 x86: **Install Over the Same Subnet (With CD Media)** *(Continued)*

The following steps create an install server by copying the following CDs to the install server's `/export/home/cdx86` directory.

a. Insert the Oracle Solaris Software - 1 CD in the system's drive.

b. Use the following command. This command creates a directory for the CD image and changes to the `Tools` directory on the mounted disc. This command then copies the image in the drive to the install server's hard disk.

```
# mkdir -p /export/home/dvdx86
# cd /cdrom/cdrom0/Solaris_10/Tools
# ./setup_install_server /export/home/cdx86
```

c. Insert the Oracle Solaris Software - 2 CD in the system's CD-ROM drive.

d. Use the following command. This command changes to the `Tools` directory on the mounted CD. Then this command copies the CD in the CD-ROM drive to the install server's hard disk and changes to the root (`/`) directory.

```
# cd /cdrom/cdrom0/Solaris_10/Tools
# ./add_to_install_server /export/home/cdx86
# cd /
```

e. Repeat the previous commands for each Oracle Solaris Software CD that you want to install.

f. Insert the first Oracle Solaris Languages CD in the system's CD-ROM drive.

g. Use the following command. This command changes to the `Tools` directory on the mounted CD. This command then copies the CD in the CD-ROM drive to the install server's hard disk.

```
# cd /cdrom/cdrom0/Solaris_10/Tools
# ./add_to_install_server /export/home/cdx86
```

h. Eject the CD.

i. Repeat the previous commands for each Oracle Solaris Languages for SPARC Platforms CD CD that you want to install.

2. **Add systems to be installed from the network.**

In this example, the install client is named `basil`, which is an x86 system. The file system `/export/home/cdx86/Solaris_10/Tools` contains the `add_install_client` command.

a. Add the client to the install server's `/etc/ethers` file. On the client, find the ethers address. The `/etc/ethers` map is taken from the local file.

```
# ifconfig -a grep ether
ether 8:0:20:b3:39:1d
```

b. On the install server, open the `/etc/ethers` file in an editor. Add the address to the list.

c. Use the following command. This command changes to the `Tools` directory on the current Oracle Solaris release CD image on the install server. Then this command adds the client system to be installed from the network.

EXAMPLE 8–4 x86: **Install Over the Same Subnet (With CD Media)** *(Continued)*

```
install_server# cd /export/home/cdx86/Solaris_10/Tools
install_server# ./add_install_client basil i86pc
```

3. **Install the system with a network installation image.**

   This step describes how to install an x86 based system over the network with the GRUB boot loader.

   a. In the system BIOS, instruct the system to boot from the network.

      After you exit BIOS, the system installs from the network. The GRUB menu is displayed.

   b. To install the Oracle Solaris OS from the network, select the appropriate Oracle Solaris entry on the menu, then press Enter.

      The installation selection screen is displayed.

   c. To install with the Oracle Solaris interactive installation GUI, type 1, then press Enter.

      The installation program begins.

   d. If you are prompted, answer the system configuration questions.

      After you confirm the system configuration information, the Welcome to Oracle Solaris panel appears.

   e. After the system boots and installs over the network, instruct the system to boot from the disk drive on subsequent boots.

   Note – When you boot the system after the installation, a GRUB menu lists the operating systems that are installed, including the newly-installed Oracle Solaris OS. Select which operating system you want to boot. The default selection loads if you do not make another selection.

For further information, see the following references.

Procedure	Reference
For a more detailed explanation about the network installation procedures that are used in this example	Chapter 6, "Installing From the Network With CD Media (Tasks)"
For information about how to complete an interactive installation with the Oracle Solaris installation GUI	"To Install or Upgrade With the Oracle Solaris Installation Program With GRUB" in *Oracle Solaris 10 1/13 Installation Guide: Basic Installations*
For overview information about the GRUB boot loader	Chapter 6, "SPARC and x86 Based Booting (Overview and Planning)," in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade*

◆ ◆ ◆ CHAPTER 9

Installing From the Network (Command Reference)

This chapter lists the commands used to set up network installations. This chapter includes the following topics.

Network Installation Commands

The following table describes the commands you use to install Oracle Solaris software over the network and indicates the platform to which the commands apply.

Command	Platform	Description
`add_install_client`	All	A command that adds network installation information about a system to an install server or boot server from the network. See the `add_install_client`(1M) man page for more information.
`setup_install_server`	All	A script that copies the current Oracle Solaris release DVD or CDs to an install server's local disk or copies the boot software to a boot server. See the `setup_install_server`(1M) man page for more information.
(CD media only) `add_to_install_server`	All	A script that copies additional packages within a product tree on the CDs to the local disk on an existing install server. See the `add_to_install_server`(1M) man page for more information.
`mount`	All	A command that enables the mounting of file systems and shows the mounted file systems, including the file system on the Oracle Solaris DVD or Oracle Solaris Software and Oracle Solaris Languages CDs. See the `mount`(1M) man page for more information.
`showmount -e`	All	A command that lists all the shared file systems that are located on a remote host. See the `showmount`(1M) man page for more information.

Command	Platform	Description
`prtconf -b`	SPARC	A command for determining a system's platform name, for example, SUNW, Ultra-5_10, or i86pc. You might need the system's platform name when you install the Oracle Solaris software. See the `prtconf(1M)` man page for more information.
`patchadd -C` *net_install_image*	All	A command to add patches to the files that are located in the miniroot, `Solaris_10 /Tools/Boot`, on a net installation image of a DVD or CD that is created by `setup_install_server`. This facility enables you to patch Oracle Solaris installation commands and other miniroot-specific commands. *net_install_image* is the absolute path name of the net installation image. **Caution –** Don't use the `patchadd -C` command unless you have read the `Patch README` instructions or have contacted your local Oracle support office. For more information, see the following references: ■ Chapter 7, "Patching the Miniroot Image (Tasks)" ■ The `patchadd(1M)` man page
`reset`	SPARC	An Open Boot PROM command for resetting the system and rebooting the machine. If you boot and see a series of error messages about I/O interrupts, press the Stop and A keys at the same time, and then type `reset` at the `ok` or > PROM prompt.
`banner`	SPARC	An Open Boot PROM command that displays system information, such as model name, Ethernet address, and memory installed. You can issue this command only at the `ok` or > PROM prompt.

x86: GRUB Menu Commands for Installation

You can customize the network boot and installation of your system by editing the commands in the GRUB menu. This section describes several commands and arguments you can insert in the commands in the GRUB menu.

In the GRUB menu, you can access the GRUB command line by typing **b** at the prompt. A command line that is similar to the following output is displayed.

```
kernel /Solaris_10_x86/multiboot kernel/unix
-B install_media=192.168.2.1:/export/cdrom0/boot
module /platform/i86pc/boot_archive
```

You can edit this command line to customize your boot and installation. The following table describes several common commands you might want to use. For a complete list of boot arguments that you can use with the `-B` option, see the `eeprom(1M)` man page.

Note – To add multiple arguments with the `-B` option, separate the arguments with a comma.

TABLE 9–1 x86: GRUB Menu Commands and Options

Command/Option	Description and Examples

`install`	Insert this option before the `-B` option to perform a JumpStart installation.
	`kernel /Solaris_10_x86/multiboot install`
	`-B install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`

TABLE 9–1 x86: GRUB Menu Commands and Options *(Continued)*

Command/Option	Description and Examples

url|`ask`	Specifies the location of the JumpStart files or prompts you for the location. Insert either option with the `install` option.
	■ *url* - Specifies the path to the files. You can specify a URL for files that are located in the following places:
	■ Local hard disk
	`file://`*JumpSstart-dir-path/compressed-config-file*
	`For example:`
	`kernel /Solaris_10_x86/multiboot install`
	`file://jumpstart/config.tar`
	`-B install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`
	■ NFS server
	`nfs://`*server_name:IP-address/JumpStart-dir/compressed-config-file*
	`For example:`
	`kernel /Solaris_10_x86/multiboot install`
	`myserver:192.168.2.1/jumpstart/config.tar`
	`-B install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`
	■ HTTP server
	`http://`*server-name:IP-address/JumpStart-dir/compressed-config-fileproxy-info*
	■ If you placed a `sysidcfg` file in the compressed configuration file, you must specify the IP address of the server that contains the file, as in the following example:
	`kernel /Solaris_10_x86/multiboot install`
	`http://192.168.2.1/jumpstart/config.tar`
	`-B install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`
	■ If you saved the compressed configuration file on an HTTP server that is behind a firewall, you must use a proxy specifier during boot. You do not need to specify an IP address for the server that contains the file. You must specify an IP address for the proxy server, as in the following example:
	`kernel /Solaris_10_x86/multiboot install`
	`http://www.shadow.com/jumpstart/config.tar&proxy=131.141.6.151`
	`-B install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`

TABLE 9–1 x86: GRUB Menu Commands and Options *(Continued)*

Command/Option	Description and Examples

url|`ask` *(continued)*	■ `ask` - When used with the `install` option, specifies that the installation program prompt you to type the location of the compressed configuration file after the system boots and connects to the network. If you use this option, you are not able to do a completely hands off JumpStart installation.
	If you bypass the prompt by pressing Return, the Oracle Solaris installation program interactively configures the network parameters. The installation program then prompts you for the location of the compressed configuration file.
	The following example performs a JumpStart and boots from a network installation image. You are prompted to input the location of the configuration file after the system connects to the network.
	`kernel /Solaris_10_x86/multiboot install ask`
	`-B install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`

`dhcp`	Insert this option before the `-B` option to instruct the installation programs to use a DHCP server to obtain network installation information that is needed to boot the system. If you do not specify to use a DHCP server by typing `dhcp`, the system uses the `/etc/bootparams` file or the naming service `bootparams` database. For example, you would not specify `dhcp` if you wanted keep a static IP address.
	`kernel /Solaris_10_x86/multiboot dhcp`
	`-B install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`

`- text`	Insert this option before the `-B` option to perform a text-based installation in a desktop session.
	`kernel /Solaris_10_x86/multiboot - text`
	`-B install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`

`- nowin`	Insert this option before the `-B` option to perform a text-based installation in a console session.
	`kernel /Solaris_10_x86/multiboot - nowin`
	`-B install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`

`console=`*serial-console*	Use this argument with the `-B` option to instruct the system to use a serial console, such as `ttya` (COM1) or `ttyb` (COM2).
	`kernel /Solaris_10_x86/multiboot -B console=ttya`
	`install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`

TABLE 9–1 x86: GRUB Menu Commands and Options *(Continued)*

Command/Option	Description and Examples

`ata-dma-enabled=[0|1]`	Use this argument with the `-B` option to enable or disable Advanced Technology Attachment (ATA) or Integrated Drive Electronics (IDE) devices and Direct Memory Access (DMA) during the installation.
	`kernel /Solaris_10_x86/multiboot -B ata-dma-enabled=0`
	`install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`

`acpi-enum=[0|1]`	Use this argument with the `-B` option to enable or disable Advanced Configuration and Power Interface (ACPI) power management.
	`kernel /Solaris_10_x86/multiboot -B acpi-enum=0`
	`install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`

`atapi-cd-dma-enabled=[0|1]`	Use this argument with the `-B` option to enable or disable DMA for CD or DVD drives during the installation.
	`kernel /Solaris_10_x86/multiboot -B atapi-cd-dma-enabled=0`
	`install_media=192.168.2.1:/export/cdrom0/boot`
	`module /platform/i86pc/boot_archive`
	Note – The DMA name *atapi* is the current variable name used for DMA. This variable is subject to change.

PART III

Installing Over a Wide Area Network

This part describes how to use the WAN boot installation method to install a system over a wide area network (WAN).

◆ ◆ ◆ CHAPTER 10

WAN Boot (Overview)

This chapter provides an overview of the WAN boot installation method. This chapter describes the following topics:

What Is WAN Boot?

The WAN boot installation method enables you to boot and install software over a wide area network (WAN) by using HTTP. By using WAN boot, you can install the Oracle Solaris OS on SPARC based systems over a large public network where the network infrastructure might be untrustworthy. You can use WAN boot with security features to protect data confidentiality and installation image integrity.

The WAN boot installation method enables you to transmit an encrypted flash archive, a feature of Oracle Solaris, over a public network to a remote SPARC based client. The WAN boot programs then install the client system by performing a JumpStart installation. To protect the integrity of the installation, you can use private keys to authenticate and encrypt data. You can also transmit your installation data and files over a secure HTTP connection by configuring your systems to use digital certificates.

To perform a WAN boot installation, you install a SPARC based system by downloading the following information from a web server over a HTTP or secure HTTP connection:

- `wanboot` program – The `wanboot` program is the second-level boot program that loads the WAN boot miniroot, client configuration files, and installation files. The `wanboot` program performs tasks similar to those that are performed by the `ufsboot` or `inetboot` second level boot programs.

- WAN boot file system – WAN boot uses several different files to configure the client and retrieve data to install the client system. These files are located in the `/etc/netboot` directory of the web server. The `wanboot-cgi` program transmits these files to the client as a file system, called the WAN boot file system.
- WAN boot miniroot – The WAN boot miniroot is a version of the Oracle Solaris miniroot that has been modified to perform a WAN boot installation. The WAN boot miniroot, like the Oracle Solaris miniroot, contains a kernel and just enough software to install the Oracle Solaris environment. The WAN boot miniroot contains a subset of the software in the Oracle Solaris miniroot.
- JumpStart configuration files – To install the system, WAN boot transmits `sysidcfg`, `rules.ok`, and profile files to the client. WAN boot then uses these files to perform a JumpStart installation on the client system.
- Flash Archive – A fash archive is a collection of files that you copy from a master system. You can then use this archive to install a client system. WAN boot uses the JumpStart installation method to install a flash archive on the client system. After you install an archive on a client system, the system contains the exact configuration of the master system.

Note – The `flarcreate` command no longer has size limitations on individual files. You can create a flash archive that contains individual files over 4 GB.

For more information, see "Creating an Archive That Contains Large Files" in *Oracle Solaris 10 1/13 Installation Guide: Flash Archives (Creation and Installation)*.

You then install the archive on the client by using the JumpStart installation method.

You can protect the transfer of the installation information by using keys and digital certificates.

For a more detailed description of the sequence of events in a WAN boot installation, see "How WAN Boot Works (Overview)" on page 129.

When to Use WAN Boot

The WAN boot installation method enables you to install SPARC based systems that are located in geographically remote areas. You might want to use WAN boot to install remote servers or clients that are accessible only over a public network.

If you want to install systems that are located on your local area network (LAN), the WAN boot installation method might require more configuration and administration than necessary. For information about how to install systems over a LAN, see Chapter 4, "Installing From the Network (Overview)."

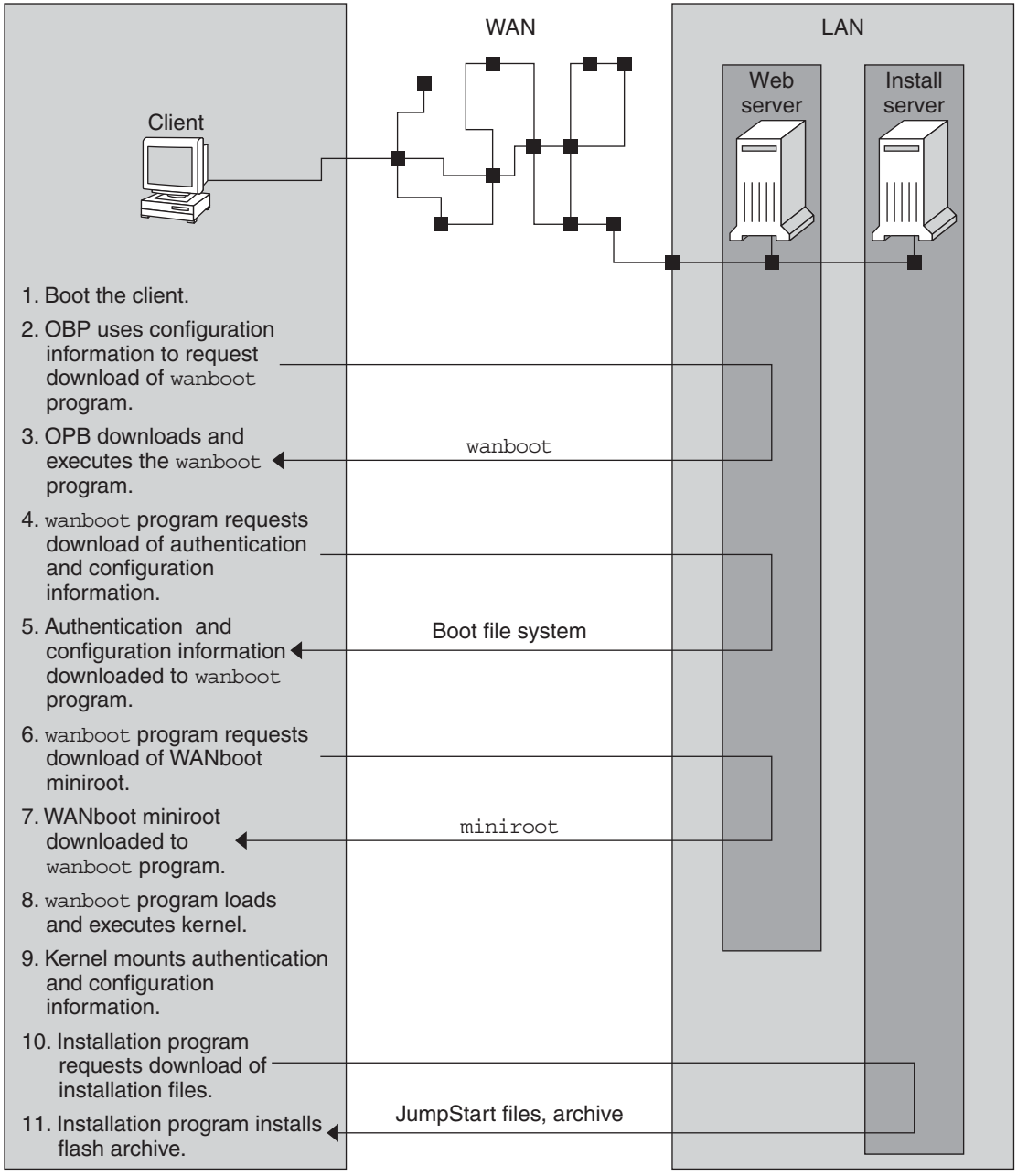
How WAN Boot Works (Overview)

WAN boot uses a combination of servers, configuration files, Common Gateway Interface (CGI) programs, and installation files to install a remote SPARC based client. This section describes the general sequence of events in a WAN boot installation.

Sequence of Events in a WAN Boot Installation

The following figure shows the basic sequence of events in a WAN boot installation. In this figure, a SPARC based client retrieves configuration data and installation files from a web server and an install server over a WAN.

FIGURE 10–1 Sequence of Events in a WAN Boot Installation



1. You boot the client in one of the following ways:

- Boot from the network by setting network interface variables in the Open Boot PROM (OBP).
- Boot from the network with the DHCP option.
- Boot from a local CD-ROM.

2. The client OBP obtains configuration information from one of the following sources:
   - From boot argument values that are typed at the command line by the user
   - From the DHCP server, if the network uses DHCP
3. The client OBP requests the WAN boot second level boot program (`wanboot`).

   The client OBP downloads the `wanboot` program from the following sources:
   - From a special web server, called the WAN boot server, by using HTTP
   - From a local CD-ROM (not shown in the figure)
4. The `wanboot` program requests the client configuration information from the WAN boot server.
5. The `wanboot` program downloads configuration files that are transmitted by the `wanboot-cgi` program from the WAN boot server. The configuration files are transmitted to the client as the WAN boot file system.
6. The `wanboot` program requests the download of the WAN boot miniroot from the WAN boot server.
7. The `wanboot` program downloads the WAN boot miniroot from the WAN boot server by using HTTP or secure HTTP.
8. The `wanboot` program loads and executes the UNIX kernel from the WAN boot miniroot.
9. The UNIX kernel locates and mounts the WAN boot file system for use by the Oracle Solaris installation program.
10. The installation program requests the download of a flash archive and JumpStart files from an install server.

    The installation program downloads the archive and JumpStart files over an HTTP or HTTPS connection.
11. The installation program performs a JumpStart installation to install the flash archive on the client.

Protecting Data During a WAN Boot Installation

The WAN boot installation method enables you to use hashing keys, encryption keys, and digital certificates to protect your system data during the installation. This section briefly describes the different data protection methods that are supported by the WAN boot installation method.

Checking the Integrity of Data With a Hashing Key

To protect the data you transmit from the WAN boot server to the client, you can generate a Hashed Message Authentication Code (HMAC) key. You install this hashing key on both the WAN boot server and the client. The WAN boot server uses this key to sign the data to be transmitted to the client. The client then uses this key to verify the integrity of the data that is transmitted by the WAN boot server. After you install a hashing key on a client, the client uses this key for future WAN boot installations.

For instructions about how to use a hashing key, see "How to Create a Hashing Key and an Encryption Key" on page 162.

Encrypting Data With Encryption Keys

The WAN boot installation method enables you to encrypt the data you transmit from the WAN boot server to the client. You can use WAN boot utilities to create a Triple Data Encryption Standard (3DES) or Advanced Encryption Standard (AES) encryption key. You can then provide this key to both the WAN boot server and the client. WAN boot uses this encryption key to encrypt the data sent from the WAN boot server to the client. The client can then use this key to decrypt the encrypted configuration files and security files that are transmitted during the installation.

Once you install an encryption key on a client, the client uses this key for future WAN boot installations.

To determine whether your site permits encryption, ask your site's security administrator. If your site permits encryption, ask your security administrator which type of encryption key you should use.

For instructions on how to use encryption keys, see "How to Create a Hashing Key and an Encryption Key" on page 162.

Protecting Data by Using HTTPS

WAN boot supports the use of HTTP over Secure Sockets Layer (HTTPS) to transfer data between the WAN boot server and the client. By using HTTPS, you can require the server, or both the server and the client, to authenticate themselves during the installation. HTTPS also encrypts the data that is transferred from the server to the client during the installation.

HTTPS uses digital certificates to authenticate systems that exchange data over the network. A digital certificate is a file that identifies a system, either a server or client, as a system to trust during online communication. You can request a digital certificate from an external certificate authority, or create your own certificate and certificate authority.

To enable the client to trust the server and accept data from the server, you must install a digital certificate on the server. You then instruct the client to trust this certificate. You can also require

the client to authenticate itself to the servers by providing a digital certificate to the client. You can then instruct the server to accept the certificate's signer when the client presents the certificate during the installation.

To use digital certificates during the installation, you must configure your web server to use HTTPS. See your web server documentation for information about how to use HTTPS.

For information about the requirements to use digital certificates during your WAN boot installation, see "Digital Certificate Requirements" on page 143. For instructions about how to use digital certificates in your WAN boot installation, see "How to Use Digital Certificates for Server and Client Authentication" on page 160.

Security Configurations Supported by WAN Boot (Overview)

WAN boot supports varying levels of security. You can use a combination of the security features that are supported in WAN boot to meet the needs of your network. A more secure configuration requires more administration, but also protects your system data to a greater extent. For more critical systems or systems you want to install over a public network, you might choose the configuration in "Secure WAN Boot Installation Configuration" on page 133. For less critical systems, or systems on semi-private networks, consider the configuration that is described in "Insecure WAN Boot Installation Configuration" on page 134.

This section briefly describes the different configurations you can use to set the level of security for your WAN boot installation. The section also describes the security mechanisms that are required by these configurations.

Secure WAN Boot Installation Configuration

This configuration protects the integrity of the data exchanged between the server and client, and helps keep the contents of the exchange confidential. This configuration uses an HTTPS connection, and uses either the 3DES or AES algorithm to encrypt the client configuration files. This configuration also requires the server to authenticate itself to the client during the installation. A secure WAN boot installation requires the following security features:

- HTTPS enabled on the WAN boot server and the install server
- HMAC SHA1 hashing key on the WAN boot server and the client
- 3DES or AES encryption key for the WAN boot server and the client
- Digital certificate of a certificate authority for the WAN boot server

If you want to also require client authentication during the installation, you must also use the following security features:

- Private key for the WAN boot server
- Digital certificate for the client

For a list of the tasks that are required to install with this configuration, see Table 12–1.

Insecure WAN Boot Installation Configuration

This security configuration requires the least administration effort but provides the least secure transfer of data from the web server to the client. You do not need to create a hashing key, encryption key, or digital certificates. You do not need to configure your web server to use HTTPS. However, this configuration transfers the installation data and files over an HTTP connection, which leaves your installation vulnerable to interception over the network.

If you want the client to check the integrity of the data that is transmitted, you can use an HMAC SHA1 hashing key with this configuration. However, the flash archive is not protected by the hashing key. The archive is transferred insecurely between the server and the client during the installation.

For a list of the tasks that are required to install with this configuration, see Table 12–1.

◆ ◆ ◆ CHAPTER 11

Preparing to Install With WAN Boot (Planning)

This chapter describes how to prepare your network for a WAN boot installation. This chapter describes the following topics:

WAN Boot Requirements and Guidelines

The section describes the system requirements to perform a WAN boot installation.

TABLE 11–1 System Requirements for WAN Boot Installation

System and Description	Requirements
WAN boot server – The WAN boot server is a web server that provides the `wanboot` program, the configuration and security files, and the WAN boot miniroot.	■ Operating system – Solaris 9 12/03 OS or a compatible version ■ Must be configured as a web server ■ Web server software must support HTTP 1.1 ■ If you want to use digital certificates, the web server software must support HTTPS

TABLE 11–1 System Requirements for WAN Boot Installation *(Continued)*

System and Description	Requirements
Install server – The install server provides the flash archive and JumpStart files that are required to install the client.	■ Available disk space – space for each flash archive ■ Media drive – CD-ROM or DVD-ROM drive ■ Operating system – Solaris 9 12/03 OS or a compatible version If the install server is a different system than the WAN boot server, the install server must meet these additional requirements: ■ Must be configured as a web server ■ Web server software must support HTTP 1.1 ■ If you want to use digital certificates, the web server software must support HTTPS
Client system – The remote system you want to install over a WAN	■ Memory - At least 1.5 GB of RAM ■ CPU – UltraSPARC II processor minimum ■ Hard disk – At least 2 GB of hard disk space ■ OBP – WAN boot-enabled PROM If the client does not have the appropriate PROM, the client must have a CD-ROM drive. To determine whether your client has a WAN boot-enabled PROM, see "How to Check the Client OBP for WAN Boot Support" on page 153.
(Optional) DHCP server – You can use a DHCP server to provide client configuration information.	If you are using an Oracle Solaris DHCP server, you must perform one of the following tasks: ■ Upgrade the server to be an EDHCP server. ■ Rename Oracle vendor options to satisfy the eight-character limit on options. For more information about the WAN installation-specific Oracle vendor options, see "Providing Configuration Information With a DHCP Server" on page 177. If the DHCP server is on a different subnet than the client, you must configure a BOOTP relay agent. For more information about how to configure a BOOTP relay agent, see Chapter 14, "Configuring the DHCP Service (Tasks)," in *Oracle Solaris Administration: IP Services*.
(Optional) Logging server – By default, all booting and installation log messages are displayed on the client console during a WAN installation. If you want to view these messages on another system, you can specify a system to serve as a logging server.	Must be configured as a web server. **Note –** If you use HTTPS during your installation, the logging server must be the same system as the WAN boot server.

TABLE 11–1 System Requirements for WAN Boot Installation *(Continued)*

System and Description	Requirements
(Optional) Proxy server – You can configure the WAN boot feature to use an HTTP proxy during the download of the installation data and files.	If the installation uses HTTPS, the proxy server must be configured to tunnel HTTPS.

Web Server Software Requirements and Guidelines

The web server software you use on your WAN boot server and install server must meet the following requirements:

- Operating system requirements – WAN boot provides a CGI program (`wanboot-cgi`) that converts data and files into a specific format that the client machine expects. To perform a WAN boot installation with these scripts, the web server software must run on the Solaris 9 12/03 OS or a compatible version.
- File size limitations – Your web server software might limit the size of the files you can transmit over HTTP. Check your web server documentation to make sure the software can transmit files that are the size of a flash archive.

  Note – The `flarcreate` command no longer has size limitations on individual files. You can create a flash archive that contains individual files over 4 GB.

  For more information, see "Creating an Archive That Contains Large Files" in *Oracle Solaris 10 1/13 Installation Guide: Flash Archives (Creation and Installation)*.

- SSL support – If you want to use HTTPS in your WAN boot installation, the web server software must support SSL version 3.

Server Configuration Options

You can customize the configuration of the servers that are required by WAN boot to meet your network needs. You can host all the servers on one system, or place the servers on multiple systems.

- **Single server** – If you want to centralize the WAN boot data and files on one system, you can host all the servers on the same machine. You can administer all your different servers on one system, and you only need to configure one system as a web server. However, a single server might not be able to support the volume of traffic that is required for a large number of simultaneous WAN boot installations.

- **Multiple servers** – If you want to distribute the installation data and files across your network, you can host these servers on multiple machines. You might set up a central WAN boot server and configure multiple install servers to host flash archives across your network. If you host the install server and logging server on independent machines, you must configure those servers as web servers.

Storing Installation and Configuration Files in the Document Root Directory

The `wanboot-cgi` program transmits the following files during a WAN boot installation.

- `wanboot` program
- WAN boot miniroot
- JumpStart files
- Flash archive

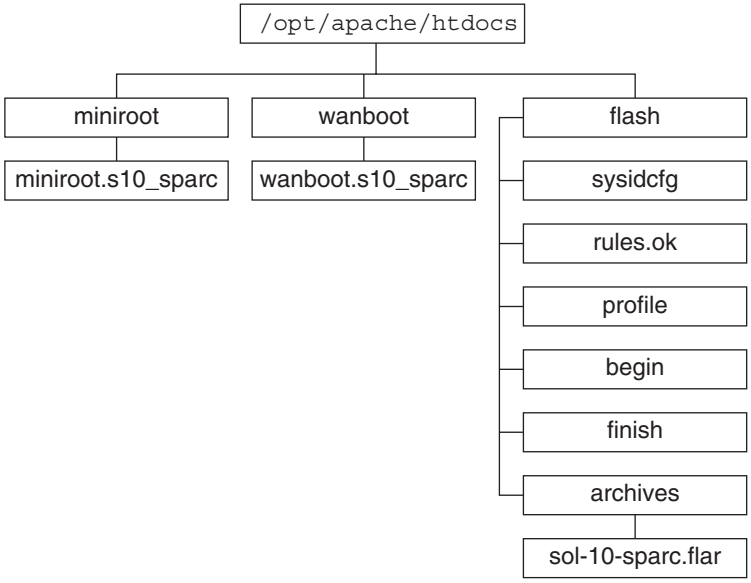
To enable the `wanboot-cgi` program to transmit these files, you must store these files in a directory that is accessible to the web server software. One way to make these files accessible is to place these files in the *document root* on your web server.

The document root, or primary document directory, is the directory on your web server where you store files you want to make available to clients. You can name and configure this directory in your web server software. See your web server documentation for more information about setting up the document root directory on your web server.

You might want to create different subdirectories of the document root directory to store your different installation and configuration files. For example, you might want to create specific subdirectories for each group of clients that you want to install. If you plan to install several different releases of the Oracle Solaris OS across your network, you might create subdirectories for each release.

The following figure shows a basic sample structure for a document root directory. In this example, the WAN boot server and install server are on the same machine. The server is running the Apache web server software.

FIGURE 11–1 Sample Structure for Document Root Directory



This sample document directory uses the following structure:

- The `/opt/apache/htdocs` directory is the document root directory.
- The WAN boot miniroot (`miniroot`) directory contains the WAN boot miniroot.
- The `wanboot` directory contains the `wanboot` program.
- The flash (`flash`) directory contains the JumpStart files that are required to install the client and the subdirectory `archives`. The `archives` directory contains the current Oracle Solaris release flash archive.

Note – If the WAN boot server and the install server are different systems, you might want to store the `flash` directory on the install server. Ensure that these files and directories are accessible to the WAN boot server.

For information about how to create the document root directory, see your web server documentation. For detailed instructions about how to create and store these installation files, see "Creating the JumpStart Installation Files" on page 164.

Storing Configuration and Security Information in the /etc/netboot Hierarchy

The /etc/netboot directory contains the configuration information, private key, digital certificate, and certificate authority that are required for a WAN boot installation. This section describes the files and directories you can create in the /etc/netboot directory to customize your WAN boot installation.

Customizing the Scope of the WAN Boot Installation

During the installation, the wanboot-cgi program searches for the client information in the /etc/netboot directory on the WAN boot server. The wanboot-cgi program converts this information into the WAN boot file system, and then transmits the WAN boot file system to the client. You can create subdirectories within the /etc/netboot directory to customize the scope of the WAN installation. Use the following directory structures to define how configuration information is shared among the clients that you want to install:

- **Global configuration** – If you want all the clients on your network to share configuration information, store the files that you want to share in the /etc/netboot directory.
- **Network-specific configuration** – If you want only those machines on a specific subnet to share configuration information, store the configuration files that you want to share in a subdirectory of /etc/netboot. The subdirectory naming convention should be:

  /etc/netboot/*net-IP*

  net-IP is the IP address of the client's subnet. For example, if you want all systems on the subnet with the IP address of 192.168.255.0 to share configuration files, create a /etc/netboot/192.168.255.0 directory. Then, store the configuration files in this directory.
- **Client-specific configuration** – If you want only a specific client to use the boot file system, store the boot file system files in a subdirectory of /etc/netboot. The subdirectory naming convention should be:

  /etc/netboot/*net-IP*/*client-ID*

  net-IP is the IP address of the subnet. *client-ID* is either the client ID that is assigned by the DHCP server, or a user-specified client ID. For example, if you want a system with the client ID 010003BA152A42 on the subnet 192.168.255.0 to use specific configuration files, create a /etc/netboot/192.168.255.0/010003BA152A42 directory. Then, store the appropriate files in this directory.

Specifying Security and Configuration Information in the /etc/netboot Directory

You specify the security and configuration information by creating the following files and storing the files in the /etc/netboot directory:

- `wanboot.conf` – This file specifies the client configuration information for a WAN boot installation.
- System configuration file (`system.conf`) – This system configuration file specifies the location of the client's `sysidcfg` file and JumpStart files.
- `keystore` – This file contains the client's HMAC SHA1 hashing key, 3DES or AES encryption key, and SSL private key.
- `truststore` – This file contains the digital certificates of certificate signing authorities that the client should trust. These trusted certificates instruct the client to trust the server during the installation.
- `certstore` – This file contains the client's digital certificate.

Note – The `certstore` file must be located in the client ID directory. See "Customizing the Scope of the WAN Boot Installation" on page 140 for more information about subdirectories of the `/etc/netboot` directory.

For detailed instructions on how to create and store these files, see the following procedures:

- "How to Create the System Configuration File" on page 172
- "How to Create the `wanboot.conf` File" on page 174
- "How to Create a Hashing Key and an Encryption Key" on page 162
- "How to Use Digital Certificates for Server and Client Authentication" on page 160

Sharing Security and Configuration Information in the `/etc/netboot` Directory

To install clients on your network, you might want to share security and configuration files among several different clients, or across entire subnets. You can share these files by distributing your configuration information throughout the `/etc/netboot/`*net-IP*`/`*client-ID*, `/etc/netboot/`*net-IP*, and `/etc/netboot` directories. The `wanboot-cgi` program searches these directories for the configuration information that best fits the client, and uses that information during the installation.

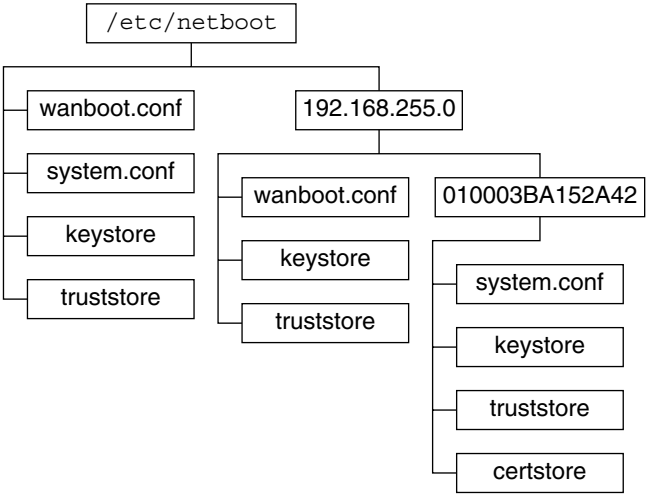
The `wanboot-cgi` program searches for client information in the following order:

1. `/etc/netboot/`*net-IP*`/`*client-ID* – The `wanboot-cgi` program first checks for configuration information that is specific to the client machine. If the `/etc/netboot/`*net-IP*`/`*client-ID* directory contains all the client configuration information, the `wanboot-cgi` program does not check for configuration information elsewhere in the `/etc/netboot` directory.
2. `/etc/netboot/`*net-IP* – If all the required information is not located in the `/etc/netboot/`*net-IP*`/`*client-ID* directory, the `wanboot-cgi` program then checks for subnet configuration information in the `/etc/netboot/`*net-IP* directory.

3. `/etc/netboot` – If the remaining information is not located in the `/etc/netboot/`*net-IP* directory, the `wanboot-cgi` program then checks for global configuration information in the `/etc/netboot` directory.

The following figure demonstrates how you can set up the `/etc/netboot` directory to customize your WAN boot installations.

FIGURE 11–2 Sample `/etc/netboot` Directory



The `/etc/netboot` directory layout in the figure enables you to perform the following WAN boot installations:

- When you install the client `010003BA152A42`, the `wanboot-cgi` program uses the following files in the `/etc/netboot/192.168.255.0/010003BA152A42` directory:
  - `system.conf`
  - `keystore`
  - `truststore`
  - `certstore`

  The `wanboot-cgi` program then uses the `wanboot.conf` file in the `/etc/netboot/192.168.255.0` directory.
- When you install a client that is located on the `192.168.255.0` subnet, the `wanboot-cgi` program uses the `wanboot.conf`, `keystore`, and `truststore` files in the `/etc/netboot/192.168.255.0` directory. The `wanboot-cgi` program then uses the `system.conf` file in the `/etc/netboot` directory.
- When you install a client machine that is not located on the `192.168.255.0` subnet, the `wanboot-cgi` program uses the following files in the `/etc/netboot` directory:

- `wanboot.conf`
- `system.conf`
- `keystore`
- `truststore`

Storing the `wanboot-cgi` Program

The `wanboot-cgi` program transmits the data and files from the WAN boot server to the client. You must ensure that this program is in a directory on the WAN boot server that is accessible to the client. One method to make this program accessible to the client is to store this program in the `cgi-bin` directory of the WAN boot server. You might need to configure your web server software to use the `wanboot-cgi` program as a CGI program. See your web server documentation for information about CGI program requirements.

Digital Certificate Requirements

If you want to add security to your WAN boot installation, you can use digital certificates to enable server and the client authentication. WAN boot can use a digital certificate to establish the identity of the server or the client during an online transaction. Digital certificates are issued by a certificate authority (CA). These certificates contain a serial number, expiration dates, a copy of the certificate holder's public key, and the certificate authority's digital signature.

If you want to require server or both client and server authentication during your installation, you must install digital certificates on the server. Follow these guidelines when you use digital certificates:

- If you want to use digital certificates, the digital certificates must be formatted as part of a Public-Key Cryptography Standards #12 (PKCS#12) file.
- If you create your own certificates, you must create the certificates as PKCS#12 files.
- If you receive your certificates from third-party certificate authorities, request your certificates in the PKCS#12 format.

For detailed instructions about how to use PKCS#12 certificates during your WAN boot installation, see "How to Use Digital Certificates for Server and Client Authentication" on page 160.

WAN Boot Security Limitations

While WAN boot provides several different security features, WAN boot does not address these potential insecurities:

- **Denial of service (DoS) attacks** – A denial of service attack can take many forms, with the goal of preventing users from accessing a specific service. A DoS attack can overwhelm a network with large amounts of data, or aggressively consume limited resources. Other DoS attacks manipulate the data that is transmitted between systems in transit. The WAN boot installation method does not protect servers or clients from DoS attacks.
- **Corrupted binaries on the servers** – The WAN boot installation method does not check the integrity of the WAN boot miniroot or the flash archive before you perform your installation. Therefore, before you perform your installation, check the integrity of your Oracle Solaris binaries against the Oracle Solaris Fingerprint Database at My Oracle Support (MOS) at `http://support.oracle.com`.
- **Encryption key and hashing key privacy** – If you use encryption keys or a hashing key with WAN boot, you must type the key value on the command line during your installation. Follow the precautions that are necessary for your network to make sure that these key values remain private.
- **Compromise of the network naming service** – If you use a naming service on your network, check the integrity of your name servers before you perform your WAN boot installation.

Gathering Information for WAN Boot Installations

You need to gather a wide variety of information to configure your network for a WAN boot installation. You might want to write down this information as you prepare to install over a WAN.

Table 11–2 and Table 11–3 are worksheets to record the WAN boot installation information for your network.

TABLE 11–2 Worksheet for Collecting Server Information

Information Needed	Notes
Install server information: ■ Path to the WAN boot miniroot on install server ■ Path to the JumpStart files on the install server	

TABLE 11–2 Worksheet for Collecting Server Information *(Continued)*

Information Needed	Notes
WAN boot server information: ■ Path to the `wanboot` program on the WAN boot server ■ URL of the `wanboot-cgi` program on the WAN boot server ■ Path to the client's subdirectory in the `/etc/netboot` hierarchy on the WAN boot server ■ (Optional) File name of the PKCS#12 certificate file ■ (Optional) Host names of any machines other than the WAN boot server that are required for WAN installation ■ (Optional) IP address and TCP port number of the network's proxy server Optional server information: ■ URL of the `bootlog-cgi` script on the logging server ■ IP address and TCP port number of the network's proxy server	

TABLE 11–3 Worksheet for Collecting Client Information

Information	Notes
IP address for the client's subnet	
IP address for the client's router	
IP address of the client	
Subnet mask for the client	
Host name for the client	
MAC address of the client	

◆ ◆ ◆ CHAPTER 12

Installing With WAN Boot (Tasks)

This chapter describes the following tasks that are necessary to prepare your network for a WAN boot installation:

Installing Over a Wide Area Network (Task Maps)

The following table list the tasks you need to perform to prepare for secure and insecure WAN boot installation:

To use a DHCP server or a logging server, complete the optional task listed at the bottom of the table.

TABLE 12–1 Task Map: Preparing to Perform a WAN Boot Installation

Task	Description	For Instructions
Decide which security features you want to use in your installation.	Review the security features and configurations to decide the level of security you want to use in your WAN boot installation.	"Protecting Data During a WAN Boot Installation" on page 131 "Security Configurations Supported by WAN Boot (Overview)" on page 133
Collect WAN boot installation information.	Complete the worksheet to record all the information you need to perform a WAN boot installation.	"Gathering Information for WAN Boot Installations" on page 144

TABLE 12–1 Task Map: Preparing to Perform a WAN Boot Installation *(Continued)*

Task	Description	For Instructions
Create the document root directory on the WAN boot server.	Create the document root directory and any subdirectories to serve the configuration and installation files.	"Creating the Document Root Directory" on page 149
Create the WAN boot miniroot.	Use the `setup_install_server` command to create the WAN boot miniroot.	"SPARC: How to Create a WAN Boot Miniroot" on page 150
Verify that the client system supports WAN boot.	Check the client OBP for boot argument support of WAN boot.	"How to Check the Client OBP for WAN Boot Support" on page 153
Install the `wanboot` program on the WAN boot server.	Copy the `wanboot` program to the document root directory of the WAN boot server.	"Installing the `wanboot` Program on the WAN Boot Server" on page 154
Install the `wanboot-cgi` program on the WAN boot server.	Copy the `wanboot-cgi` program to the WAN boot server's CGI directory.	"How to Copy the `wanboot-cgi` Program to the WAN Boot Server" on page 157
(Optional) Set up the logging server.	Configure a dedicated system for displaying boot and installation log messages.	"How to Configure the WAN Boot Logging Server" on page 158
Set up the `/etc/netboot` hierarchy.	Populate the `/etc/netboot` hierarchy with the configuration and security files that are required for a WAN boot installation.	"Creating the `/etc/netboot` Hierarchy on the WAN Boot Server" on page 155
For a more secure WAN boot installation, configure the web server to use secure HTTP.	Identify the web server requirements that are necessary to perform a WAN installation with HTTPS.	"Protecting Data by Using HTTPS" on page 159
For a more secure WAN boot installation, format digital certificates .	Split a PKCS#12 file into a private key and a certificate to use with the WAN installation.	"How to Use Digital Certificates for Server and Client Authentication" on page 160
Create a hashing key — For a more secure WAN boot installation create an encryption key.	Use the `wanbootutil keygen` command to create HMAC SHA1, 3DES, or AES keys. For insecure installations that check data integrity, complete this task to create an HMAC SHA1 hashing key.	"How to Create a Hashing Key and an Encryption Key" on page 162
Create the flash archive.	Use the `flarcreate` command to create an archive of the software that you want to install on the client.	"How to Create the Flash Archive" on page 165

TABLE 12–1 Task Map: Preparing to Perform a WAN Boot Installation *(Continued)*

Task	Description	For Instructions
Create the installation files for the JumpStart, a feature of Oracle Solaris, installation.	Use a text editor to create the following files: ■ `sysidcfg` ■ `profile` ■ `rules.ok` ■ `begin scripts` ■ `finish scripts`	"How to Create the `sysidcfg` File" on page 166 "How to Create the JumpStart Profile" on page 167 "How to Create the JumpStart `rules` File" on page 169 "Creating Begin and Finish Scripts" on page 170
Create the system configuration file.	Set the configuration information in the `system.conf` file.	"How to Create the System Configuration File" on page 172
Create the WAN boot configuration file.	Set the configuration information in the `wanboot.conf` file.	"How to Create the `wanboot.conf` File" on page 174
(Optional) Configure the DHCP server to support a WAN boot installation.	Set Oracle vendor options and macros in the DHCP server.	"Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45

Configuring the WAN Boot Server

The WAN boot server is a web server that provides the boot and configuration data during a WAN boot installation. For a list of the system requirements for the WAN boot server, see Table 11–1.

This section describes the following tasks required to configure the WAN boot server for a WAN boot installation:

- "Creating the Document Root Directory" on page 149
- "Creating the WAN Boot Miniroot" on page 150
- "Installing the `wanboot` Program on the WAN Boot Server" on page 154
- "Creating the `/etc/netboot` Hierarchy on the WAN Boot Server" on page 155
- "Copying the WAN Boot CGI Program to the WAN Boot Server" on page 157
- "Protecting Data by Using HTTPS" on page 159

Creating the Document Root Directory

To serve the configuration and installation files, you must make these files accessible to the web server software on the WAN boot server. One method to make these files accessible is to store them in the WAN boot server's document root directory.

If you want to use a document root directory to serve the configuration and installation files, you must create this directory. See your web server documentation for information about how to create the document root directory. For detailed information about how to design your document root directory, see "Storing Installation and Configuration Files in the Document Root Directory" on page 138.

For an example of how to set up this directory, see "Create the Document Root Directory" on page 201.

After you create the document root directory, create the WAN boot miniroot. For instructions, see "Creating the WAN Boot Miniroot" on page 150.

Creating the WAN Boot Miniroot

WAN boot uses a special Oracle Solaris miniroot that has been modified to perform a WAN boot installation. The WAN boot miniroot contains a subset of the software in the Oracle Solaris miniroot. To perform a WAN boot installation, you must copy the miniroot from the Oracle Solaris DVD or the Oracle Solaris Software - 1 CD to the WAN boot server. Use the `-w` option of the `setup_install_server` command to copy the WAN boot miniroot from the Oracle Solaris software media to your system's hard disk.

▼ SPARC: How to Create a WAN Boot Miniroot

This procedure creates a SPARC WAN boot miniroot with SPARC media. If you want to serve a SPARC WAN boot miniroot from an x86–based server, you must create the miniroot on a SPARC machine. After you create the miniroot, copy the miniroot to the document root directory on the x86–based server.

Before You Begin This procedure assumes that the WAN boot server is running Solaris Volume Manager. If you are not using Solaris Volume Manager, see *System Administration Guide: Devices and File Systems*.

The boot server system must meet the following requirements.

- Include a CD-ROM or DVD-ROM drive
- Be part of the site's network and naming service

  If you use a naming service, the system must already be in a naming service, such as NIS, NIS+, DNS, or LDAP. If you do not use a naming service, you must distribute information about this system by following your site's policies.

1 Become superuser or assume an equivalent role on the WAN boot server.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Insert the Oracle Solaris Software - 1 CD or the Oracle Solaris DVD in the install server's drive.

3 Create a directory for the WAN boot miniroot and Oracle Solaris installation image.

```
# mkdir -p WAN-dir install-dir
```

`-p` Instructs the `mkdir` command to create all the necessary parent directories for the directory you want to create.

WAN-dir Specifies the directory where the WAN boot miniroot is to be created on the install server. This directory needs to accommodate miniroots that are typically 250 MB in size.

install-dir Specifies the directory on the install server where the Oracle Solaris software image is to be copied. This directory can be removed later in this procedure.

4 Change to the `Tools` directory on the mounted disc.

```
# cd /cdrom/cdrom0/Solaris_10/Tools
```

`cdrom0` is the path to the drive that contains the Oracle Solaris OS media.

5 Copy the WAN boot miniroot and the Oracle Solaris software image to the WAN boot server's hard disk.

```
# ./setup_install_server -w WAN-dir install-dir
```

Note – The `setup_install_server` command indicates whether you have enough disk space available for the Oracle Solaris Software disc images. To determine available disk space, use the `df -kl` command.

The `setup_install_server -w` command creates the WAN boot miniroot and a network installation image of the Oracle Solaris software.

6 (Optional) Remove the network installation image.

You do not need the Oracle Solaris software image to perform a WAN installation with a flash archive. If you do not plan to use the network installation image for other network installations, remove the network installation image to free the disk space.

```
# rm -rf install-dir
```

7 Make the WAN boot miniroot available to the WAN boot server in one of the following ways:

- **Create a symbolic link to the WAN boot miniroot in the document root directory of the WAN boot server.**

  ```
  # cd /document-root-dir/miniroot
  # ln -s /WAN-dir/miniroot .
  ```

document-root-dir/miniroot	Specifies the directory in the WAN boot server's document root directory where you want to link to the WAN boot miniroot.
/*WAN-dir*/miniroot	Specifies the path to the WAN boot miniroot.

- **Move the WAN boot miniroot to the document root directory on the WAN boot server.**

  ```
  # mv /WAN-dir/miniroot /document-root-dir/miniroot/miniroot-name
  ```

Example 12–1 Creating the WAN Boot Miniroot

Use the setup_install_server(1M) command with the -w option to copy the WAN boot miniroot and the Oracle Solaris software image to the /export/install/Solaris_10 directory of wanserver-1.

Insert the Oracle Solaris Software media in the media drive that is attached to wanserver-1.

```
wanserver-1# mkdir -p /export/install/cdrom0
wanserver-1# cd /cdrom/cdrom0/Solaris_10/Tools
wanserver-1# ./setup_install_server -w /export/install/cdrom0/miniroot \
/export/install/cdrom0
```

Move the WAN boot miniroot to the document root directory (/opt/apache/htdocs/) of the WAN boot server. In this example the name of the WAN boot miniroot is miniroot.s10_sparc.

```
wanserver-1# mv /export/install/cdrom0/miniroot/miniroot \
/opt/apache/htdocs/miniroot/miniroot.s10_sparc
```

Next Steps After you create the WAN boot miniroot, verify that the client OpenBoot PROM (OBP) supports WAN boot. For instructions, see "Verifying WAN Boot Support on the Client" on page 153.

See Also For additional information about the setup_install_server command, see the install_scripts(1M) man page.

Verifying WAN Boot Support on the Client

To perform an unattended WAN boot installation, the client system's OpenBoot PROM (OBP) must support WAN boot. If the client's OBP does not support WAN boot, you can perform a WAN boot installation by providing the necessary programs on a local CD.

You can determine whether the client supports WAN boot by checking the client's OBP configuration variables.

▼ How to Check the Client OBP for WAN Boot Support

1 Become superuser or assume an equivalent role.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

2 Check the OBP configuration variables for WAN boot support.

```
# eeprom | grep network-boot-arguments
```

- If the variable `network-boot-arguments` is displayed or if the command returns the output `network-boot-arguments: data not available`, the OBP supports WAN boot installations. You do not need to update the OBP before you perform your WAN boot installation.
- If the command does not return any output, the OBP does not support WAN boot installations. You must perform one of the following tasks.
  - If the client has an OBP that is capable of supporting WAN boot installations, update the OBP. See your system documentation for information.
  - If the current OBP does not provide WAN boot support, perform the WAN boot installation from the Oracle Solaris Software CD1 or DVD after you complete the preparation tasks and are ready to install the client.

    For instructions about how to boot the client from CD1, see "How to Perform a WAN Boot Installation With Local CD Media" on page 194. To continue preparing for the WAN boot installation, see "Creating the `/etc/netboot` Hierarchy on the WAN Boot Server" on page 155.

Next Steps If the client OBP supports WAN boot, you must copy the `wanboot` program to the WAN boot server. For instructions, see "Installing the `wanboot` Program on the WAN Boot Server" on page 154.

If the client OBP does not support WAN boot, you do not need to copy the `wanboot` program to the WAN boot server. You must provide the `wanboot` program to the client on a local CD. To continue the installation, see "Creating the `/etc/netboot` Hierarchy on the WAN Boot Server" on page 155.

See Also For additional information about the `setup_install_server` command, see Chapter 4, "Installing From the Network (Overview)."

Installing the `wanboot` Program on the WAN Boot Server

WAN boot uses a special second-level boot program (`wanboot`) to install the client. The `wanboot` program loads the WAN boot miniroot, client configuration files, and installation files that are required to perform a WAN boot installation.

To perform a WAN boot installation, you must provide the `wanboot` program to the client during the installation. You can provide this program to the client in the following ways:

- If your client's PROM supports WAN boot, you can transmit the program from the WAN boot server to the client. You must install the `wanboot` program on the WAN boot server.

  To find out how to check whether your client's PROM supports WAN boot, see "How to Check the Client OBP for WAN Boot Support" on page 153.
- If your client's PROM does not support WAN boot, you must provide the program to the client on a local CD. Go to "Creating the `/etc/netboot` Hierarchy on the WAN Boot Server" on page 155 to continue preparing for your installation.

▼ SPARC: How to Install the `wanboot` Program on the WAN Boot Server

This procedure assumes that the WAN boot server is running Solaris Volume Manager. If you are not using Solaris Volume Manager, see *System Administration Guide: Devices and File Systems*.

Before You Begin Verify that your client system supports WAN boot. See "How to Check the Client OBP for WAN Boot Support" on page 153 for more information.

1 Become superuser or assume an equivalent role on the install server.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

2. **Insert the Oracle Solaris Software - 1 CD or the Oracle Solaris DVD in the install server's drive.**

3. **Change to the `sun4u` platform directory on the Oracle Solaris Software - 1 CD or the Oracle Solaris DVD.**

   ```
   # cd /cdrom/cdrom0/Solaris_10/Tools/Boot/platform/sun4u/
   ```

4. **Copy the `wanboot` program to the install server.**

   ```
   # cp wanboot /document-root-dir/wanboot/wanboot-name
   ```

document-root-dir	Specifies the document root directory of the WAN boot server.
wanboot-name	Specifies the name of the `wanboot` program. Name this file descriptively, for example, `wanboot.s10_sparc`.

5. **Make the `wanboot` program available to the WAN boot server in one of the following ways:**

   - Create a symbolic link to the `wanboot` program in the document root directory of the WAN boot server.

     ```
     # cd /document-root-dir/wanboot
     # ln -s /WAN-dir/wanboot
     ```

document-root-dir`/wanboot`	Specifies the directory in the WAN boot server's document root directory where you want to link to the `wanboot` program
/*WAN-dir*`/wanboot`	Specifies the path to the `wanboot` program

   - Move the WAN boot miniroot to the document root directory on the WAN boot server.

     ```
     # mv /wan-dir/wanboot /document-root-dir/wanboot/wanboot-name
     ```

Next Steps After you install the `wanboot` program on the WAN boot server, you must create the `/etc/netboot` hierarchy on the WAN boot server. For instructions, see "Creating the `/etc/netboot` Hierarchy on the WAN Boot Server" on page 155.

Creating the `/etc/netboot` Hierarchy on the WAN Boot Server

During the installation, WAN boot refers to the contents of the `/etc/netboot` hierarchy on the web server for instructions about how to perform the installation. This directory contains the configuration information, private key, digital certificate, and certificate authority required for a WAN boot installation. During the installation, the `wanboot-cgi` program converts this information into the WAN boot file system. The `wanboot-cgi` program then transmits the WAN boot file system to the client.

You can create subdirectories within the `/etc/netboot` directory to customize the scope of the WAN installation. For information about directory structures to define how configuration information is shared among the clients that you want to install, see "Customizing the Scope of the WAN Boot Installation" on page 140.

For detailed planning information about these configurations, see "Storing Configuration and Security Information in the `/etc/netboot` Hierarchy" on page 140.

How to Create the `/etc/netboot` Hierarchy on the WAN Boot Server

1 Become superuser or assume an equivalent role on the WAN boot server.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

2 Create the `/etc/netboot` directory.

```
# mkdir /etc/netboot
```

3 Change the permissions of the `/etc/netboot` directory to 700.

```
# chmod 700 /etc/netboot
```

4 Change the owner of the `/etc/netboot` directory to the web server owner.

```
# chown web-server-user:web-server-group /etc/netboot/
```

web-server-user Specifies the user owner of the web server process.

web-server-group Specifies the group owner of the web server process.

5 Exit the superuser role.

```
# exit
```

6 Assume the user role of the web server owner.

7 Create the client subdirectory of the `/etc/netboot` directory.

```
# mkdir -p /etc/netboot/net-IP/client-ID
```

`-p` Instructs the `mkdir` command to create all the necessary parent directories for the directory you want to create.

(Optional) *net-IP* Specifies the network IP address of the client's subnet.

(Optional) *client-ID* Specifies the client ID. The client ID can be a user-defined value or the DHCP client ID. The *client-ID* directory must be a subdirectory of the *net-ip* directory.

8 **For each directory in the `/etc/netboot` hierarchy, change the permissions to 700.**

```
# chmod 700 /etc/netboot/dir-name
```

Example 12–2 Creating the `/etc/netboot` Hierarchy on the WAN Boot Server

The following example shows how to create the `/etc/netboot` hierarchy for the client `010003BA152A42` on subnet `192.168.198.0`. In this example, the user `nobody` and the group `admin` own the web server process.

```
# cd /
# mkdir /etc/netboot/
# chmod 700 /etc/netboot
# chown nobody:admin /etc/netboot
# exit
server# su nobody
Password:
nobody# mkdir -p /etc/netboot/192.168.198.0/010003BA152A42
nobody# chmod 700 /etc/netboot/192.168.198.0
nobody# chmod 700 /etc/netboot/192.168.198.0/010003BA152A42
```

Next Steps After you create the `/etc/netboot` hierarchy, you must copy the WAN Boot CGI program to the WAN boot server. For instructions, see "Copying the WAN Boot CGI Program to the WAN Boot Server" on page 157.

Copying the WAN Boot CGI Program to the WAN Boot Server

The `wanboot-cgi` program creates the data streams that transmit the following files from the WAN boot server to the client:

- `wanboot` program
- WAN boot file system
- WAN boot miniroot

The `wanboot-cgi` program is installed on the system when you install the current Oracle Solaris release software. To enable the WAN boot server to use this program, copy this program to the `cgi-bin` directory of the WAN boot server.

▼ How to Copy the `wanboot-cgi` Program to the WAN Boot Server

1 **Become superuser or assume an equivalent role on the WAN boot server.**

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 **Copy the `wanboot-cgi` program to the WAN boot server.**

```
# cp /usr/lib/inet/wanboot/wanboot-cgi /WAN-server-root/cgi-bin/wanboot-cgi
```

/WAN-server-root Specifies the root directory of the web server software on the WAN boot server.

3 **On the WAN boot server, change the permissions of the CGI program to 755.**

```
# chmod 755 /WAN-server-root/cgi-bin/wanboot-cgi
```

Next Steps After you copy the WAN boot CGI program to the WAN boot server, you can optionally set up a logging server. For instructions, see "How to Configure the WAN Boot Logging Server" on page 158.

If you do not want to set up a separate logging server, see "Protecting Data by Using HTTPS" on page 159 for instructions about how to set up the security features of a WAN boot installation.

▼ How to Configure the WAN Boot Logging Server

By default, all WAN boot logging messages are displayed on the client system. This default behavior enables you to quickly debug any installation issues.

If you want to record boot and installation logging messages on a system other than the client, you must set up a logging server. If you want to use a logging server with HTTPS during the installation, you must configure the WAN boot server as the logging server.

1 **Copy the `bootlog-cgi` script to the logging server's CGI script directory.**

```
# cp /usr/lib/inet/wanboot/bootlog-cgi \    log-server-root/cgi-bin
```

log-server-root`/cgi-bin` Specifies the `cgi-bin` directory in the logging server's web server directory

2 **Change the permissions of the `bootlog-cgi` script to 755.**

```
# chmod 755 log-server-root/cgi-bin/bootlog-cgi
```

3 **Set the value of the `boot_logger` parameter in the `wanboot.conf` file.**

In the `wanboot.conf` file, specify the URL of the `bootlog-cgi` script on the logging server.

For more information about setting parameters in the `wanboot.conf` file, see "How to Create the `wanboot.conf` File" on page 174.

During the installation, boot and installation log messages are recorded in the `/tmp` directory of the logging server. The log file is named `bootlog.`*hostname*, where *hostname* is the host name of the client.

Example 12–3 Configuring a Logging Server for WAN Boot Installation Over HTTPS

The following example configures the WAN boot server as a logging server.

```
# cp /usr/lib/inet/wanboot/bootlog-cgi /opt/apache/cgi-bin/
# chmod 755 /opt/apache/cgi-bin/bootlog-cgi
```

Next Steps After you set up the logging server, you can optionally set up the WAN boot installation to use digital certificates and security keys. See "Protecting Data by Using HTTPS" on page 159 for instructions about how to set up the security features of a WAN boot installation.

Protecting Data by Using HTTPS

To protect your data during the transfer from the WAN boot server to the client, you can use HTTP over Secure Sockets Layer (HTTPS). To use the more secure installation configuration that is described in "Secure WAN Boot Installation Configuration" on page 133, you must enable your web server to use HTTPS.

If you do not want to perform a secure WAN boot, skip the procedures in this section. To continue preparing for your less secure installation, see "Creating the JumpStart Installation Files" on page 164.

To enable the web server software on the WAN boot server to use HTTPS, you must perform the following tasks.

- Activate Secure Sockets Layer (SSL) support in your web server software.

  The processes for enabling SSL support and client authentication vary by web server. This document does not describe how to enable these security features on your web server. For information about these features, see your web server documentation. For information about activating SSL on the Apache web server, see the Apache Documentation Project at `http://httpd.apache.org/docs-project/`.
- Install digital certificates on the WAN boot server.

  For information about using digital certificates with WAN boot, see "How to Use Digital Certificates for Server and Client Authentication" on page 160.
- Provide a trusted certificate to the client.

  For instructions about how to create a trusted certificate, see "How to Use Digital Certificates for Server and Client Authentication" on page 160.

- Create a hashing key and an encryption key.

  For instructions about how to create keys, see "How to Create a Hashing Key and an Encryption Key" on page 162.
- (Optional) Configure the web server software to support client authentication.

  For information about how to configure your web server to support client authentication, see your web server documentation.

This section describes how to use digital certificates and keys in your WAN boot installation.

▼ How to Use Digital Certificates for Server and Client Authentication

The WAN boot installation method can use PKCS#12 files to perform an installation over HTTPS with server or both client and server authentication. For requirements and guidelines about using PKCS#12 files, see "Digital Certificate Requirements" on page 143.

If you do not want to perform a secure WAN boot, skip to "Creating the JumpStart Installation Files" on page 164.

Before You Begin Before you split a PKCS#12 file, create the appropriate subdirectories of the `/etc/netboot` hierarchy on the WAN boot server.

- For overview information that describes the `/etc/netboot` hierarchy, see "Storing Configuration and Security Information in the `/etc/netboot` Hierarchy" on page 140.
- For instructions about how to create the `/etc/netboot` hierarchy, see "Creating the `/etc/netboot` Hierarchy on the WAN Boot Server" on page 155.

1 Assume the same user role as the web server user on the WAN boot server.

2 Extract the trusted certificate from the PKCS#12 file by inserting the certificate in the client's `truststore` file in the `/etc/netboot` hierarchy.

```
# wanbootutil p12split -i p12cert \
-t /etc/netboot/net-IP/client-ID/truststore
```

`p12split`
Splits a PKCS#12 file into separate private key and certificate files.

`-i` *p12cert*
Specifies the name of the PKCS#12 file to split.

`-t /etc/netboot/`*net-IP*`/`*client-ID*`/truststore`
Inserts the certificate in the client's `truststore` file. *net-IP* is the IP address of the client's subnet. *client-ID* can be a user-defined ID or the DHCP client ID.

3 (Optional) If you want to require client authentication:

- Insert the client certificate in the client's `certstore`.

  ```
  # wanbootutil p12split -i p12cert -c \
  /etc/netboot/net-IP/client-ID/certstore -k keyfile
  ```

  `-i` *p12cert*
  Specifies the name of the PKCS#12 file to split.

  `-c /etc/netboot/`*net-IP*`/`*client-ID*`/certstore`
  Inserts the client's certificate in the client's `certstore`. *net-IP* is the IP address of the client's subnet. *client-ID* can be a user-defined ID or the DHCP client ID.

  `-k` *keyfile*
  Specifies the name of the client's SSL private key file to create from the split PKCS#12 file.

- Insert the private key in the client's `keystore`.

  ```
  # wanbootutil keymgmt -i -k keyfile \
  -s /etc/netboot/net-IP/client-ID/keystore -o type=rsa
  ```

  `keymgmt -i`
  Inserts an SSL private key in the client's `keystore`.

  `-k` *keyfile*
  Specifies the name of the client's private key file that was created in the previous step

  `-s /etc/netboot/`*net-IP*`/`*client-ID*`/keystore`.
  Specifies the path to the client's `keystore`

  `-o type=rsa`
  Specifies the key type as RSA

Example 12–4 Creating a Trusted Certificate for Server Authentication

In the following example, you use a PKCS#12 file to install client `010003BA152A42` on subnet `192.168.198.0`. This command sample extracts a certificate from a PKCS#12 file that is named `client.p12`. The command then places the contents of the trusted certificate in the client's `truststore` file.

Before you execute these commands, you must first assume the same user role as the web server user. In this example, the web server user role is `nobody`.

```
server# su nobody
Password:
nobody# wanbootutil p12split -i client.p12 \
-t /etc/netboot/192.168.198.0/010003BA152A42/truststore
nobody# chmod 600 /etc/netboot/192.168.198.0/010003BA152A42/truststore
```

Next Steps After you create a digital certificate, create a hashing key and an encryption key. For instructions, see"How to Create a Hashing Key and an Encryption Key" on page 162.

See Also For more information about how to create trusted certificates, see the `wanbootutil(1M)` man page.

How to Create a Hashing Key and an Encryption Key

If you want to use HTTPS to transmit your data, you must create a HMAC SHA1 hashing key and an encryption key. If you plan to install over a semi—private network, you might not want to encrypt the installation data. You can use a HMAC SHA1 hashing key to check the integrity of the `wanboot` program.

If you do not want to perform a secure WAN boot, skip to "Creating the JumpStart Installation Files" on page 164.

1 Assume the same user role as the web server user on the WAN boot server.

2 Create the master HMAC SHA1 key.

```
# wanbootutil keygen -m
```

3 Create the HMAC SHA1 hashing key for the client from the master key.

```
# wanbootutil keygen -c -o [net=net-IP,{cid=client-ID,}]type=sha1
```

`-c`	Creates the client's hashing key from the master key.
`-o`	Indicates that additional options are included for the `wanbootutil keygen` command.
(Optional) `net=`*net-IP*	Specifies the IP address for the client's subnet. If you do not use the `net` option, the key is stored in the `/etc/netboot/keystore` file and can be used by all WAN boot clients.
(Optional) `cid=`*client-ID*	Specifies the client ID. The client ID can be a user-defined ID or the DHCP client ID. The `cid` option must be preceded by a valid `net=` value. If you do not specify the `cid` option with the `net` option, the key is stored in the `/etc/netboot/`*net-IP*`/keystore` file. This key can be used by all WAN boot clients on the *net-IP* subnet.
`type=sha1`	Instructs the `wanbootutil keygen` utility to create a HMAC SHA1 hashing key for the client.

4 If you are performing a more secure WAN installation over HTTPS with server authentication, create an encryption key for the client.

You need to create an encryption key to perform a WAN boot installation over HTTPS. Before the client establishes an HTTPS connection with the WAN boot server, the WAN boot server transmits encrypted data and information to the client. The encryption key enables the client to decrypt this information and use this information during the installation.

If you only want to check the integrity of the `wanboot` program, you do not need to create an encryption key. See"Installing Keys on the Client" on page 182.

```
# wanbootutil keygen -c -o [net=net-IP,{cid=client-ID,}]type=key-type
```

`-c`	Creates the client's encryption key.
`-o`	Indicates that additional options are included for the `wanbootutil keygen` command.
(Optional) `net=`*net-IP*	Specifies the network IP address for the client. If you do not use the `net` option, the key is stored in the `/etc/netboot/keystore` file and can be used by all WAN boot clients.
(Optional) `cid=`*client-ID*	Specifies the client ID. The client ID can be a user-defined ID, or the DHCP client ID. The `cid` option must be preceded by a valid `net=` value. If you do not specify the `cid` option with the `net` option, the key is stored in the `/etc/netboot/`*net-ip*`/keystore` file. This key can be used by all WAN boot clients on the *net-ip* subnet.
`type=`*key-type*	Instructs the `wanbootutil keygen` utility to create an encryption key for the client. *key-type* can have a value of `3des` or `aes`.

Example 12–5 Creating Required Keys for WAN Boot Installation Over HTTPS

The following example creates a master HMAC SHA1 key for the WAN boot server. This example also creates a HMAC SHA1 hashing key and 3DES encryption key for client 010003BA152A42 on subnet 192.168.198.0.

Before you execute these commands, you must first assume the same user role as the web server user. In this example, the web server user role is `nobody`.

```
server# su nobody
Password:
nobody# wanbootutil keygen -m
nobody# wanbootutil keygen -c -o net=192.168.198.0,cid=010003BA152A42,type=sha1
nobody# wanbootutil keygen -c -o net=192.168.198.0,cid=010003BA152A42,type=3des
```

Next Steps After you create a hashing and an encryption key, you must create the installation files. For instructions, see "Creating the JumpStart Installation Files" on page 164

For instructions about how to install keys on the client, see "Installing Keys on the Client" on page 182.

See Also For overview information about hashing keys and encryption keys, see "Protecting Data During a WAN Boot Installation" on page 131.

For more information about how to create hashing and encryption keys, see the `wanbootutil(1M)` man page.

Creating the JumpStart Installation Files

WAN boot performs a JumpStart installation to install a flash archive on the client. The JumpStart installation method is a command–line interface that enables you to automatically install several systems based on profiles that you create. The profiles define specific software installation requirements. You can also incorporate shell scripts to include preinstallation and postinstallation tasks. You choose which profile and scripts to use for installation or upgrade.

The JumpStart installation method installs or upgrades the system based on the profile and scripts that you select. Also, you can use a `sysidcfg` file to specify configuration information so that the JumpStart installation is completely free of manual intervention.

The `rules` file is a text file that contains a rule for each group of systems on which you want to install the Oracle Solaris OS. Each rule distinguishes a group of systems that are based on one or more system attributes. Each rule also links each group to a profile. A profile is a text file that defines how the Oracle Solaris software is to be installed on each system in the group. For example, the following rule specifies that the JumpStart program use the information in the `basic_prof` profile to install any system with the `sun4u` platform group:

```
karch sun4u - basic_prof -
```

The `rules` file is used to create the `rules.ok` file, which is required for JumpStart installations.

For detailed information about how to create a `rules` file, see "Creating the rules File" in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

To prepare the JumpStart files for a WAN boot installation, complete the following tasks:

- "How to Create the Flash Archive" on page 165
- "How to Create the `sysidcfg` File" on page 166
- "How to Create the JumpStart `rules` File" on page 169
- "How to Create the JumpStart Profile" on page 167
- "Creating Begin and Finish Scripts" on page 170

For detailed information on the JumpStart installation method, see Chapter 2, "JumpStart (Overview)," in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

How to Create the Flash Archive

The Flash Archive installation feature enables you to use a single reference installation of the Oracle Solaris OS on a system, which is called the master system. You can then create a flash archive, which is a replica image of the master system. You can install the flash archive on other systems in the network, creating clone systems.

Before You Begin

- Before you create a flash archive, you must first install the master system.
  - For information about installing a master system, see "Installing the Master System" in *Oracle Solaris 10 1/13 Installation Guide: Flash Archives (Creation and Installation)*.
  - For detailed information about flash archives, see Chapter 1, "Flash Archive Overview," in *Oracle Solaris 10 1/13 Installation Guide: Flash Archives (Creation and Installation)*.
- File size issues:
  - Check your web server software documentation to verify that the software can transmit files that are the size of a flash archive.
  - The `flarcreate` command no longer has size limitations on individual files. You can create a flash archive that contains individual files over 4 GB.

    For more information, see "Creating an Archive That Contains Large Files" in *Oracle Solaris 10 1/13 Installation Guide: Flash Archives (Creation and Installation)*.

1 Boot the master system.

Run the master system in as inactive a state as possible. When possible, run the system in single-user mode. If that is not possible, shut down any applications that you want to archive and any applications that require extensive operating system resources.

2 Create the archive.

`# flarcreate -n` *name* `[`*optional-parameters*`]` *document-root*`/flash/`*filename*

name	The name that you give the archive, which is the value of the `content_name` keyword.
optional-parameters	You can use several options to the `flarcreate` command to customize your flash archive. For detailed descriptions of these options, see Chapter 6, "Flash Archive (Reference)," in *Oracle Solaris 10 1/13 Installation Guide: Flash Archives (Creation and Installation)*.
document-root`/flash`	The path to the flash subdirectory of the install server's document root directory.
filename	The name of the archive file.

To conserve disk space, you might want to use the `-c` option of the `flarcreate` command to compress the archive. However, a compressed archive can affect the performance of your WAN boot installation. For more information about creating a compressed archive, see the `flarcreate(1M)` man page.

- If the archive creation is successful, the `flarcreate` command returns an exit code of 0.
- If the archive creation fails, the `flarcreate` command returns a nonzero exit code.

Example 12–6 Creating a Flash Archive for a WAN Boot Installation

This example creates a flash archive by cloning the WAN boot server system with the host name `wanserver`. The archive is named `sol_10_sparc`, and is copied exactly from the master system. The archive is an exact duplicate of the master system. The archive is stored in `sol_10_sparc.flar`. The archive is saved in the `flash/archives` subdirectory of the document root directory on the WAN boot server.

```
wanserver# flarcreate -n sol_10_sparc \
/opt/apache/htdocs/flash/archives/sol_10_sparc.flar
```

Next Steps After you create the Flash Archive, preconfigure the client information in the `sysidcfg` file. For instructions, see "How to Create the `sysidcfg` File" on page 166.

See Also For detailed instructions about how to create a flash archive, see Chapter 3, "Creating Flash Archives (Tasks)," in *Oracle Solaris 10 1/13 Installation Guide: Flash Archives (Creation and Installation)*.

For more information about the `flarcreate` command, see the `flarcreate(1M)` man page.

▼ How to Create the `sysidcfg` File

You can specify a set of keywords in the `sysidcfg` file to preconfigure a system.

Before You Begin Create the flash Archive. See "How to Create the Flash Archive" on page 165 for detailed instructions.

1 Create a file called `sysidcfg` on the install server that contains your desired keywords.

For detailed information about `sysidcfg` keywords, see "`sysidcfg` File Keywords" on page 22.

2 Save the `sysidcfg` file in a location that is accessible to the WAN boot server.

Save the file to one of the following locations:

- If the WAN boot server and install server are hosted on the same machine, save this file to the `flash` subdirectory of the document root directory on the WAN boot server.
- If the WAN boot server and install server are not on the same machine, save this file to the `flash` subdirectory of the document root directory of the install server.

Example 12–7 `sysidcfg` File for WAN Boot Installation

The following is an example of a `sysidcfg` file for a SPARC based system. The host name, IP address, and netmask of this system have been preconfigured by editing the naming service.

```
network_interface=primary {hostname=wanclient
                           default_route=192.168.198.1
                           ip_address=192.168.198.210
                           netmask=255.255.255.0
                           protocol_ipv6=no}
timezone=US/Central
system_locale=C
terminal=xterm
timeserver=localhost
name_service=NIS {name_server=matter(192.168.255.255)
                  domain_name=mind.over.example.com
                  }
security_policy=none
```

Next Steps After you create the `sysidcfg` file, create a JumpStart profile for the client. For instructions, see "How to Create the JumpStart Profile" on page 167.

See Also For more detailed information about `sysidcfg` keywords and values, see "Preconfiguring With the `sysidcfg` File" on page 18.

▼ How to Create the JumpStart Profile

A profile is a text file that instructs the JumpStart program how to install the Oracle Solaris software on a system. A profile defines elements of the installation, for example, the software group to install.

For detailed information about how to create profiles, see "Creating a Profile" in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

Before You Begin Create the `sysidcfg` file for the client. See "How to Create the `sysidcfg` File" on page 166 for detailed instructions.

1. **Create a profile on the install server containing the desired keywords and values.**

   Ensure that the name of the profile reflects how you intend to use the profile to install the Oracle Solaris software on a system. For example, you might name the profiles `basic_install`, `eng_profile`, or `user_profile`.

   For a list of profile keywords and values, see "Profile Keywords and Values" in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

   Profile keywords and their values are case sensitive.

2. **Save the profile in a location that is accessible to the WAN boot server.**

   Save the profile in one of the following locations:

   - If the WAN boot server and install server are hosted on the same machine, save this file to the `flash` subdirectory of the document root directory on the WAN boot server.
   - If the WAN boot server and install server are not on the same machine, save this file to the `flash` subdirectory of the document root directory of the install server.

3. **Ensure that `root` owns the profile and that the permissions are set to 644.**

4. **(Optional) Test the profile.**

   For detailed information, see "Testing a Profile" in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

Example 12–8 Retrieving a Flash Archive From a Secure HTTP Server

In the following example, the profile indicates that the JumpStart program retrieves the flash archive from a secure HTTP server.

```
# profile keywords        profile values
# ----------------        -------------------
install_type              flash_install
archive_location          https://192.168.198.2/sol_10_sparc.flar
partitioning              explicit
filesys                   c0t1d0s0 4000 /
filesys                   c0t1d0s1 512 swap
filesys                   c0t1d0s7 free /export/home
```

Some of the keywords and values in this example are as follows:

`install_type`	The profile installs a flash archive on the clone system. All files are overwritten as in an initial installation.
`archive_location`	The compressed flash archive is retrieved from a secure HTTP server.
`partitioning`	The file system slices are determined by the `filesys` keywords, value `explicit`. The size of root (`/`) is based on the size of the flash archive.

The size of `swap` is set to the necessary size and is installed on `c0t1d0s1`. `/export/home` is based on the remaining disk space. `/export/home` is installed on `c0t1d0s7`.

Next Steps After you create a profile, you must create and validate the `rules` file. For instructions, see "How to Create the JumpStart `rules` File" on page 169.

See Also For more information about how to create a profile, see "Creating a Profile" in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

For more detailed information about profile keywords and values, see "Profile Keywords and Values" in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

▼ How to Create the JumpStart `rules` File

Before You Begin Create the profile for the client. See "How to Create the JumpStart Profile" on page 167 for detailed instructions.

1. **On the install server, create a text file that is named `rules`.**

2. **Add a rule in the `rules` file for each group of systems you want to install.**

   For detailed information about how to create a rules file, see "Creating the rules File" in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

3. **Save the `rules` file on the install server.**

4. **Validate the `rules` file.**

   ```
   $ ./check -p path -r file name
   ```

   `-p` *path* — Validates the `rules` by using the `check` script from the current Oracle Solaris release software image instead of the `check` script from the system you are using. *path* is the image on a local disk or a mounted Oracle Solaris DVD or a Oracle Solaris Software - 1 CD.

   Use this option to run the most recent version of `check` if your system is running a previous version of the Oracle Solaris OS.

   `-r` *file name* — Specifies a rules file other than the file that is named `rules`. By using this option, you can test the validity of a rule before you integrate the rule into the `rules` file.

As the `check` script runs, the script reports the checking of the validity of the `rules` file and each profile. If no errors are encountered, the script reports `The custom JumpStart configuration is ok`. The `check` script creates the `rules.ok` file.

5 Save the `rules.ok` file in a location that is accessible to the WAN boot server.

Save the file to one of the following locations:

- If the WAN boot server and install server are hosted on the same machine, save this file to the `flash` subdirectory of the document root directory on the WAN boot server.
- If the WAN boot server and install server are not on the same machine, save this file to the `flash` subdirectory of the document root directory of the install server.

6 Ensure that `root` owns the `rules.ok` file and that the permissions are set to 644.

Example 12–9 Creating and Validating the `rules` File

In this example the JumpStart programs use the `rules` file to select the correct installation profile for the `wanclient-1` system.

The IP address of the client system is `192.168.198.210`, and the netmask is `255.255.255.0`.

This `rules` file, named `wanclient_rule`, instructs the JumpStart programs to use the `wanclient_prof` profile to install the current Oracle Solaris release software on the client.

```
network 192.168.198.0 - wanclient_prof -
```

Run the `check` script to verify that the files are valid.

```
wanserver# ./check -r wanclient_rule
```

If the `check` script does not find any errors, the script creates the `rules.ok` file.

Save the `rules.ok` file in the `/opt/apache/htdocs/flash/` directory.

Next Steps After you create the `rules.ok` file, you can optionally set up begin and finish scripts for your installation. For instructions, see "Creating Begin and Finish Scripts" on page 170.

If you do not want to set up begin and finish scripts, see "Creating the Configuration Files" on page 171 to continue the WAN boot installation.

Creating Begin and Finish Scripts

Begin and finish scripts are user-defined Bourne shell scripts that you specify in the `rules` file. A begin script performs tasks before the Oracle Solaris software is installed on a system. A finish

script performs tasks after the Oracle Solaris software is installed on a system but before the system reboots. You can use these scripts only when using JumpStart to install Oracle Solaris.

You can use begin scripts to create derived profiles. Finish scripts enable you to perform various postinstallation tasks, such as adding files, packages, patches, or additional software.

You must store the begin and finish scripts in the same directory as the `sysidcfg`, `rules.ok`, and profile files on the install server.

- For more information about creating begin scripts, see "Creating Begin Scripts" in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.
- For more information about creating finish scripts, see "Creating Finish Scripts" in *Oracle Solaris 10 1/13 Installation Guide: JumpStart Installations*.

To continue preparing for your WAN boot installation, see "Creating the Configuration Files" on page 171.

Creating the Configuration Files

WAN boot uses the following files to specify the location of the data and files that are required for a WAN boot installation:

- System configuration file (`system.conf`)

  In the system configuration file, you can direct the WAN boot installation programs to the following files:

  - `sysidcfg` file
  - `rules.ok` file
  - JumpStart profile

  WAN boot follows the pointers in the system configuration file to install and configure the client.

  The system configuration file is a plain text file, and must be formatted in the following pattern.

  setting=value
- `wanboot.conf` file
- The `wanboot.conf` file is a plain text configuration file that the WAN boot programs use to perform a WAN installation. The `wanboot-cgi` program, the boot file system, and the WAN boot miniroot all use the information included in the `wanboot.conf` file to install the client machine.

Save the `wanboot.conf` file in the appropriate client subdirectory in the `/etc/netboot` hierarchy on the WAN boot server. For information about how to define the scope of your WAN boot installation with the `/etc/netboot` hierarchy, see "Creating the `/etc/netboot` Hierarchy on the WAN Boot Server" on page 155.

If the WAN boot server is running the current Oracle Solaris release, a sample `wanboot.conf` file is located in `/etc/netboot/wanboot.conf.sample`. You can use this sample as a template for your WAN boot installation.

You must include the information in the following table in the `wanboot.conf` file.

Type of Information	Description
WAN boot server information	■ Path to `wanboot` program on the WAN boot server ■ URL of `wanboot-cgi` program on WAN boot server
Install server information	■ Path to WAN boot miniroot on the install server ■ Path to system configuration file on the WAN boot server that specifies location of `sysidcfg` and JumpStart files
Security information	■ Signature type for the WAN boot file system or WAN boot miniroot ■ Encryption type for the WAN boot file system ■ Whether the server should be authenticated during the WAN boot installation ■ Whether the client should be authenticated during the WAN boot installation
Optional information	■ Additional hosts that might need to be resolved for the client during a WAN boot installation ■ URL to the `bootlog-cgi` script on the logging server

You specify this information by listing parameters with associated values in the following format.

parameter=value

This section describes how to create and store these two files.

▼ How to Create the System Configuration File

This procedure describes how to use a system configuration file to direct the WAN installation programs to the `sysidcfg`, `rules.ok`, and profile files.

Before You Begin Before you create the system configuration file, you must create the installation files for your WAN boot installation. See "Creating the JumpStart Installation Files" on page 164 for detailed instructions.

1 Assume the same user role as the web server user on the WAN boot server.

2 Create a text file named descriptively, for example, `sys-conf.s10–sparc`.

3 Add the following entries to the system configuration file.

`SsysidCF=`*sysidcfg-file-URL*
This setting points to the `flash` directory on the install server that contains the `sysidcfg` file. Make sure that this URL matches the path to the `sysidcfg` file that you created in "How to Create the `sysidcfg` File" on page 166.

For WAN installations that use HTTPS, set the value to a valid HTTPS URL.

`SjumpsCF=`*JumpStart-files-URL*
This setting points to the flash directory on the install server that contains the `rules.ok` file, profile file, and begin and finish scripts. Make sure that this URL matches the path to the JumpStart files that you created in "How to Create the JumpStart Profile" on page 167 and "How to Create the JumpStart `rules` File" on page 169.

For WAN installations that use HTTPS, set the value to a valid HTTPS URL.

4 Save the file to a directory that is accessible to the WAN boot server.

For administration purposes, you might want to save the file to the appropriate client directory in the `/etc/netboot` directory on the WAN boot server.

5 Change the permissions on the system configuration file to 600.

```
# chmod 600 /path/system-conf-file
```

Example 12–10 System Configuration File for WAN Boot Installation Over HTTPS

In the following example, the WAN boot programs check for the `sysidcfg` and JumpStart files on the web server `https://www.example.com` on port 1234. The web server uses secure HTTP to encrypt data and files during the installation.

The `sysidcfg` and JumpStart files are located in the `flash` subdirectory of the document root directory `/opt/apache/htdocs`.

```
SsysidCF=https://www.example.com:1234/flash
SjumpsCF=https://www.example.com:1234/flash
```

Example 12–11 System Configuration File for Insecure WAN Boot Installation

In the following example, the WAN boot programs check for the `sysidcfg` and JumpStart files on the web server `http://www.example.com`. The web server uses HTTP, so the data and files are not protected during the installation.

The `sysidcfg` and JumpStart files are located in the `flash` subdirectory of the document root directory `/opt/apache/htdocs`.

```
SsysidCF=http://www.example.com/flash
SjumpsCF=http://www.example.com/flash
```

Next Steps After you create the system configuration file, create the `wanboot.conf` file. For instructions, see "How to Create the `wanboot.conf` File" on page 174.

▼ How to Create the `wanboot.conf` File

For detailed information about `wanboot.conf` file parameters and syntax, see "`wanboot.conf` File Parameters and Syntax" on page 217.

1. **Assume the same user role as the web server user on the WAN boot server.**

2. **Create the `wanboot.conf` text file.**

   You can create a new text file that is named `wanboot.conf`, or use the sample file that is located in `/etc/netboot/wanboot.conf.sample`. If you use the sample file, rename the file `wanboot.conf` after you add parameters.

3. **Type the `wanboot.conf` parameters and values for your installation.**

   For detailed descriptions of `wanboot.conf` parameters and values, see "`wanboot.conf` File Parameters and Syntax" on page 217.

4. **Save the `wanboot.conf` file to the appropriate subdirectory of the `/etc/netboot` hierarchy.**

   For information about how to create the `/etc/netboot` hierarchy, see "Creating the `/etc/netboot` Hierarchy on the WAN Boot Server" on page 155.

5. **Validate the `wanboot.conf` file.**

   ```
   # bootconfchk /etc/netboot/path/wanboot.conf
   ```

   path Specifies the path to the client's `wanboot.conf` file on the WAN boot server

   - If the `wanboot.conf` file is structurally valid, the `bootconfchk` command returns an exit code of 0.
   - If the `wanboot.conf` file is invalid, the `bootconfchk` command returns a nonzero exit code.

6 Change the permissions on the `wanboot.conf` file to 600.

```
# chmod 600 /etc/netboot/path/wanboot.conf
```

Example 12–12 `wanboot.conf` File for WAN Boot Installation Over HTTPS

The following `wanboot.conf` file example includes configuration information for a WAN installation that uses secure HTTP. The `wanboot.conf` file also indicates that a 3DES encryption key is used in this installation.

```
boot_file=/wanboot/wanboot.s10_sparc
root_server=https://www.example.com:1234/cgi-bin/wanboot-cgi
root_file=/miniroot/miniroot.s10_sparc
signature_type=sha1
encryption_type=3des
server_authentication=yes
client_authentication=no
resolve_hosts=
boot_logger=https://www.example.com:1234/cgi-bin/bootlog-cgi
system_conf=sys-conf.s10–sparc
```

This `wanboot.conf` file specifies the following configuration:

`boot_file=/wanboot/wanboot.s10_sparc`
: The second level boot program is named `wanboot.s10_sparc`. This program is located in the `/wanboot` directory in the WAN boot server's document root directory.

`root_server=https://www.example.com:1234/cgi-bin/wanboot-cgi`
: The location of the `wanboot-cgi` program on the WAN boot server is `https://www.example.com:1234/cgi-bin/wanboot-cgi`. The `https` portion of the URL indicates that this WAN boot installation uses secure HTTP.

`root_file=/miniroot/miniroot.s10_sparc`
: The WAN boot miniroot is named `miniroot.s10_sparc`. This miniroot is located in the `/miniroot` directory in the WAN boot server's document root directory.

`signature_type=sha1`
: The `wanboot.s10_sparc` program and the WAN boot file system are signed with a HMAC SHA1 hashing key.

`encryption_type=3des`
: The `wanboot.s10_sparc` program and the boot file system are encrypted with a 3DES key.

`server_authentication=yes`
: The server is authenticated during the installation.

`client_authentication=no`
: The client is not authenticated during the installation.

`resolve_hosts=`
: No additional host names are needed to perform the WAN installation. All required files and information are located in the document root directory on the WAN boot server.

`boot_logger=https://www.example.com:1234/cgi-bin/bootlog-cgi`
Booting and installation log messages are recorded on the WAN boot server by using secure HTTP.

For instructions on how to set up an optional logging server for your WAN boot installation, see "How to Configure the WAN Boot Logging Server" on page 158.

`system_conf=sys-conf.s10–sparc`
The system configuration file that contains the locations of the `sysidcfg` and JumpStart files is located in a subdirectory of the `/etc/netboot` hierarchy. The system configuration file is named `sys-conf.s10–sparc`.

Example 12–13 `wanboot.conf` File for Insecure WAN Boot Installation

The following `wanboot.conf` file example includes configuration information for a less secure WAN boot installation that uses HTTP. This `wanboot.conf` file also indicates that the installation does not use an encryption key or a hashing key.

```
boot_file=/wanboot/wanboot.s10_sparc
root_server=http://www.example.com/cgi-bin/wanboot-cgi
root_file=/miniroot/miniroot.s10_sparc
signature_type=
encryption_type=
server_authentication=no
client_authentication=no
resolve_hosts=
boot_logger=http://www.example.com/cgi-bin/bootlog-cgi
system_conf=sys-conf.s10–sparc
```

This `wanboot.conf` file specifies the following configuration:

`boot_file=/wanboot/wanboot.s10_sparc`
The second level boot program is named `wanboot.s10_sparc`. This program is located in the `/wanboot` directory in the WAN boot server's document root directory.

`root_server=http://www.example.com/cgi-bin/wanboot-cgi`
The location of the `wanboot-cgi` program on the WAN boot server is `http://www.example.com/cgi-bin/wanboot-cgi`. This installation does not use secure HTTP.

`root_file=/miniroot/miniroot.s10_sparc`
The WAN boot miniroot is named `miniroot.s10_sparc`. This miniroot is located in the `/miniroot` subdirectory in the WAN boot server's document root directory.

`signature_type=`
The `wanboot.s10_sparc` program and the WAN boot file system are not signed with a hashing key.

`encryption_type=`
The `wanboot.s10_sparc` program and the boot file system are not encrypted.

`server_authentication=no`
The server is not authenticated with keys or certificates during the installation.

`client_authentication=no`
The client is not authenticated with keys or certificates during the installation.

`resolve_hosts=`
No additional host names are needed to perform the installation. All required files and information are located in the document root directory on the WAN boot server.

`boot_logger=http://www.example.com/cgi-bin/bootlog-cgi`
Booting and installation log messages are recorded on the WAN boot server.

For instructions on how to set up an optional logging server for your WAN boot installation, see "How to Configure the WAN Boot Logging Server" on page 158.

`system_conf=sys-conf.s10–sparc`
The system configuration file that contains the locations of the `sysidcfg` and JumpStart files is named `sys-conf.s10–sparc`. This file is located in the appropriate client subdirectory of the `/etc/netboot` hierarchy.

Next Steps After you create the `wanboot.conf` file, you can optionally configure a DHCP server to support WAN boot. For instructions, see "Providing Configuration Information With a DHCP Server" on page 177.

If you do not want to use a DHCP server in your WAN boot installation, see "How to Check the `net` Device Alias in the Client OBP" on page 180 to continue the WAN boot installation.

See Also For detailed descriptions of `wanboot.conf` parameters and values, see "`wanboot.conf` File Parameters and Syntax" on page 217 and the man page `wanboot.conf(4)`.

Providing Configuration Information With a DHCP Server

If you use a DHCP server on your network, you can configure the DHCP server to supply the following information:

- Proxy server's IP address
- Location of the `wanboot-cgi` program

You can use the following DHCP vendor options in your WAN boot installation:

`SHTTPproxy`	Specifies the IP address of the network's proxy server
`SbootURI`	Specifies the URL of the `wanboot-cgi` program on the WAN boot server

For information about setting these vendor options on a Oracle Solaris DHCP server, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

For detailed information about setting up a Oracle Solaris DHCP server, see Chapter 14, "Configuring the DHCP Service (Tasks)," in *Oracle Solaris Administration: IP Services*.

To continue with your WAN boot installation, see Chapter 13, "SPARC: Installing With WAN Boot (Tasks)."

◆ ◆ ◆ CHAPTER 13

SPARC: Installing With WAN Boot (Tasks)

This chapter describes how to perform a WAN boot installation on a SPARC based client. For information about how to prepare for a WAN boot installation, see Chapter 12, "Installing With WAN Boot (Tasks)."

This chapter describes the following tasks.

Task Map: Installing a Client With WAN Boot

The following table lists the tasks you need to perform to install a client over a WAN.

TABLE 13–1 Task Map: Performing a WAN Boot Installation

Task	Description	For Instructions
Prepare the network for a WAN boot installation.	Set up the servers and files that are required to perform a WAN boot installation.	Chapter 12, "Installing With WAN Boot (Tasks)"
Verify that the `net` device alias is set correctly in the client OBP.	Use the `devalias` command to verify that the `net` device alias is set to the primary network interface.	"How to Check the `net` Device Alias in the Client OBP" on page 180

TABLE 13–1 Task Map: Performing a WAN Boot Installation *(Continued)*

Task	Description	For Instructions
Provide keys to the client	Provide keys to the client by setting OBP variables or entering key values during the installation. This task is required for secure installation configurations. For insecure installations that check data integrity, complete this task to provide the HMAC SHA1 hashing key to the client.	"Installing Keys on the Client" on page 182
Install the client over a wide area network.	Choose the appropriate method to install your client.	"How to Perform a Noninteractive WAN Boot Installation" on page 187 "How to Perform an Interactive WAN Boot Installation" on page 189 "How to Perform a WAN Boot Installation With a DHCP Server" on page 193 "How to Perform a WAN Boot Installation With Local CD Media" on page 194

Preparing the Client for a WAN Boot Installation

Before you install the client system, prepare the client by performing the following tasks.

▼ How to Check the net Device Alias in the Client OBP

To boot the client from the WAN with the `boot net`, the `net` device alias must be set to the client's primary network device. On most systems, this alias is already set correctly. However, if the alias is not set to the network device you want to use, you must change the alias.

For more information about setting device aliases, see "The Device Tree" in *OpenBoot 3.x Command Reference Manual*.

1 Become superuser or assume an equivalent role on the client.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Bring the system to run level 0.

```
# init 0
```

The ok prompt is displayed.

3 At the ok prompt, check device aliases that are set in the OBP.

```
ok devalias
```

The `devalias` command outputs information that is similar to the following example.

```
screen                   /pci@1f,0/pci@1,1/SUNW,m64B@2
net                      /pci@1f,0/pci@1,1/network@c,1
net2                     /pci@1f,0/pci@1,1/network@5,1
disk                     /pci@1f,0/pci@1/scsi@8/disk@0,0
cdrom                    /pci@1f,0/pci@1,1/ide@d/cdrom@0,0:f
keyboard                 /pci@1f,0/pci@1,1/ebus@1/su@14,3083f8
mouse                    /pci@1f,0/pci@1,1/ebus@1/su@14,3062f8
```

- If the `net` alias is set to the network device you wan to use during the installation, you do not need to reset the alias. Go to "Installing Keys on the Client" on page 182 to continue your installation.
- If the `net` alias is not set to the network device you want to use, you must reset the alias.

4 Set the `net` device alias either permanently or only for this installation.

- To set the `net` device alias for this installation only, use the `devalias` command.

  ```
  ok devalias net device-path
  ```

  `net` *device-path* Assigns the device *device-path* to the `net` alias
- To permanently set the `net` device alias, use the `nvalias` command.

  ```
  ok nvalias net device-path
  ```

  `net` *device-path* Assigns the device *device-path* to the `net` alias

Example 13–1 Checking and Resetting the net Device Alias

The following commands show how to check and reset the `net` device alias.

Check the device aliases.

```
ok devalias
screen                   /pci@1f,0/pci@1,1/SUNW,m64B@2
net                      /pci@1f,0/pci@1,1/network@c,1
net2                     /pci@1f,0/pci@1,1/network@5,1
disk                     /pci@1f,0/pci@1/scsi@8/disk@0,0
```

```
cdrom                    /pci@1f,0/pci@1,1/ide@d/cdrom@0,0:f
keyboard                 /pci@1f,0/pci@1,1/ebus@1/su@14,3083f8
mouse                    /pci@1f,0/pci@1,1/ebus@1/su@14,3062f8
```

If you want to use the `/pci@1f,0/pci@1,1/network@5,1` network device, type the following command:

```
ok devalias net /pci@1f,0/pci@1,1/network@5,1
```

Next Steps After you check the `net` device alias, continue the installation.

- If you are using a hashing key and an encryption key in your installation, see "Installing Keys on the Client" on page 182.
- If you are performing a less secure installation without keys, see "Installing the Client" on page 187.

Installing Keys on the Client

For a more secure WAN boot installation or an insecure installation with data integrity checking, you must install keys on the client. By using a hashing key and an encryption key, you can protect the data that is transmitted to the client. You can install these keys in the following ways.

- Set OBP variables – You can assign key values to OBP network boot argument variables before you boot the client. These keys can then be used for future WAN boot installations of the client.
- Enter the key values during the boot process – You can set key values at the `wanboot` program `boot>` prompt. If you use this method to install keys, the keys are only used for the current WAN boot installation.

You can also install keys in the OBP of a running client. If you want to install keys on a running client, the system must be running the Solaris 9 12/03 OS or a compatible version.

When you install keys on your client, ensure that the key values are not transmitted over an insecure connection. Follow your site's security policies to ensure the privacy of the key values.

- For instructions about how to assign key values to OBP network boot argument variables, see "How to Install Keys in the Client OBP" on page 183.
- For instructions about how to install keys during the boot process, see "How to Perform an Interactive WAN Boot Installation" on page 189.
- For instructions about how to install keys in the OBP of a running client, see "How to Install a Hashing Key and an Encryption Key on a Running Client" on page 185.

How to Install Keys in the Client OBP

You can assign key values to OBP network boot argument variables before you boot the client. These keys can then be used for future WAN boot installations of the client.

1. **Assume the same user role as the web server user on the WAN boot server.**

2. **Display the key value for each client key.**

   ```
   # wanbootutil keygen -d -c -o net=net-IP,cid=client-ID,type=key-type
   ```

   net-IP The IP address of the client's subnet.

   client-ID The ID of the client you want to install. The client ID can be a user-defined ID or the DHCP client ID.

   key-type The key type you want to install on the client. Valid key types are `3des`, `aes`, or `sha1`.

   The hexadecimal value for the key is displayed.

3. **Repeat the previous step for each type of client key you want to install.**

4. **Bring the client system to run level 0.**

   ```
   # init 0
   ```

   The `ok` prompt is displayed.

5. **At the client `ok` prompt, set the value for the hashing key.**

   ```
   ok set-security-key wanboot-hmac-sha1 key-value
   ```

   `set-security-key` Installs the key on the client.

   `wanboot-hmac-sha1` Instructs OBP to install a HMAC SHA1 hashing key.

   key-value Specifies the hexadecimal string that is displayed in Step 2.

   The HMAC SHA1 hashing key is installed in the client OBP.

6. **At the client `ok` prompt, install the encryption key.**

   ```
   ok set-security-key wanboot-3des key-value
   ```

   `wanboot-3des` Instructs OBP to install a 3DES encryption key. If you want to use an AES encryption key, set this value to `wanboot-aes`.

   key-value Specifies the hexadecimal string that represents the encryption key.

   The 3DES encryption key is installed in the client OBP.

7 (Optional) Verify that the keys are set in the client OBP.

```
ok list-security-keys
Security Keys:
        wanboot-hmac-sha1
        wanboot-3des
```

8 (Optional) If you need to delete a key, type the following command:

```
ok set-security-key key-type
```

key-type Specifies the type of key you need to delete. Use the value `wanboot-hmac-sha1`, `wanboot-3des`, or `wanboot-aes`.

Example 13–2 Installing Keys in the Client OBP

The following example shows how to install a hashing key and an encryption key in the client OBP. Display the key values on the WAN boot server.

```
# wanbootutil keygen -d -c -o net=192.168.198.0,cid=010003BA152A42,type=sha1
b482aaab82cb8d5631e16d51478c90079cc1d463# wanbootutil keygen -d -c -o net=192.168.198.0,cid=010003BA152A42,type=3des
9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

The example uses the following information:

`net=192.168.198.0`
Specifies the IP address of the client's subnet

`cid=010003BA152A42`
Specifies the client's ID

`b482aaab82cb8d5631e16d51478c90079cc1d463`
Specifies the value of the client's HMAC SHA1 hashing key

`9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04`
Specifies the value of the client's 3DES encryption key

Install the keys on the client system.

The following commands perform the following tasks.

- Installs the HMAC SHA1 hashing key with a value of `b482aaab82cb8d5631e16d51478c90079cc1d463` on the client
- Installs the 3DES encryption key with a value of `9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04` on the client

  If you use an AES encryption key in your installation, change `wanboot-3des` to `wanboot-aes`.

```
ok set-security-key wanboot-hmac-sha1 b482aaab82cb8d5631e16d51478c90079cc1d463
ok set-security-key wanboot-3des 9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

Next Steps After you install keys on your client, you are ready to install the client over the WAN. For instructions, see "Installing the Client" on page 187.

See Also For more information about how to display key values, see the `wanbootutil(1M)` man page.

How to Install a Hashing Key and an Encryption Key on a Running Client

You can set key values at the `wanboot` program `boot>` prompt on a running system. If you use this method to install keys, the keys are only used for the current WAN boot installation.

Before You Begin This procedure makes the following assumptions:

- The client system is powered on.
- The client is accessible over a secure connection, such as a secure shell (`ssh`).

1. **Assume the same user role as the web server user on the WAN boot server.**

2. **Display the key value for the client keys.**

   ```
   # wanbootutil keygen -d -c -o net=net-IP,cid=client-ID,type=key-type
   ```

   net-IP The IP address of the client's subnet.

   client-ID The ID of the client you want to install. The client ID can be a user-defined ID or the DHCP client ID.

   key-type The key type you want to install on the client. Valid key types are `3des`, `aes`, or `sha1`.

   The hexadecimal value for the key is displayed.

3. **Repeat the previous step for each type of client key you want to install.**

4. **Become superuser or assume an equivalent role on the client machine.**

   Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

5. **Install the necessary keys on the running client machine.**

   ```
   # /usr/lib/inet/wanboot/ickey -o type=key-type
   > key-value
   ```

   key-value Specifies the hexadecimal string that is displayed in Step 2.

6. **Repeat the previous step for each type of client key you want to install.**

Example 13–3 Installing Keys in the OBP of a Running Client System

The following example shows how to install keys in the OBP of a running client.

Display the key values on the WAN boot server.

```
# wanbootutil keygen -d -c -o net=192.168.198.0,cid=010003BA152A42,type=sha1
b482aaab82cb8d5631e16d51478c90079cc1d463
# wanbootutil keygen -d -c -o net=192.168.198.0,cid=010003BA152A42,type=3des
9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

The example uses the following information:

`net=192.168.198.0`
: Specifies the IP address of the client's subnet

`cid=010003BA152A42`
: Specifies the client's ID

`b482aaab82cb8d5631e16d51478c90079cc1d463`
: Specifies the value of the client's HMAC SHA1 hashing key

`9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04`
: Specifies the value of the client's 3DES encryption key

  If you use an AES encryption key in your installation, change `type=3des` to `type=aes` to display the encryption key value.

Install the keys in the OBP of the running client.

The following commands perform the following tasks:

- Installs a HMAC SHA1 hashing key with a value of `b482aaab82cb8d5631e16d51478c90079cc1d463` on the client
- Installs a 3DES encryption key with a value of `9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04` on the client

```
# /usr/lib/inet/wanboot/ickey -o type=sha1 b482aaab82cb8d5631e16d51478c90079cc1d463
# /usr/lib/inet/wanboot/ickey -o type=3des 9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

Next Steps After you install keys on your client, you are ready to install the client over the WAN. For instructions, see "Installing the Client" on page 187.

See Also For more information about how to display key values, see the `wanbootutil(1M)` man page.

For additional information about how to install keys on a running system, see the `ickey(1M)` man page.

Installing the Client

The following table describes the ways you can install the system after you finish preparing your network for a WAN boot installation.

TABLE 13–2 Methods to Install the Client

Method	Description	Instructions
Noninteractive installation	Use this installation method if you want to install keys on the client and set the client configuration information before you boot the client.	■ To install keys on the client before the installation, see "Installing Keys on the Client" on page 182. ■ To perform a noninteractive installation, see "How to Perform a Noninteractive WAN Boot Installation" on page 187.
Interactive installation	Use this installation method if you want to set the client configuration information during the boot process.	"How to Perform an Interactive WAN Boot Installation" on page 189
Installing with a DHCP server	Use this installation method if you configured the network DHCP server to provide client configuration information during the installation.	■ To configure a DHCP server to support a WAN boot installation, see "Providing Configuration Information With a DHCP Server" on page 177. ■ To use a DHCP server during your installation, see "How to Perform a WAN Boot Installation With a DHCP Server" on page 193.
Installing with local CD media	If your client OBP does not support WAN boot, boot the client from a local copy of the Oracle Solaris Software CD.	■ To determine if the client OBP supports WAN boot, see "How to Check the Client OBP for WAN Boot Support" on page 153. ■ To install the client with a local copy of the Oracle Solaris Software CD, see "How to Perform a WAN Boot Installation With Local CD Media" on page 194.

▼ How to Perform a Noninteractive WAN Boot Installation

Use this installation method if you prefer to install keys and set client configuration information before you install the client. You can then boot the client from the WAN and perform an unattended installation.

This procedure assumes that you have either installed keys in the client's OBP, or that you are performing an insecure installation. For information about installing keys on the client before your installation, see "Installing Keys on the Client" on page 182.

1 **If the client system is currently running, bring the system to run level 0.**

```
# init 0
```

The ok prompt is displayed.

2 **At the ok prompt on the client system, set the network boot argument variables in OBP.**

```
ok setenv network-boot-arguments  host-ip=client-IP,
router-ip=router-IP,subnet-mask=mask-value,
hostname=client-name,http-proxy=proxy-IP:port,
file=wanbootCGI-URL
```

Note – The line breaks in this command sample are included for formatting purposes only. Do not enter a carriage return until you finish typing the command.

`host-ip=`*client-IP*	Specifies the IP address of the client.
`router-ip=`*router-IP*	Specifies the IP address of the network router.
`subnet-mask=`*mask-value*	Specifies the subnet mask value.
`hostname=`*client-name*	Specifies the host name of the client.
(Optional) `http-proxy=`*proxy-IP:port*	Specifies the IP address and port of the network's proxy server.
`file=`*wanbootCGI-URL*	Specifies the URL of the `wanboot-cgi` program on the web server.

3 **Use the network boot argument variables to boot the client from the WAN.**

```
ok boot net - install
```

The client installs over the WAN. If the WAN boot programs do not find all the necessary installation information, the `wanboot` program prompts to provide the missing information. Type the additional information at the prompt.

Example 13–4 Noninteractive WAN Boot Installation

In the following example, the network boot argument variables for the client system `myclient` are set before the machine is booted. This example assumes that a hashing key and encryption key are already installed on the client. For information about installing keys before you boot from the WAN, see "Installing Keys on the Client" on page 182.

```
ok setenv network-boot-arguments host-ip=192.168.198.136,
router-ip=192.168.198.129,subnet-mask=255.255.255.192
hostname=myclient,file=http://192.168.198.135/cgi-bin/wanboot-cgi
ok boot net - install
Resetting ...
```

```
Sun Blade 100 (UltraSPARC-IIe), No Keyboard
Copyright 1998-2003 Sun Microsystems, Inc.  All rights reserved.
OpenBoot 4.x.build_28, 512 MB memory installed, Serial #50335475.
Ethernet address 0:3:ba:e:f3:75, Host ID: 83000ef3.


Rebooting with command: boot net - install
Boot device: /pci@1f,0/network@c,1  File and args: - install
```

The following variables are set.

- The client IP address is set to `192.168.198.136`.
- The client's router IP address is set to `192.168.198.129`.
- The client's subnet mask is set to `255.255.255.192`.
- The client's host name is set to `seahag`.
- The `wanboot-cgi` program is located at `http://192.168.198.135/cgi-bin/wanboot-cgi`.

See Also For more information about how to set network boot arguments, see the `set(1)` man page.

For more information about how to boot a system, see the `boot(1M)` man page.

How to Perform an Interactive WAN Boot Installation

Use this installation method if you want to install keys and set client configuration information at the command line during the installation.

This procedure assumes that you are using HTTPS in your WAN installation. If you are performing an insecure installation that does not use keys, do not display or install the client keys.

1 Assume the same user role as the web server user on the WAN boot server.

2 Display the key value for each client key.

```
# wanbootutil keygen -d -c -o net=net-IP,cid=client-ID,type=key-type
```

net-IP The IP address of the subnet for the client you want to install.

client-ID The ID of the client you want to install. The client ID can be a user-defined ID or the DHCP client ID.

key-type The key type you want to install on the client. Valid key types are `3des`, `aes`, or `sha1`.

The hexadecimal value for the key is displayed.

3 Repeat the previous step for each type of client key you are installing.

4 If the client system is currently running, bring the client to run level 0.

5 At the ok prompt on the client system, set the network boot argument variables in OBP.

```
ok setenv network-boot-arguments  host-ip=client-IP,router-ip=router-ip,
subnet-mask=mask-value,hostname=client-name,
http-proxy=proxy-ip:port,bootserver=wanbootCGI-URL
```

Note – The line breaks in this command sample are included for formatting purposes only. Do not enter a carriage return until you finish typing the command.

`host-ip=`*client-IP*	Specifies the IP address of the client.
`router-ip=`*router-IP*	Specifies the IP address of the network router.
`subnet-mask=`*mask-value*	Specifies the subnet mask value.
`hostname=`*client-name*	Specifies the host name of the client.
(Optional) `http-proxy=`*proxy-IP:port*	Specifies the IP address and port of the network's proxy server.
`bootserver=`*wanbootCGI-URL*	Specifies the URL of the `wanboot-cgi` program on the web server.

Note – The URL value for the `bootserver` variable must not be an HTTPS URL. The URL must start with `http://`.

6 At the client ok prompt, boot and install from the network.

```
ok boot net -o prompt - install
```

The `boot>` prompt is displayed. The `wanboot` program prompts the user to enter client configuration information at the `boot>` prompt.

7 Install the encryption key.

```
boot> 3des=key-value
```

`3des=`*key-value* Specifies the hexadecimal string of the 3DES key that is displayed in Step 2.

If you use an AES encryption key, use the following format for this command.

```
boot> aes=key-value
```

8 Install the hashing key.

```
boot> sha1=key-value
```

`sha1=`*key-value* Specifies the hashing key value that is displayed in Step 2.

9 Type the following command to continue the boot process.

```
boot> go
```

The client installs over the WAN.

10 If prompted, type client configuration information on the command line.

If the WAN boot programs do not find all the necessary installation information, the `wanboot` program prompts to provide the missing information. Type the additional information at the prompt.

Example 13–5 Interactive WAN Boot Installation

In the following example, the `wanboot` program prompts you to set the key values for the client system during the installation.

Display the key values on the WAN boot server.

```
# wanbootutil keygen -d -c -o net=192.168.198.0,cid=010003BA152A42,type=sha1
b482aaab82cb8d5631e16d51478c90079cc1d463
# wanbootutil keygen -d -c -o net=192.168.198.0,cid=010003BA152A42,type=3des
9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

The example uses the following information:

`net=192.168.198.0`
Specifies the IP address of the client's subnet.

`cid=010003BA152A42`
Specifies the client's ID.

`b482aaab82cb8d5631e16d51478c90079cc1d463`
Specifies the value of the client's HMAC SHA1 hashing key.

`9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04`
Specifies the value of the client's 3DES encryption key.

If you use an AES encryption key in your installation, change `type=3des` to `type=aes` to display the encryption key value.

Set the network boot argument variables in the OBP on the client.

```
ok setenv network-boot-arguments host-ip=192.168.198.136,
router-ip=192.168.198.129,subnet-mask=255.255.255.192,hostname=myclient,
bootserver=http://192.168.198.135/cgi-bin/wanboot-cgi
```

The following variables are set.

- The client IP address is set to `192.168.198.136`.
- The client's router IP address is set to `192.168.198.129`.
- The client's subnet mask is set to `255.255.255.192`.
- The client's host name is set to `myclient`.
- The `wanboot-cgi` program is located at `http://192.168.198.135/cgi-bin/wanboot-cgi`.

Boot and install the client.

```
ok boot net -o prompt - install
Resetting ...


Sun Blade 100 (UltraSPARC-IIe), No Keyboard
Copyright 1998-2003 Sun Microsystems, Inc.  All rights reserved.
OpenBoot 4.x.build_28, 512 MB memory installed, Serial #50335475.
Ethernet address 0:3:ba:e:f3:75, Host ID: 83000ef3.



Rebooting with command: boot net -o prompt
Boot device: /pci@1f,0/network@c,1  File and args: -o prompt
```

The following commands perform the following tasks:

- Installs the 3DES encryption key with the value `9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04` on the client
- Installs the HMAC SHA1 hashing key with the value `b482aaab82cb8d5631e16d51478c90079cc1d463` on the client
- Starts the installation.

```
boot> 3des=9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04

boot> sha1=b482aaab82cb8d5631e16d51478c90079cc1d463

boot> go
```

See Also For more information about how to display key values, see the `wanbootutil(1M)` man page.

For more information about how to set network boot arguments, see the `set(1)` man page.

For more information about how to boot a system, see the `boot(1M)` man page.

▼ How to Perform a WAN Boot Installation With a DHCP Server

If you configured a DHCP server to support WAN boot options, you can use the DHCP server to provide client configuration information during the installation. For more information about configuring a DHCP server to support a WAN boot installation, see "Providing Configuration Information With a DHCP Server" on page 177.

Before You Begin This procedure makes the following assumptions:

- The client system is running.
- You have either installed keys on the client or you are performing an insecure installation.

  For information about installing keys on the client before your installation, see "Installing Keys on the Client" on page 182.
- You have configured your DHCP server to support the `SbootURI` and `SHTTPproxy` WAN boot options.

  These options enable the DHCP server to provide the configuration information that is required by WAN boot.

  For information about how to set installation options on your DHCP server, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

1 If the client system is currently running, bring the system to run level 0.

```
# init 0
```

The `ok` prompt is displayed.

2 At the `ok` prompt on the client system, set the network boot argument variables in OBP.

`ok` **`setenv network-boot-arguments dhcp,hostname=`***`client-name`*

`dhcp`	Instructs the OBP to use the DHCP server to configure the client.
`hostname=`*`client-name`*	Specifies the host name you want to assign to the client.

3 Boot the client from the network using the network boot argument variables to boot from the WAN.

`ok` **`boot net - install`**

The client installs over the WAN. If the WAN boot programs do not find all the necessary installation information, the `wanboot` program prompts to provide the missing information. Type the additional information at the prompt.

Example 13–6 WAN Boot Installation With a DHCP Server

In the following example, the DHCP server on the network provides client configuration information. This sample requests the host name `myclient` for the client.

```
ok setenv network-boot-arguments dhcp, hostname=myclient

ok boot net - install
Resetting ...



Sun Blade 100 (UltraSPARC-IIe), No Keyboard
Copyright 1998-2003 Sun Microsystems, Inc.  All rights reserved.
OpenBoot 4.x.build_28, 512 MB memory installed, Serial #50335475.
Ethernet address 0:3:ba:e:f3:75, Host ID: 83000ef3.



Rebooting with command: boot net - install
Boot device: /pci@1f,0/network@c,1  File and args: - install
```

See Also For more information about how to set network boot arguments, see the `set(1)` man page.

For more information about how to boot a system, see the `boot(1M)` man page.

For more information about how to configure a DHCP server, see "Providing Configuration Information With a DHCP Server" on page 177.

▼ How to Perform a WAN Boot Installation With Local CD Media

If your client's OBP does not support WAN boot, you can install with a Oracle Solaris Software - 1 CD inserted in the client's CD-ROM drive. When you use a local CD, the client retrieves the `wanboot` program from the local media, rather than from the WAN boot server.

This procedure assumes that you are using HTTPS in your WAN installation. If you are performing an insecure installation, do not display or install the client keys.

1 Assume the same user role as the web server user on the WAN boot server.

2 Display the key value for each client key.

```
# wanbootutil keygen -d -c -o net=net-IP,cid=client-ID,type=key-type
```

net-IP The network IP address for the client you are installing.

client-ID The ID of the client you are installing. The client ID can be a user-defined ID or the DHCP client ID.

key-type The key type you are installing on the client. Valid key types are `3des`, `aes`, or `sha1`.

The hexadecimal value for the key is displayed.

3 Repeat the previous step for each type of client key you are installing.

4 On the client system, insert the Oracle Solaris Software - 1 CD in the CD-ROM drive.

5 Power on the client system.

6 Boot the client from the CD.

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

`cdrom` Instructs the OBP to boot from the local CD-ROM.

`-o prompt` Instructs the `wanboot` program to prompt the user to enter client configuration information.

`-F wanboot` Instructs the OBP to load the `wanboot` program from the CD-ROM.

`- install` Instructs the client to perform a WAN boot installation.

The client's OBP loads the `wanboot` program from the Oracle Solaris Software - 1 CD. The `wanboot` program boots the system, and the `boot>` prompt is displayed.

7 Type the encryption key value.

```
boot> 3des=key-value
```

`3des=`*key-value* Specifies the hexadecimal string of the 3DES key that is displayed in Step 2.

If you use an AES encryption key, use the following format for this command.

```
boot> aes=key-value
```

8 Type the hashing key value.

```
boot> sha1=key-value
```

`sha1=`*key-value* Specifies the hexadecimal string that represents the hashing key value that is displayed in Step 2.

9 Set the network interface variables.

```
boot> variable=value[,variable=value*]
```

Type the following variable and value pairs at the `boot>` prompt:

`host-ip=`*client-IP*	Specifies the IP address of the client.
`router-ip=`*router-IP*	Specifies the IP address of the network router.
`subnet-mask=`*mask-value*	Specifies the subnet mask value.
`hostname=`*client-name*	Specifies the host name of the client.
(Optional) `http-proxy=`*proxy-IP:port*	Specifies the IP address and port number of the network's proxy server.
`bootserver=`*wanbootCGI-URL*	Specifies the URL of the `wanboot-cgi` program on the web server.

Note – The URL value for the`bootserver` variable must not be an HTTPS URL. The URL must start with `http://`.

You can enter these variables in the following ways:

- Type one variable and value pair at the `boot>` prompt, then press the Return key.

  ```
  boot> host-ip=client-IP
  boot> subnet-mask=mask-value
  ```

- Type all the variable and value pairs on one `boot>` prompt line, then press the Return key. Type commas to separate each variable and value pair.

  ```
  boot> host-ip=client-IP,subnet-mask=mask-value,
  router-ip=router-IP,hostname=client-name,
  http-proxy=proxy-IP:port,bootserver=wanbootCGI-URL
  ```

10 Type the following command to continue the boot process.

```
boot> go
```

The client installs over the WAN. If the WAN boot programs do not find all the necessary installation information, the `wanboot` program prompts to provide the missing information. Type the additional information at the prompt.

Example 13–7 Installing With Local CD Media

In the following example, the `wanboot` program on a local CD prompts you to set the network interface variables for the client during the installation.

Display the key values on the WAN boot server.

```
# wanbootutil keygen -d -c -o net=192.168.198.0,cid=010003BA152A42,type=sha1
b482aaab82cb8d5631e16d51478c90079cc1d463
# wanbootutil keygen -d -c -o net=192.168.198.0,cid=010003BA152A42,type=3des
9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

The example uses the following information.

`net=192.168.198.0`
: Specifies the IP address of the client's subnet

`cid=010003BA152A42`
: Specifies the client's ID

`b482aaab82cb8d5631e16d51478c90079cc1d463`
: Specifies the value of the client's HMAC SHA1 hashing key

`9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04`
: Specifies the value of the client's 3DES encryption key

  If you use an AES encryption key in your installation, change `type=3des` to `type=aes` to display the encryption key value.

Boot and install the client.

```
ok boot cdrom -o prompt -F wanboot - install
Resetting ...


Sun Blade 100 (UltraSPARC-IIe), No Keyboard
Copyright 1998-2003 Sun Microsystems, Inc.  All rights reserved.
OpenBoot 4.x.build_28, 512 MB memory installed, Serial #50335475.
Ethernet address 0:3:ba:e:f3:75, Host ID: 83000ef3.



Rebooting with command: boot cdrom -F wanboot - install
Boot device: /pci@1f,0/network@c,1  File and args: -o prompt
```

The following commands perform the following tasks:

- Enters the 3DES encryption key with the value `9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04` on the client
- Enters the HMAC SHA1 hashing key with the value `b482aaab82cb8d5631e16d51478c90079cc1d463` on the client
- Sets the client IP address to 192.168.198.124
- Sets the client's subnet mask to 255.255.255.128
- Sets the client's router IP address to 192.168.198.1
- Sets the client's host name to `myclient`
- Sets the client ID to 010003BA152A42
- Sets the location of the `wanboot-cgi` program to `http://192.168.198.135/cgi-bin/wanboot-cgi/`

```
boot> 3des=9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

```
boot> sha1=b482aaab82cb8d5631e16d51478c90079cc1d463

boot> host-ip=192.168.198.124

boot> subnet-mask=255.255.255.128

boot> router-ip=192.168.198.1

boot> hostname=myclient
boot> client-id=010003BA152A42

boot> bootserver=http://192.168.198.135/cgi-bin/wanboot-cgi

boot> go
```

See Also For more information about how to display key values, see the `wanbootutil(1M)` man page.

For more information about how to set network boot arguments, see the `set(1)` man page.

For more information about how to boot a system, see the `boot(1M)` man page.

◆ ◆ ◆ CHAPTER 14

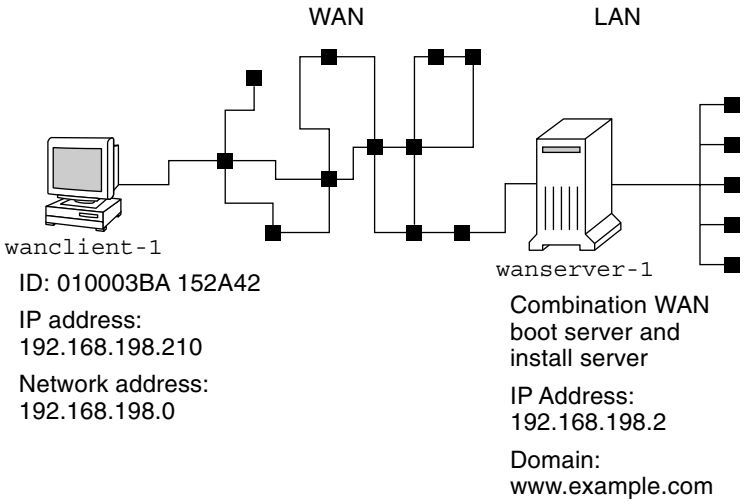
SPARC: Installing With WAN Boot (Examples)

This chapter provides an example of setting up and installing client systems over a wide area network (WAN). The examples in this chapter describe how to perform a secure WAN boot installation over an HTTPS connection.

Sample Site Setup

The following figure shows the site setup for this example.

FIGURE 14–1 Sample Site for WAN Boot Installation



This sample site has the following characteristics:

- The server `wanserver-1` is to be configured as a WAN boot server and an install server.
- The IP address of `wanserver-1` is 192.168.198.2.
- The domain name of `wanserver-1` is `www.example.com`.
- `wanserver-1` is running the current Oracle Solaris release.
- `wanserver-1` is running the Apache web server. The Apache software on `wanserver-1` is configured to support HTTPS.
- The client to be installed is named `wanclient-1`.
- `wanclient-1` is an UltraSPARCII system.
- The client ID for `wanclient-1` is `010003BA152A42`.
- The IP address of `wanclient-1` is `192.168.198.210`.
- The IP address of the client's subnet is `192.168.198.0`.
- The client system `wanclient-1` has Internet access but is not directly connected to the network that includes `wanserver-1`.
- `wanclient-1` is a new system that is to be installed with the current Oracle Solaris release software.

Create the Document Root Directory

To store the installation files and data, set up the following directories in the document root directory (`/opt/apache/htdocs`) on `wanserver-1`.

- Oracle Solaris Flash directory

  ```
  wanserver-1# mkdir -p /opt/apache/htdocs/flash/
  ```

- WAN boot miniroot directory

  ```
  wanserver-1# mkdir -p /opt/apache/htdocs/miniroot/
  ```

- `wanboot` program directory

  ```
  wanserver-1# mkdir -p /opt/apache/htdocs/wanboot/
  ```

Create the WAN Boot Miniroot

Use the `setup_install_server(1M)` with the `-w` option to copy the WAN boot miniroot and the Oracle Solaris software image to the `/export/install/Solaris_10` directory of `wanserver-1`.

Insert the Oracle Solaris Software media in the media drive that is attached to `wanserver-1`. Type the following commands.

```
wanserver-1# mkdir -p /export/install/cdrom0
wanserver-1# cd /cdrom/cdrom0/Solaris_10/Tools
wanserver-1# ./setup_install_server -w /export/install/cdrom0/miniroot \
/export/install/cdrom0
```

Move the WAN boot miniroot to the document root directory (`/opt/apache/htdocs/`) of the WAN boot server.

```
wanserver-1# mv /export/install/cdrom0/miniroot/miniroot \
/opt/apache/htdocs/miniroot/miniroot.s10_sparc
```

Check the Client OBP for WAN Boot Support

Determine that the client OBP supports WAN boot by typing the following command on the client system.

```
# eeprom | grep network-boot-arguments
network-boot-arguments: data not available
```

In the previous example, the `network-boot-arguments: data not available` output indicates that the client OBP supports WAN boot.

Install the wanboot Program on the WAN Boot Server

To install the wanboot program on the WAN boot server, copy the program from the Oracle Solaris Software media to the WAN boot server's document root directory.

Insert the Oracle Solaris DVD or the Oracle Solaris Software - 1 CD in the media drive that is attached to wanserver-1 and type the following commands.

```
wanserver-1# cd /cdrom/cdrom0/Solaris_10/Tools/Boot/platform/sun4u/
wanserver-1# cp wanboot /opt/apache/htdocs/wanboot/wanboot.s10_sparc
```

Create the /etc/netboot Hierarchy

Create the wanclient-1 subdirectories of the /etc/netboot directory on the WAN boot server. The WAN boot installation programs retrieve configuration and security information from this directory during the installation.

wanclient-1 is located on the subnet 192.168.198.0, and has a client ID of 010003BA152A42. To create the appropriate subdirectory of /etc/netboot for wanclient-1, perform the following tasks:

- Create the /etc/netboot directory.
- Change the permissions of the /etc/netboot directory to 700.
- Change the ownership of the /etc/netboot directory to the owner of the web server process.
- Assume the same user role as the web server user.
- Create a subdirectory of /etc/netboot that is named after the subnet (192.168.198.0).
- Create a subdirectory of the subnet directory that is named after the client ID.
- Change the permissions of the /etc/netboot subdirectories to 700.

```
wanserver-1# cd /
wanserver-1# mkdir /etc/netboot/
wanserver-1# chmod 700 /etc/netboot
wanserver-1# chown nobody:admin /etc/netboot
wanserver-1# exit
wanserver-1# su nobody
Password:
nobody# mkdir -p /etc/netboot/192.168.198.0/010003BA152A42
nobody# chmod 700 /etc/netboot/192.168.198.0
nobody# chmod 700 /etc/netboot/192.168.198.0/010003BA152A42
```

Copy the `wanboot-cgi` Program to the WAN Boot Server

On systems that are running the current Oracle Solaris release, the `wanboot-cgi` program is located in the `/usr/lib/inet/wanboot/` directory. To enable the WAN boot server to transmit the installation data, copy the `wanboot-cgi` program to the `cgi-bin` directory in the web server software directory.

```
wanserver-1# cp /usr/lib/inet/wanboot/wanboot-cgi \
/opt/apache/cgi-bin/wanboot-cgi
wanserver-1# chmod 755 /opt/apache/cgi-bin/wanboot-cgi
```

(Optional) Configure the WAN Boot Server as a Logging Server

By default, all WAN boot logging messages are displayed on the client system. This default behavior enables you to quickly debug any installation issues.

If you want to view the boot and installation messages on the WAN boot server, copy the `bootlog-cgi` script to the `cgi-bin` directory on `wanserver-1`.

```
wanserver-1# cp /usr/lib/inet/wanboot/bootlog-cgi /opt/apache/cgi-bin/
wanserver-1# chmod 755 /opt/apache/cgi-bin/bootlog-cgi
```

Configure the WAN Boot Server to Use HTTPS

To use HTTPS in your WAN boot installation, you must enable SSL support in the web server software. You must also install a digital certificate on the WAN boot server. This example assumes that the Apache web server on `wanserver-1` is configured to use SSL. This example also assumes that a digital certificate and a certificate authority that establish the identity of `wanserver-1` are already installed on `wanserver-1`.

For examples about how to configure your web server software to use SSL, see your web server documentation.

Provide the Trusted Certificate to the Client

By requiring the server to authenticate itself to the client, you protect the data that is transmitted from the server to the client over HTTPS. To enable server authentication, you provide a trusted certificate to the client. The trusted certificate enables the client to verify the identity of the server during the installation.

To provide the trusted certificate to the client, assume the same user role as the web server user. Split the certificate to extract a trusted certificate. Then, insert the trusted certificate in the client's `truststore` file in the `/etc/netboot` hierarchy.

In this example, you assume the web server user role of `nobody`. Then, you split the server PKCS#12 certificate that is named `cert.p12`, and insert the trusted certificate in `/etc/netboot` directory for `wanclient-1`.

```
wanserver-1# su nobody
Password:
wanserver-1# wanbootutil p12split -i cert.p12 -t \
/etc/netboot/192.168.198.0/010003BA152A42/truststore
```

(Optional) Use Private Key and Certificate for Client Authentication

To further protect your data during the installation, you might want to require `wanclient-1` to authenticate itself to `wanserver-1`. To enable client authentication in your WAN boot installation, insert a client certificate and private key in the client subdirectory of the `/etc/netboot` hierarchy.

To provide a private key and certificate to the client, perform the following tasks:

- Assume the same user role as the web server user.
- Split the PKCS#12 file into a private key and a client certificate.
- Insert the certificate in the client's `certstore` file.
- Insert the private key in the client's `keystore` file.

In this example, you assume the web server user role of `nobody`. Then, you split the server PKCS#12 certificate that is named `cert.p12`. You insert certificate in the `/etc/netboot` hierarchy for `wanclient-1`. You then insert the private key that you named `wanclient.key` in the client's `keystore` file.

```
wanserver-1# su nobody
Password:
wanserver-1# wanbootutil p12split -i cert.p12 -c \
/etc/netboot/192.168.198.0/010003BA152A42/certstore -k wanclient.key
wanserver-1# wanbootutil keymgmt -i -k wanclient.key \
-s  /etc/netboot/192.168.198.0/010003BA152A42/keystore \
-o type=rsa
```

Create the Keys for the Server and the Client

To protect the data transmitted between the server and client, you create a hashing key and an encryption key. The server uses the hashing key to protect the integrity of the `wanboot` program. The server uses the encryption key to encrypt the configuration and installation data. The client uses the hashing key to check the integrity of the downloaded `wanboot` program. The client uses the encryption key to decrypt the data during the installation.

First, assume the same user role as the web server user. In this example, the web server user role is `nobody`.

```
wanserver-1# su nobody
Password:
```

Then, use the wanbootutil keygen command to create a master HMAC SHA1 key for wanserver-1.

```
wanserver-1# wanbootutil keygen -m
```

Then, create a hashing key and an encryption key for wanclient-1.

```
wanserver-1# wanbootutil keygen -c -o net=192.168.198.0,cid=010003BA152A42,type=sha1
wanserver-1# wanbootutil keygen -c -o net=192.168.198.0,cid=010003BA152A42,type=3des
```

The previous command creates a HMAC SHA1 hashing key and a 3DES encryption key for wanclient-1. 192.168.198.0 specifies the subnet of wanclient-1, and 010003BA152A42 specifies the client ID of wanclient-1.

Create the Flash Archive

In this example, you create a flash archive by cloning the wanserver-1 master system. The archive is named sol_10_sparc, and is copied exactly from the master system. The archive is an exact duplicate of the master system. The archive is stored in sol_10_sparc.flar. Save the archive in the flash/archives subdirectory of the document root directory on the WAN boot server.

```
wanserver-1# flarcreate -n sol_10_sparc \
/opt/apache/htdocs/flash/archives/sol_10_sparc.flar
```

Create the sysidcfg File

To preconfigure the wanclient-1 system, specify keywords and values in the sysidcfg file. Save this file in the appropriate subdirectory of the document root directory of wanserver-1.

EXAMPLE 14–1 sysidcfg File for client-1 System

The following example shows a sysidcfg file for wanclient-1. The host name, IP address, and netmask of these systems have been preconfigured by editing the naming service. This file is located in the /opt/apache/htdocs/flash/ directory.

```
network_interface=primary {hostname=wanclient-1
                           default_route=192.168.198.1
                           ip_address=192.168.198.210
                           netmask=255.255.255.0
                           protocol_ipv6=no}
timezone=US/Central
system_locale=C
```

EXAMPLE 14–1 `sysidcfg` File for client-1 System *(Continued)*

```
terminal=xterm
timeserver=localhost
name_service=NIS {name_server=matter(192.168.254.254)
                  domain_name=leti.example.com
                  }
security_policy=none
```

Create the Client's Profile

For the `wanclient-1` system, create a profile that is named `wanclient_1_prof`. The `wanclient_1_prof` file contains the following entries, which define the current Oracle Solaris release software to be installed on the `wanclient-1` system.

```
# profile keywords         profile values
# ----------------         -------------------
install_type               flash_install
archive_location           https://192.168.198.2/flash/archives/cdrom0.flar
partitioning               explicit
filesys                    c0t1d0s0 4000 /
filesys                    c0t1d0s1 512 swap
filesys                    c0t1d0s7 free /export/home
```

Some of the keywords and values from this example are as follows:

`install_type` The profile installs a flash archive on the clone system. All files are overwritten as in an initial installation.

`archive_location` The compressed Flash Archive is retrieved from `wanserver-1`.

`partitioning` The file system slices are determined by the `filesys` keywords, value `explicit`. The size of root (`/`) is based on the size of the flash archive. The size of `swap` is set to the necessary size and is installed on `c0t1d0s1`. `/export/home` is based on the remaining disk space. `/export/home` is installed on `c0t1d0s7`.

Create and Validate the `rules` File

The JumpStart program uses the `rules` file to select the correct installation profile for the `wanclient-1` system. Create a text file that is named `rules`. Then, add keywords and values to this file.

The IP address of the `wanclient-1` system is `192.168.198.210`, and the netmask is `255.255.255.0`. Use the `network` rule keyword to specify the profile that the JumpStart program should use to install `wanclient-1`.

```
network 192.168.198.0 - wanclient_1_prof -
```

This rules file instructs the JumpStart program to use the wanclient_1_prof to install the current Oracle Solaris release software on wanclient-1.

Name this rule file wanclient_rule.

After you create the profile and the rules file, run the check script to verify that the files are valid.

```
wanserver-1# ./check -r wanclient_rule
```

If the check script does not find any errors, the script creates the rules.ok file.

Save the rules.ok file in the /opt/apache/htdocs/flash/ directory.

Create the System Configuration File

Create a system configuration file that lists the locations of the sysidcfg file and the JumpStart files on the install server. Save this file in a directory that is accessible to the WAN boot server.

In the following example, the wanboot-cgi program looks for the sysidcfg and JumpStart files in the document root directory of the WAN boot server. The domain name of the WAN boot server is https://www.example.com. The WAN boot server is configured to use secure HTTP, so the data and files are protected during the installation.

In this example, the system configuration file is named sys-conf.s10–sparc, and the file is saved in the /etc/netboot hierarchy on the WAN boot server. The sysidcfg and JumpStart files are located in the flash subdirectory of the document root directory.

```
SsysidCF=https://www.example.com/flash/
SjumpsCF=https://www.example.com/flash/
```

Create the wanboot.conf File

WAN boot uses the configuration information that is included in the wanboot.conf file to install the client machine. Create the wanboot.conf file in a text editor. Save the file to the appropriate client subdirectory in the /etc/netboot hierarchy on the WAN boot server.

The following wanboot.conf file for wanclient-1 includes configuration information for a WAN installation that uses secure HTTP. This file also instructs WAN boot to use a HMAC SHA1 hashing key and a 3DES encryption key to protect data.

```
boot_file=/wanboot/wanboot.s10_sparc
root_server=https://www.example.com/cgi-bin/wanboot-cgi
root_file=/miniroot/miniroot.s10_sparc
signature_type=sha1
encryption_type=3des
server_authentication=yes
client_authentication=no
resolve_hosts=
boot_logger=
system_conf=sys-conf.s10–sparc
```

This wanboot.conf file specifies the following configuration:

`boot_file=/wanboot/wanboot.s10_sparc`
: The wanboot program is named wanboot.s10_sparc. This program is located in the wanboot directory in the document root directory on wanserver-1.

`root_server=https://www.example.com/cgi-bin/wanboot-cgi`
: The location of the wanboot-cgi program on wanserver-1 is https://www.example.com/cgi-bin/wanboot-cgi. The https portion of the URL indicates that this WAN boot installation uses secure HTTP.

`root_file=/miniroot/miniroot.s10_sparc`
: The WAN boot miniroot is named miniroot.s10_sparc. The miniroot is located in the miniroot directory in the document root directory on wanserver-1.

`signature_type=sha1`
: The wanboot program and the WAN boot file system are signed by using a HMAC SHA1 hashing key.

`encryption_type=3des`
: The wanboot program and the WAN boot file system are encrypted with a 3DES key.

`server_authentication=yes`
: The server is authenticated during the installation.

`client_authentication=no`
: The client is not authenticated during the installation.

Note – If you performed the tasks in "(Optional) Use Private Key and Certificate for Client Authentication" on page 204, set this parameter as `client_authentication=yes`

`resolve_hosts=`
: No additional host names are needed to perform the WAN installation. All the host names that are required by the wanboot-cgi program are specified in the wanboot.conf file and the client certificate.

`boot_logger=`
: Booting and installation log messages are displayed on the system console. If you configured the logging server in "(Optional) Configure the WAN Boot Server as a Logging Server" on

page 203 and you want WAN boot messages to appear on the WAN boot server as well, set this parameter to `boot_logger=https://www.example.com/cgi-bin/bootlog-cgi`.

`system_conf=sys-conf.s10–sparc`
The system configuration file that specifies the locations of the `sysidcfg` and JumpStart files is located in the `sys-conf.s10–sparc` file in the `/etc/netboot` hierarchy on `wanserver-1`.

In this example, you save the `wanboot.conf` file in the `/etc/netboot/192.168.198.0/010003BA152A42` directory on `wanserver-1`.

Check the net Device Alias in OBP

To boot the client from the WAN with the `boot net`, the `net` device alias must be set to the client's primary network device. At the client `ok` prompt, use the `devalias` command to verify that the `net` alias is set to the primary network device `/pci@1f,0/pci@1,1/network@c,1`.

```
ok devalias
screen                   /pci@1f,0/pci@1,1/SUNW,m64B@2
net                      /pci@1f,0/pci@1,1/network@c,1
net2                     /pci@1f,0/pci@1,1/network@5,1
disk                     /pci@1f,0/pci@1/scsi@8/disk@0,0
cdrom                    /pci@1f,0/pci@1,1/ide@d/cdrom@0,0:f
keyboard                 /pci@1f,0/pci@1,1/ebus@1/su@14,3083f8
mouse                    /pci@1f,0/pci@1,1/ebus@1/su@14,3062f8
```

In the previous output example, the primary network device `/pci@1f,0/pci@1,1/network@c,1` is assigned to the `net` alias. You do not need to reset the alias.

Install Keys on the Client

You have already created the hashing key and encryption key to protect your data during the installation. To enable the client to decrypt the data transmitted from `wanserver-1` during the installation, install these keys on `wanclient-1`.

On `wanserver-1`, display the key values.

```
wanserver-1# wanbootutil keygen -d -c -o net=192.168.198.0,cid=010003BA152A42,type=sha1
b482aaab82cb8d5631e16d51478c90079cc1d463
wanserver-1# wanbootutil keygen -d -c -o net=192.168.198.0,cid=010003BA152A42,type=3des
9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

This example uses the following information:

`net=192.168.198.0`
Specifies the IP address of the client's subnet.

`cid=010003BA152A42`
Specifies the client's ID.

`b482aaab82cb8d5631e16d51478c90079cc1d463`
Specifies the value of the client's HMAC SHA1 hashing key.

`9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04`
Specifies the value of the client's 3DES encryption key.

If you use an AES encryption key in your installation, change `type=3des` to `type=aes` to display the encryption key value.

At the `ok` prompt on `wanclient-1`, install the keys.

The following commands perform the following tasks:

- Installs the HMAC SHA1 hashing key with a value of `b482aaab82cb8d5631e16d51478c90079cc1d463` on `wanclient-1`
- Installs the 3DES encryption key with a value of `9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04` on `wanclient-1`

```
ok set-security-key wanboot-hmac-sha1  b482aaab82cb8d5631e16d51478c90079cc1d463
ok set-security-key wanboot-3des  9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

Install the Client

You can perform an unattended installation by setting network boot argument variables for `wanclient-1` at the `ok` prompt, and then booting the client.

```
ok setenv network-boot-arguments host-ip=192.168.198.210,
router-ip=192.168.198.1,subnet-mask=255.255.255.0,hostname=wanclient-1,
file=http://192.168.198.2/cgi-bin/wanboot-cgi
ok boot net - install
Resetting ...



Sun Blade 100 (UltraSPARC-IIe), No Keyboard
Copyright 1998-2003 Sun Microsystems, Inc.  All rights reserved.
OpenBoot 4.x.build_28, 512 MB memory installed, Serial #50335475.
Ethernet address 0:3:ba:e:f3:75, Host ID: 83000ef3.



Rebooting with command: boot net - install
Boot device: /pci@1f,0/network@c,1  File and args: - install



<time unavailable> wanboot progress: wanbootfs: Read 68 of 68 kB (100%)
<time unavailable> wanboot info: wanbootfs: Download complete
Fri Jun 20 09:16:06 wanboot progress: miniroot: Read 166067 of 166067 kB (100%)
Fri Jun 20Tue Apr 15 09:16:06 wanboot info: miniroot: Download complete
```

```
SunOS Release 5.10 Version WANboot10:04/11/03 64-bit
Copyright 1983-2003 Sun Microsystems, Inc.  All rights reserved.
Use is subject to license terms.
Configuring devices.
```

The following variables are set.

- The client IP address is set to `192.168.198.210`.
- The client's router IP address is set to `192.168.198.1`.
- The client's subnet mask is set to `255.255.255.0`.
- The client's host name is set to `wanclient-1`.
- The `wanboot-cgi` program is located at `http://192.168.198.2/cgi-bin/wanboot-cgi`.

The client installs over the WAN. If the `wanboot` program does not find all the necessary installation information, you might be prompted to provide the missing information at the command line.

◆ ◆ ◆ CHAPTER 15

WAN Boot (Reference)

This chapter briefly describes the commands and files you use to perform a WAN installation. It covers the following topics:

WAN Boot Installation Commands

This section describes the commands you use to perform a WAN boot installation.

TABLE 15–1 Preparing the WAN Boot Installation and Configuration Files

Task and Description	Command
Copy the Oracle Solaris installation image to *install-dir-path*, and copy the WAN boot miniroot to *WAN-dir-path* on the install server's local disk.	`setup_install_server –w` *WAN-dir-path install-dir-path*

TABLE 15–1 Preparing the WAN Boot Installation and Configuration Files *(Continued)*

Task and Description	Command
Create a flash archive that is named *name*`.flar`. ■ *name* is the name of the archive ■ *optional-parameters* are optional parameters you can use to customize the archive ■ *document-root* is the path to the document root directory on the install server ■ *filename* is the name of the archive	`flarcreate -n` *name* `[`*optional-parameters*`]` *document-root*`/flash/`*filename*
Check the validity of the JumpStart `rules` file that is named *rules*.	`./check -r` *rules*
Check the validity of the `wanboot.conf` file. ■ *net-IP* is the IP address of the client's subnet. ■ *client-ID* can be a user-defined ID or the DHCP client ID.	`bootconfchk /etc/netboot/`*net-IP*`/`*client-ID*`/wanboot.conf`
Check for WAN boot installation support in the client OBP.	`eeprom | grep network-boot-arguments`

TABLE 15–2 Preparing the WAN Boot Security Files

Task and Description	Command
Create a master HMAC SHA1 key for the WAN boot server.	`wanbootutil keygen -m`
Create a HMAC SHA1 hashing key for the client. ■ *net-IP* is the IP address of the client's subnet. ■ *client-ID* can be a user-defined ID or the DHCP client ID.	`wanbootutil keygen -c -o net=`*net-IP*`,cid=`*client-ID*`,type=sha1`
Create an encryption key for the client. ■ *key-type* is either `3des` or `aes`.	`wanbootutil keygen -c -o net=`*net-IP*`,cid=`*client-ID*`,type=`*key-type*
Split a PKCS#12 certificate file and insert the certificate in the client's `truststore`. ■ *p12cert* is the name of the PKCS#12 certificate file.	`wanbootutil p12split -i` *p12cert* `-t /etc/netboot/`*net-IP*`/`*client-ID*`/truststore`

TABLE 15–2 Preparing the WAN Boot Security Files *(Continued)*

Task and Description	Command
Split a PKCS#12 certificate file and insert the client certificate in the client's `certstore`. ■ *keyfile* is the name of the client's private key.	`wanbootutil p12split -i` *p12cert* `-c /etc/netboot/`*net-IP*`/`*client-ID*`/certstore -k` *keyfile*
Insert the client private key from a split PKCS#12 file in the client's `keystore`.	`wanbootutil keymgmt -i -k` *keyfile* `-s /etc/netboot/`*net-IP*`/`*client-ID*`/keystore -o type=rsa`
Display the value of a HMAC SHA1 hashing key.	`wanbootutil keygen -d -c -o net=`*net-IP*`,cid=`*client-ID*`,type=sha1`
Display the value of an encryption key. ■ *key-type* is either `3des` or `aes`.	`wanbootutil keygen -d -c -o net=`*net-IP*`,cid=`*client-ID*`,type=`*key-type*
Insert a hashing key or an encryption key on a running system. *key-type* can have a value of `sha1`, `3des`, or `aes`.	`/usr/lib/inet/wanboot/ickey -o type=`*key-type*

OBP Commands

The following table lists the OBP commands that you type at the client `ok` prompt to perform a WAN boot installation.

TABLE 15–3 OBP Commands for a WAN Boot Installation

Task and Description	OBP Command
Begin an unattended WAN boot installation.	`boot net – install`
Begin an interactive WAN boot installation.	`boot net –o prompt - install`
Begin a WAN boot installation from a local CD.	`boot cdrom –F wanboot - install`
Install a hashing key before you begin a WAN boot installation.*key-value* is the hexadecimal value of the hashing key.	`set-security-key wanboot-hmac-sha1` *key-value*
Install an encryption key before you begin a WAN boot installation. ■ *key-type* is either `wanboot-3des` or `wanboot-aes`. ■ *key-value* is the hexadecimal value of the encryption key.	`set-security-key` *key-type key-value*
Verify that key values are set in OBP.	`list-security-keys`

TABLE 15–3 OBP Commands for a WAN Boot Installation *(Continued)*

Task and Description	OBP Command
Set client configuration variables before you begin your WAN boot installation. ■ *client-IP* is the IP address of the client. ■ *router-IP* is the IP address of the network router. ■ *mask-value* is the subnet mask value. ■ *client-name* is the host name of the client. ■ *proxy-IP* is the IP address of the network's proxy server. ■ *wanbootCGI-path* is the path to the `wanbootCGI` programs on the web server.	`setenv network-boot-arguments host-ip=`*client-IP*`,router-ip=`*router-IP*`, subnet-mask=`*mask-value*`,hostname=`*client-name*`, http-proxy=`*proxy-IP*`,file=`*wanbootCGI-path*
Check the network device alias.	`devalias`
Set the network device alias, where *device-path* is the path to the primary network device.	■ To set the alias for the current installation only, type `devalias net` *device-path*. ■ To permanently set the alias, type `nvvalias net` *device-path*.

System Configuration File Settings and Syntax

The system configuration file enables you to direct the WAN boot installation programs to the following files.

- `sysidcfg`
- `rules.ok`
- JumpStart profile

The system configuration file is a plain text file, and must be formatted in the following pattern.

setting=value

The `system.conf` file must contain the following settings:

`SsysidCF=`*sysidcfg-file-URL*
: This setting points to the directory on the install server that contains the `sysidcfg` file. For WAN installations that use HTTPS, set the value to a valid HTTPS URL.

`SjumpsCF=`*jumpstart-files-URL*
: This setting points to the JumpStart directory that contains the `rules.ok` and profile files. For WAN installations that use HTTPS, set the value to a valid HTTPS URL.

You can store the `system.conf` in any directory that is accessible to the WAN boot server.

wanboot.conf File Parameters and Syntax

The wanboot.conf file is a plain text configuration file that the WAN boot installation programs use to perform a WAN installation. The following programs and files use the information included in the wanboot.conf file to install the client machine:

- wanboot-cgi program
- WAN boot file system
- WAN boot miniroot

Save the wanboot.conf file in the appropriate client subdirectory in the /etc/netboot hierarchy on the WAN boot server. For information about how to define the scope of your WAN boot installation with the /etc/netboot hierarchy, see "Creating the /etc/netboot Hierarchy on the WAN Boot Server" on page 155.

You specify information in the wanboot.conf file by listing parameters with associated values in the following format:

parameter=value

Parameter entries cannot span lines. You can include comments in the file by preceding the comments with the # character.

For detailed information about the wanboot.conf file, see the wanboot.conf(4) man page.

You must set the following parameters in the wanboot.conf file:

boot_file=*wanboot-path*
: This parameter specifies the path to the wanboot program. The value is a path relative to the document root directory on the WAN boot server.

```
boot_file=/wanboot/wanboot.s10_sparc
```

root_server=*wanbootCGI-URL*/wanboot-cgi
: This parameter specifies the URL of the wanboot-cgi program on the WAN boot server.

- Use an HTTP URL if you are performing a WAN boot installation without client or server authentication.

```
root_server=http://www.example.com/cgi-bin/wanboot-cgi
```

- Use an HTTPS URL if you are performing a WAN boot installation with server authentication, or server and client authentication.

```
root_server=https://www.example.com/cgi-bin/wanboot-cgi
```

root_file=*miniroot-path*
: This parameter specifies the path to the WAN boot miniroot on the WAN boot server. The value is a path relative to the document root directory on the WAN boot server.

```
root_file=/miniroot/miniroot.s10_sparc
```

`signature_type=sha1 | empty`
This parameter specifies the type of hashing key to use to check the integrity of the data and files that are transmitted.

- For WAN boot installations that use a hashing key to protect the `wanboot` program, set this value to `sha1`.

  ```
  signature_type=sha1
  ```

- For insecure WAN installations that do not use a hashing key, leave this value blank.

  ```
  signature_type=
  ```

`encryption_type=3des | aes | empty`
This parameter specifies the type of encryption to use to encrypt the `wanboot` program and WAN boot file system.

- For WAN boot installations that use HTTPS, set this value to `3des` or `aes` to match the key formats you use. You must also set the `signature_type` keyword value to `sha1`.

  ```
  encryption_type=3des
  ```

  or

  ```
  encryption_type=aes
  ```

- For an insecure WAN boot installations that do not use encryption key, leave this value blank.

  ```
  encryption_type=
  ```

`server_authentication=yes | no`
This parameter specifies if the server should be authenticated during the WAN boot installation.

- For WAN boot installations with server authentication or server and client authentication, set this value to `yes`. You must also set the value of `signature_type` to `sha1`, `encryption_type` to `3des` or `aes`, and the URL of `root_server` to an HTTPS value.

  ```
  server_authentication=yes
  ```

- For insecure WAN boot installations that do not use server authentication or server and client authentication, set this value to `no`. You can also leave the value blank.

  ```
  server_authentication=no
  ```

`client_authentication=yes | no`
This parameter specifies if the client should be authenticated during a WAN boot installation.

- For WAN boot installations with server and client authentication, set this value to `yes`. You must also set the value of `signature_type` to `sha1`, `encryption_type` to `3des` or `aes`, and the URL of `root_server` to an HTTPS value.

  ```
  client_authentication=yes
  ```

- For WAN boot installations that do not use client authentication, set this value to `no`. You can also leave the value blank.

```
client_authentication=no
```

`resolve_hosts=`*hostname* | *empty*
This parameter specifies additional hosts that need to be resolved for the `wanboot-cgi` program during the installation.

Set the value to the host names of systems that are not specified previously in the `wanboot.conf` file or in a client certificate.

- If all the required hosts are listed in the `wanboot.conf` file or the client certificate, leave this value blank.

  ```
  resolve_hosts=
  ```

- If specific hosts are not listed in the `wanboot.conf` file or the client certificate, set the value to these host names.

  ```
  resolve_hosts=seahag,matters
  ```

`boot_logger=`*bootlog-cgi-path* | *empty*
This parameter specifies the URL to the `bootlog-cgi` script on the logging server.

- To record boot or installation log messages on a dedicated logging server, set the value to the URL of the `bootlog-cgi` script on the logging server.

  ```
  boot_logger=http://www.example.com/cgi-bin/bootlog-cgi
  ```

- To display boot and installation messages on the client console, leave this value blank.

  ```
  boot_logger=
  ```

`system_conf=system.conf` | *custom-system-conf*
This parameter specifies the path to the system configuration file that includes the location of `sysidcfg` and JumpStart files.

Set the value to the path to the `sysidcfg` and JumpStart files on the web server.

```
system_conf=sys.conf
```

PART IV

Appendixes

This part provides reference information.

◆ ◆ ◆ APPENDIX A

Troubleshooting (Tasks)

This chapter contains a list of specific error messages and general problems you might encounter when installing the Oracle Solaris 10 1/13 OS. The chapter also explains how to fix the problems. The content is organized according to where in the installation process the problem occurred.

Note – When you see the phrase "bootable media," this means the Oracle Solaris installation program and JumpStart, a feature of Oracle Solaris, installation method.

Problems With Setting Up Network Installations

`Unknown client "`*host-name*`"`

Cause: The *host-name* argument in the `add_install_client` command is not a host in the naming service.

Solution: Add the host *host_name* to the naming service and run the `add_install_client` command again.

`Error: <system name> does not exist in the NIS ethers map`

`Add it, and rerun the add_install_client command`

Description: When you run the `add_install_client` command, the command fails with the above error.

Cause: The client you are adding to the install server does not exist in the server's `/etc/ethers` file.

Solution: Add the needed information to the `/etc/ethers` file on the install server and run the `add_install_client` command again.

1. Become superuser or assume an equivalent role.

   Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2. On the client, find the `ethers` address.

   ```
   # ifconfig -a grep ethers
   ether 8:0:20:b3:39:1d
   ```

3. On the install server, add the address to the list the in the `/etc/ethers` file.
4. On the client, run `add_install_client` again as in this example.

   ```
   # ./add_install_client bluegill sun4u
   ```

Problems With Booting a System

Error Messages When Booting From Media

`le0: No carrier - transceiver cable problem`
Cause: The system is not connected to the network.

Solution: If the system is a nonnetworked system, ignore this message. If the system is a networked system, ensure that the Ethernet cabling is attached securely.

`The file just loaded does not appear to be executable`
Cause: The system cannot find the proper media for booting.

Solution: Verify that the system has been set up properly to install the Oracle Solaris 10 1/13 software from the network from an install server.

- If you copied the images of the Oracle Solaris DVD or the Oracle Solaris Software CDs to the install server, ensure that you specified the correct platform group for the system when you set it up.
- If you are using DVD or CD media, ensure that the Oracle Solaris DVD or Oracle Solaris Software - 1 CD is mounted and accessible on the install server.

`boot: cannot open <filename> (SPARC based systems only)`
Cause: This error occurs when you override the location of the `boot -file` by explicitly setting it.

Solution: Try one of the following:

- Reset the `boot -file` in the PROM to " " (blank).
- Ensure that `diag-switch` is set to off and to true.

`Can't boot from file/device`

Cause: The installation media cannot find the bootable media.

Solution: Ensure that the following conditions are met:

- The DVD-ROM or CD-ROM drive is installed properly and turned on.
- Oracle Solaris DVD or the Oracle Solaris Software - 1 CD is inserted into the drive.
- The disc is free of damage or dirt.

`WARNING: clock gained` *xxx* `days -- CHECK AND RESET DATE!` **`(SPARC based systems only)`**

Description: This is an informational message.

Solution: Ignore the message and continue with the installation.

`Not a UFS file system` **`(x86 based systems only)`**

Cause: When the current Oracle Solaris release was installed (either through the Oracle Solaris installation program or JumpStart), no boot disk was selected. You now must edit the BIOS to boot the system.

Solution: Select the BIOS to boot. See your BIOS documentation for instructions.

General Problems When Booting From Media

`The system does not boot.`

Description: When initially setting up a JumpStart server, you might encounter boot problems that do not return an error message. To verify information about the system and how the system is booting, run the `boot` command with the `-v` option, which displays verbose debugging information.

Note – If you do not include this option, the messages are still printed but the output is directed to the system log file. For more information, see the `syslogd(1M)` man page.

Solution: For SPARC based systems, at the `ok` prompt, type the following command:

```
ok boot net -v - install
```

`Boot from DVD media fails on systems with Toshiba SD-M 1401 DVD-ROM`

Description: If your system has a Toshiba SD-M1401 DVD-ROM with firmware revision 1007, the system cannot boot from the Oracle Solaris DVD.

Solution: Apply patch 111649–03, or later version, to update the Toshiba SD-M1401 DVD-ROM drive's firmware. The patch 111649–03 is available at http://support.oracle.com/ (My Oracle Support) from the Patches and Updates tab.

`The system hangs or panics when nonmemory PC cards are inserted. (x86 based systems only)`

Cause: Nonmemory PC cards cannot use the same memory resources that are used by other devices.

Solution: To correct this problem, see the instructions for your PC card and check for the address range.

`The system hangs before displaying the system prompt. (x86 based systems only)`

Cause: You have hardware that is not supported.

Solution: Check your hardware manufacturer's documentation.

Booting From the Network, Error Messages

`WARNING: getfile: RPC failed: error 5 (RPC Timed out).`

Description: This error occurs when you have two or more servers on a network responding to an install client's boot request. The install client connects to the wrong boot server, and the installation hangs. The following specific reasons might cause this error to occur:

Cause: *Reason 1:* `/etc/bootparams` files might exist on different servers with an entry for this install client.

Solution: *Reason 1:* Ensure that servers on the network do not have multiple `/etc/bootparams` entries for the install client. If they do have multiple entries, remove duplicate client entries in the `/etc/bootparams` file on all install servers and boot servers except the one you want the install client to use.

Cause: *Reason 2:* Multiple `/tftpboot` or `/rplboot` directory entries might exist for this install client.

Solution: *Reason 2:* Ensure that servers on the network do not have multiple `/tftpboot` or `/rplboot` directory entries for the install client. If they do have multiple entries, remove duplicate client entries from the `/tftpboot` or `/rplboot` directories on all install servers and boot servers except the one you want the install client to use.

Cause: *Reason 3:* An install client entry might exist in the `/etc/bootparams` file on a server and an entry in another `/etc/bootparams` file that enables all systems to access the profile server. The entry would resemble the following:

```
* install_config=profile-server:path
```

A line that resembles the previous entry in the NIS or NIS+ `bootparams` table can also cause this error.

Solution: *Reason 3:* If a wildcard entry is in the naming service `bootparams` map or table (for example, `* install_config=`), delete it and add it to the `/etc/bootparams` file on the boot server.

`No network boot server. Unable to install the system. See installation instructions. (`**`SPARC based systems only`**`)`

Cause: A system on which you are attempting to install from the network is not set up correctly.

Solution: Ensure that you correctly set up the system to install from the network. See "Adding Systems to Be Installed From the Network With a CD Image" on page 93.

`prom_panic: Could not mount file system (`**`SPARC based systems only`**`)`

Cause: You are installing Oracle Solaris from a network but the boot software cannot locate the following:

- Oracle Solaris DVD, either the DVD or a copy of the DVD image on the install server
- Oracle Solaris Software - 1 CD image, either the Oracle Solaris Software - 1 CD or a copy of the CD image on the install server

Solution: Ensure that the installation software is mounted and shared.

- If you are installing Oracle Solaris from the install server's DVD-ROM or CD-ROM drive, ensure that the Oracle Solaris DVD or Oracle Solaris Software - 1 CD is inserted in the CD-ROM drive, is mounted, and is shared in the `/etc/dfs/dfstab` file.
- If installing from a copy of the Oracle Solaris DVD image or Oracle Solaris Software - 1 CD image on the install server's disk, ensure that the directory path to the copy is shared in the `/etc/dfs/dfstab` file.

`Timeout waiting for ARP/RARP packet...(`**`SPARC based systems only`**`)`

Cause: *Reason 1:* The client is trying to boot from the network but it cannot find a system that knows about the client.

Solution: *Reason 1:* Verify the system's host name is in the NIS or NIS+ naming service. Also, verify the `bootparams` search order in the boot server's `/etc/nsswitch.conf` file.

For example, the following line in the `/etc/nsswitch.conf` file indicates that JumpStart or the Oracle Solaris installation program first looks in the NIS maps for `bootparams` information. If the program does not find any information, the installer looks in the boot server's `/etc/bootparams` file.

```
bootparams: nis files
```

Cause: *Reason 2:* The client's Ethernet address is not correct.

Solution: *Reason 2:* Verify that the client's Ethernet address in the install server's `/etc/ethers` file is correct.

Cause: *Reason 3:* In a JumpStart installation, the `add_install_client` command specifies the platform group that uses a specified server as an install server. This problem occurs if the wrong architecture value is used when using the `add_install_client`. For example, the machine you want to install is a `sun4u`, but you used `i86pc` instead.

Solution: *Reason 3:* Rerun `add_install_client` with the correct architecture value.

`ip: joining multicasts failed on tr0 - will use link layer broadcasts for multicast (`**`x86 based systems only`**`)`

Cause: This error message is displayed when you boot a system with a token ring card. Ethernet multicast and token ring multicast do not work the same way. The driver returns this error message because an invalid multicast address was provided to it.

Solution: Ignore this error message. If multicast does not work, IP uses layer broadcasts instead and does not cause the installation to fail.

`Requesting Internet address for` *Ethernet-Address* `(`**`x86 based systems only`**`)`

Cause: The client is trying to boot from the network but it cannot find a system that knows about the client.

Solution: Verify the system's host name is listed in the naming service. If the system's host name is listed in the NIS or NIS+ naming service and the system continues to print this error message, try rebooting.

`RPC: Timed out No bootparams (whoami) server responding; still trying... (`**`x86 based systems only`**`)`

Cause: The client is trying to boot from the network but it cannot find a system with an entry in the `/etc/bootparams` file on the install server.

Solution: Use `add_install_client` on the install server to add the proper entry in the `/etc/bootparams` file, enabling the client to boot from the network.

`Still trying to find a RPL server... (`**`x86 based systems only`**`)`

Cause: The system is trying to boot from the network but the server is not set up to boot this system.

Solution: On the install server, execute `add_install_client` for the system to be installed. The `add_install_client` command sets up an `/rplboot` directory, which contains the necessary network boot program.

`CLIENT MAC ADDR: FF FF FF FF FF FF (network installations with DHCP only)`

Cause: The DHCP server is not configured correctly. This error might occur if the options or macros are not correctly defined in the DHCP Manager software.

Solution: In the DHCP Manager software, verify that the options and macros are correctly defined. Confirm that the Router option is defined, and that the value of the Router option is correct for the subnet you are using for the network installation.

General Problems When Booting From the Network

`The system boots from the network, but from a system other than the specified install server.`

Cause: An `/etc/bootparams` and perhaps an `/etc/ethers` entry exist on another system for the client.

Solution: On the name server, update the `/etc/bootparams` entry for the system that is being installed. The entry should conform to the following syntax:

install-system `root=`*boot-server*`:`*path* `install=`*install-server*`:`*path*

Also, ensure that only one `bootparams` entry is on the subnet for the install client.

`The system does not boot from the network (network installations with DHCP only).`

Cause: The DHCP server is not configured correctly. This error might occur if the system is not configured as an installation client on the DHCP server.

Solution: In the DHCP manager software, verify that installation options and macros are defined for the client system. For more information, see "Preconfiguring System Configuration Information With the DHCP Service (Tasks)" on page 45.

Initial Installation of the Oracle Solaris OS

`Initial installation fails`

Solution: If the Oracle Solaris installation fails, you must restart the installation. To restart the installation, boot the system from the Oracle Solaris DVD, the Oracle Solaris Software - 1 CD, or from the network.

You cannot uninstall the Oracle Solaris software after the software has been partially installed. You must restore your system from a backup or begin the Oracle Solaris installation process again.

`/cdrom/sol_Solaris_10/SUNW`*xxxx*`/reloc.cpio: Broken pipe`
Description: This error message is informational and does not affect the installation. The condition occurs when a write on a pipe does not have a reading process.

Solution: Ignore the message and continue with the installation.

`WARNING: CHANGE DEFAULT BOOT DEVICE (x86 based systems only)`
Cause: This is an informational message. The default boot device set in the system's BIOS might be set to a device that requires you to use the Oracle Solaris Device Configuration Assistant to boot the system.

Solution: Continue with the installation and, if necessary, change the system's default boot device specified in the BIOS after you install the Oracle Solaris software to a device that does not require the Oracle Solaris Device Configuration Assistant.

---

x86 only – If you are using the `locale` keyword to test a JumpStart profile for an initial installation, the `pfinstall -D` command fails to test the profile. For a workaround, see the error message "could not select locale," in the section, "Upgrading the Oracle Solaris OS" on page 232.

▼ x86: How to Check an IDE Disk for Bad Blocks

IDE disk drives do not automatically map out bad blocks like other drives supported by Oracle Solaris software. Before installing Oracle Solaris on an IDE disk, you might want to perform a surface analysis on the disk.

1 Become superuser or assume an equivalent role.

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

2 Boot to the installation media.

3 When you are prompted to select an installation type, select option 6, Single user shell.

4 Start the `format(1M)` program.

```
# format
```

5 Specify the IDE disk drive on which you want to perform a surface analysis.

```
# cxdy
```

cx The controller number

d*y* The device number

6 Determine whether you have an `fdisk` partition.

- If an Oracle Solaris `fdisk` partition does not exist, use the `fdisk` command to create one on the disk.

```
format> fdisk
```

7 Begin the surface analysis.

```
format> analyze
```

8 Determine the current settings.

```
analyze> config
```

9 (Optional) Change settings.

```
analyze> setup
```

10 Determine whether any bad blocks exist.

`analyze>` *type-of-surface-analysis*

type-of-surface-analysis Read, write, or compare

If `format` finds bad blocks, it remaps them.

11 Exit the analysis.

```
analyze> quit
```

12 Specify blocks to remap if necessary.

```
format> repair
```

13 Exit the format program.

```
quit
```

14 Restart the media in multiuser mode.

```
# exit
```

Upgrading the Oracle Solaris OS

Upgrading Error Messages

`No upgradable disks`

Cause: A swap entry in the `/etc/vfstab` file is causing the upgrade to fail.

Solution: Comment out the following lines in the `/etc/vfstab` file:

- All swap files and slices on disks not being upgraded
- Swap files that are no longer present
- Any unused swap slices

`usr/bin/bzcat not found`

Cause: Live Upgrade fails because of needing a patch cluster.

Solution: A patch is needed to install Live Upgrade. Ensure that you have the most recently updated patch list by consulting http://support.oracle.com/ (My Oracle Support). Search for the knowledge document 1004881.1 - Solaris Live Upgrade Software Patch Requirements (formerly 206844) on My Oracle Support.

`Upgradeable Solaris root devices were found, however, no suitable partitions to hold the Solaris install software were found. Upgrading using the Solaris Installer is not possible. It might be possible to upgrade using the Solaris Software 1 CDROM. (x86 based systems only)`

Cause: You cannot upgrade with the Oracle Solaris Software - 1 CD because you do not have enough space.

Solution: To upgrade, you can either create a swap slice that is larger than or equal to 512 MB or use another method of upgrading such as the Oracle Solaris installation program from Oracle Solaris DVD, a net installation image, or JumpStart.

`ERROR: Could not select locale (x86 based systems only)`

Cause: When you test your JumpStart profile by using the `pfinstall -D` command, the dry run test fails under the following conditions:

- The profile contains the locale keyword.
- You're testing a release that contains GRUB software. Starting with the Solaris 10 1/06 release, the GRUB boot loader facilitates booting different operating systems installed on your system with the GRUB menu.

With the introduction of GRUB software, the miniroot is compressed. The software can no longer find the list of locales from the compressed miniroot. The miniroot is the smallest possible Oracle Solaris root (/) file system and is found on the Oracle Solaris installation media.

Solution: Perform the following steps. Use the following values.

- `MEDIA_DIR` is `/cdrom/cdrom0/`
- `MINIROOT_DIR` is `$MEDIA_DIR/Solaris_10/Tools/Boot`
- `MINIROOT_ARCHIVE` is `$MEDIA_DIR/boot/x86.miniroot`
- `TEMP_FILE_NAME` is `/tmp/test`

1. Become superuser or assume an equivalent role.

   Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2. Uncompress the miniroot archive.

   ```
   # /usr/bin/gzcat $MINIROOT_ARCHIVE > $TEMP_FILE_NAME
   ```

3. Create the miniroot device by using the `lofiadm` command.

   ```
   # LOFI_DEVICE=/usr/sbin/lofiadm -a $TEMP_FILE_NAME
   # echo $LOFI_DEVICE
   /dev/lofi/1
   ```

4. Mount the miniroot with the `lofi` command under the Miniroot directory.

   ```
   # /usr/sbin/mount -F ufs  $LOFI_DEVICE  $MINIROOT_DIR
   ```

5. Test the profile.

   ```
   # /usr/sbin/install.d/pfinstall -D -c $MEDIA_DIR $path-to-jumpstart_profile
   ```

6. After the testing is completed, unmount the lofi device.

   ```
   # umount  $LOFI_DEVICE
   ```

7. Delete the `lofi` device.

   ```
   # lofiadm -d $TEMP_FILE_NAME
   ```

General Problems When Upgrading

`The upgrade option is not presented even though there is a version of Solaris software that's upgradable on the system.`

Cause: *Reason 1:* The `/var/sadm` directory is a symlink or it is mounted from another file system.

Solution: *Reason 1:* Move the `/var/sadm` directory into the root (/) or `/var` file system.

Cause: *Reason 2:* The `/var/sadm/softinfo/INST_RELEASE` file is missing.

Solution: *Reason 2:* Create a new `INST_RELEASE` file by using the following template:

```
OS=Solaris
VERSION=x
REV=0
```

x The version of Oracle Solaris software on the system

Cause: *Reason 3:* The package `SUNWusr` is missing from `/var/sadm/softinfo`.

Solution: *Solution 3:* You need to do an initial installation. The Oracle Solaris software is not upgradable.

`Couldn't shut down or initialize the md driver`

Solution: Perform the following:

- If the file system is not a RAID-1 volume, comment out file system in the `vsftab` file.
- If the file system is a RAID-1 volume, break the mirror and reinstall. For information about unmirroring, see "Removing RAID-1 Volumes (Unmirroring)" in *Solaris Volume Manager Administration Guide*.

`The upgrade fails because the Solaris installation program cannot mount a file system.`

Cause: During an upgrade, the script attempts to mount all the file systems that are listed in the system's `/etc/vfstab` file on the root (`/`) file system that is being upgraded. If the installation script cannot mount a file system, it fails and exits.

Solution: Ensure that all file systems in the system's `/etc/vfstab` file can be mounted. Comment out any file systems in the `/etc/vfstab` file that cannot be mounted or that might cause the problem so that the Oracle Solaris installation program does not try to mount them during the upgrade. Any system-based file systems that contain software to be upgraded (for example, `/usr`) cannot be commented out.

`The upgrade fails`

Description: The system does not have enough space for the upgrade.

Cause: Check "Upgrading With Disk Space Reallocation" in *Oracle Solaris 10 1/13 Installation Guide: Planning for Installation and Upgrade* for the space requirement and see if you can fix this issue without using auto-layout to reallocate space.

`Problems upgrading RAID–1 volume root (/) file systems`

Solution: If you have problems upgrading when using Solaris Volume Manager RAID-1 volumes that are the root (`/`) file system, see Chapter 25, "Troubleshooting Solaris Volume Manager (Tasks)," in *Solaris Volume Manager Administration Guide*.

How to Continue Upgrading After a Failed Upgrade

If the upgrade fails and the system cannot be soft-booted for reasons beyond your control, such as a power failure, or a network connection failure, try to continue upgrading.

1. **Reboot the system from the Oracle Solaris DVD, the Oracle Solaris Software - 1 CD, or from the network.**

2. **Choose the upgrade option for installation.**

   The Oracle Solaris installation program determines whether the system has been partially upgraded and continues the upgrade.

x86: Problems With Live Upgrade When You Use GRUB

The following errors can occur when you use Live Upgrade and the GRUB boot loader on an x86 based system.

`ERROR: The media product tools installation directory` *path-to-installation-directory* `does not exist.`

`ERROR: The media` *dirctory* `does not contain an operating system upgrade image.`

Description: These error messages can occur when using the `luupgrade` command to upgrade a new boot environment.

Cause: An older version of Live Upgrade is being used. The Live Upgrade packages you have installed on your system are incompatible with the media and the release on that media.

Solution: Always use the Live Upgrade packages from the release you are upgrading to.

Example: In the following example, the error message indicates that the Live Upgrade packages on the system are not the same version as on the media.

```
# luupgrade -u -n s10u1 -s /mnt
    Validating the contents of the media </mnt>.
    The media is a standard Solaris media.
    ERROR: The media product tools installation directory
</mnt/Solaris_10/Tools/Boot/usr/sbin/install.d/install_config> does
not exist.
    ERROR: The media </mnt> does not contain an operating system upgrade
image.
```

`ERROR: Cannot find or is not executable: </sbin/biosdev>.`

`ERROR: One or more patches required by Live Upgrade has not been installed.`

Cause: One or more patches required by Live Upgrade are not installed on your system. Beware that this error message does not catch all missing patches.

Solution: Before using Live Upgrade, always install all the required patches. Ensure that you have the most recently updated patch list by consulting (`http://support.oracle.com/`) (My Oracle Support). Search for the knowledge document 1004881.1 - Solaris Live Upgrade Software Patch Requirements (formerly 206844) on My Oracle Support.

`ERROR: Device mapping command </sbin/biosdev> failed. Please reboot and try again.`

Cause: *Reason 1*: Live Upgrade is unable to map devices because of previous administrative tasks.

Solution: *Reason 1*: Reboot the system and try Live Upgrade again

Cause: *Reason 2*: If you reboot your system and get the same error message, you have two or more identical disks. The device mapping command is unable to distinguish between them.

Solution: *Reason 2*: Create a new dummy `fdisk` partition on one of the disks. (See the `fdisk(1M)` man page). Then reboot the system.

`Cannot delete the boot environment that contains the GRUB menu`

Cause: Live Upgrade imposes the restriction that a boot environment cannot be deleted if the boot environment contains the GRUB menu.

Solution: Use the `lumake(1M)` or `luupgrade(1M)` commands to reuse that boot environment.

`The file system containing the GRUB menu was accidentally remade. However, the disk has the same slices as before. For example, the disk was not re-sliced.`

Cause: The file system that contains the GRUB menu is critical to keeping the system bootable. Live Upgrade commands do not destroy the GRUB menu. But, if you accidentally remake or otherwise destroy the file system containing the GRUB menu with a command other than a Live Upgrade command, the recovery software attempts to reinstall the GRUB menu. The recovery software puts the GRUB menu back in the same file system at the next reboot. For example, you might have used the `newfs` or `mkfs` commands on the file system and accidentally destroyed the GRUB menu. To restore the GRUB menu correctly, the slice must adhere to the following conditions:

- Contains a mountable file system
- Remains a part of the same Live Upgrade boot environment where the slice resided previously

Before rebooting the system, make any necessary corrective actions on the slice.

Solution: Reboot the system. A backup copy of the GRUB menu is automatically installed.

`The GRUB menu's menu.lst file was accidentally deleted.`

Solution: Reboot the system. A backup copy of the GRUB menu is automatically installed.

System Panics When Upgrading With Live Upgrade Running Veritas VxVM

▼ How to Upgrade When Running Veritas VxVM

When you use Live Upgrade while upgrading and running Veritas VxVM, the system panics on reboot unless you upgrade by using the following procedure. The problem occurs if packages do not conform to Oracle Solaris advanced packaging guidelines.

1. **Become superuser or assume an equivalent role.**

Note – Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

---

2. **Create an inactive boot environment. See "Creating a New Boot Environment" in *Oracle Solaris 10 1/13 Installation Guide: Live Upgrade and Upgrade Planning*.**

3. **Before upgrading the inactive boot environment, disable the existing Veritas software on the inactive boot environment.**

   a. **Mount the inactive boot environment.**

      `# lumount` *inactive-boot-environment-name mount-point*

      For example:

      ```
      # lumount solaris8 /mnt
      ```

   b. **Change to the directory that contains the `vfstab` file.**

      ```
      # cd /mnt/etc
      ```

   c. **Make a copy of the inactive boot environment's `vfstab` file.**

      For example:

      ```
      # cp vfstab vfstab.501
      ```

   d. **In the copied `vfstab`, comment out all Veritas file system entries.**

      ```
      #  sed  '/vx\/dsk/s/^/#/g'  < vfstab >  vfstab.novxfs
      ```

      The first character of each line is changed to #, which makes the line a comment line. Note that this comment line is different than the system file-comment lines.

e. **Copy the changed `vfstab` file, for example:**

```
# cp vfstab.novxfs vfstab
```

f. **Change directories to the inactive boot environment's system file, for example:**

```
# cd /mnt/etc
```

g. **Make a copy of the inactive boot environment's system file, for example:**

```
# cp system system.501
```

h. **Comment out all "forceload:" entries that include `drv/vx`.**

```
# sed '/forceload:   drv\/vx/s/^/*/' <system> system.novxfs
```

The first character of each line is changed to *, which makes the line a command line. Note that this comment line is different than the `vfstab` file comment lines.

i. **Create the Veritas `install-db` file, for example:**

```
# touch vx/reconfig.d/state.d/install-db
```

j. **Unmount the inactive boot environment.**

```
# luumount inactive-boot-environment-name
```

4 **See Chapter 5, "Upgrading With Live Upgrade (Tasks)," in *Oracle Solaris 10 1/13 Installation Guide: Live Upgrade and Upgrade Planning*. Upgrade the inactive boot environment.**

5 **See "Activating a Boot Environment" in *Oracle Solaris 10 1/13 Installation Guide: Live Upgrade and Upgrade Planning*. Activate the inactive boot environment.**

6 **Shut down the system.**

```
# init 0
```

7 **Boot the inactive boot environment in single-user mode.**

```
OK boot -s
```

Several messages and error messages that contain "vxvm" or "VXVM" are displayed that can be ignored. The inactive boot environment becomes active.

8 **Upgrade Veritas.**

a. **Remove the Veritas `VRTSvmsa` package from the system, for example:**

```
# pkgrm VRTSvmsa
```

b. **Change directories to the Veritas packages.**

```
# cd /location-of-Veritas-software
```

c. **Add the latest Veritas packages to the system.**

```
#  pkgadd -d 'pwd' VRTSvxvm VRTSvmsa VRTSvmdoc VRTSvmman VRTSvmdev
```

9 **Restore the original `vfstab` and system files.**

```
# cp /etc/vfstab.original /etc/vfstab
# cp /etc/system.original /etc/system
```

10 **Reboot the system.**

```
# init 6
```

x86: Service Partition Not Created by Default on Systems With No Existing Service Partition

If you install the current Oracle Solaris release on a system that does not currently include a service or diagnostic partition, the installation program might not create a service partition by default. If you want to include a service partition on the same disk as the Oracle Solaris partition, you must re-create the service partition before you install the current Oracle Solaris release.

If you installed the Solaris 8 2/02 OS on a system with a service partition, the installation program might not have preserved the service partition. If you did not manually edit the `fdisk` boot partition layout to preserve the service partition, the installation program deleted the service partition during the installation.

Note – If you did not specifically preserve the service partition when you installed the Solaris 8 2/02 OS, you might not be able to re-create the service partition and upgrade to the current Oracle Solaris release.

If you want to include a service partition on the disk that contains the Oracle Solaris partition, choose one of the following workaround methods.

▼ How to Include a Service Partition When Installing Software From a Network Installation Image or From the Oracle Solaris DVD

To install the software from a net installation image or from the Oracle Solaris DVD over the network, follow these steps.

1 **Delete the contents of the disk.**

2. **Before you install, create the service partition by using the diagnostics CD for your system.**
   For information about how to create the service partition, see your hardware documentation.
3. **Boot the system from the network.**
   The Customize `fdisk` Partitions screen is displayed.
4. **Load the default boot disk partition layout by clicking Default.**
   The installation program preserves the service partition and creates the Oracle Solaris partition.

How to Include a Service Partition When Installing From the Oracle Solaris Software - 1 CD or From a Network Installation Image

To use the Oracle Solaris installation program to install from the Oracle Solaris Software - 1 CD or from a network installation image on a boot server, follow these steps.

1. **Delete the contents of the disk.**
2. **Before you install, create the service partition by using the diagnostics CD for your system.**
   For information about how to create the service partition, see your hardware documentation.

   The installation program prompts you to choose a method for creating the Oracle Solaris partition.
3. **Boot the system.**
4. **Select the `Use rest of disk for Solaris partition` option.**
   The installation program preserves the service partition and creates the Oracle Solaris partition.
5. **Complete the installation.**

◆ ◆ ◆ APPENDIX B

Installing or Upgrading Remotely (Tasks)

This appendix describes how to use the installation program to install or upgrade to the Oracle Solaris OS on a machine or domain that does not have a directly attached DVD-ROM or CD-ROM drive.

Note – If you are installing or upgrading the Oracle Solaris OS on a multi–domain server, refer to the system controller or system service processor documentation before beginning the installation process.

SPARC: Using the Installation Program to Install or Upgrade From a Remote DVD-ROM or CD-ROM

If you want to install the Oracle Solaris OS on a machine or domain that does not have a directly attached DVD-ROM or CD-ROM drive, you can use a drive that is attached to another machine. Both machines must be connected to the same subnet. Use the following instructions to complete the installation.

▼ SPARC: How to Install or Upgrade From a Remote DVD-ROM and CD-ROM

Note – This procedure assumes that the system is running the Volume Manager. If you are not using the Volume Manager to manage media, refer to *System Administration Guide: Devices and File Systems*.

In the following procedure, the remote system with the DVD-ROM or CD-ROM is identified as *remote system*. The system that is the client to be installed is identified as *client system*.

1. **Identify a system that is running the Oracle Solaris OS and has a DVD-ROM or CD-ROM drive.**

2. **On the *remote system* with the DVD-ROM or CD-ROM drive, insert the Oracle Solaris DVD or the Oracle Solaris Software for SPARC Platforms - 1 CD in the drive.**

   The Volume Manager mounts the disc.

3. **On the remote system, change directories to the DVD or CD where the `add_install_client` command is located.**

   - For DVD media, type:

     remote system`# cd /cdrom/cdrom0/Solaris_10/Tools`
   - For CD media, type:

     remote system`# cd /cdrom/cdrom0`

4. **On the remote system, add the system that you want to install as a client.**

   - For DVD media, type:

     remote system`# ./add_install_client \`
     client-system-name arch
   - For CD media, type:

     remote system`# ./add_install_client -s` *remote_system_name*`: \`
     `/cdrom/cdrom0` *client-system-name arch*

remote-system-name	The name of the system with the DVD-ROM or CD-ROM drive
client-system-name	The name of the machine you want to install
arch	The platform group of the machine you want to install, for example sun4u. On the system that you want to install, find the platform group by using the `uname -m` command.

5. **Boot the *client system* that you want to install.**

   client system: `ok boot net`

   The installation begins.

6. **Follow the instructions to type system configuration information if needed.**

   - If you are using DVD media, follow the instructions on the screen to complete the installation. You are finished.
   - If you are using CD media, the machine reboots and the installation program begins. After the Welcome panel, the Specify Media panel appears with Network File System selected. Proceed to Step 7.

7. **On the Specify Media panel, click Next.**

   The Specify Network File System Path panel appears and the text field contains the installation path.

   client-system-IP-address:`/cdrom/cdrom0`

8. **On the remote system where the DVD or CD is mounted, change directories to `root`.**

   remote system`# cd /`

9. **On the remote system, check for the path to the slice that has been shared.**

   remote system`# share`

10. **On the remote system, unshare the Oracle Solaris DVD or Oracle Solaris Software for SPARC Platforms - 1 CD by using the path that is found in Step 9. If paths lead to two slices, `unshare` both slices.**

    remote system`# unshare` *absolute_path*

    absolute_path Is the absolute path shown in the `share` command

    In this example, slice 0 and slice 1 are unshared.

    ```
    remote system# unshare /cdrom/cdrom0
    remote system# unshare /cdrom/cdrom0
    ```

11. **On the client system that you are installing, continue the installation by clicking Next.**

12. **If the installation program prompts you to insert the Oracle Solaris Software - 2 CD, repeat Step 9 through Step 11 to unshare the Oracle Solaris Software - 1 CD and to export and install the Oracle Solaris Software - 2 CD.**

13. **If the installation program prompts you to insert additional Oracle Solaris Software CDs, repeat Step 9 through Step 11 to unshare the Oracle Solaris Software CDs and to export and install the additional CDs.**

14. **If the installation program prompts you to insert the first Oracle Solaris Languages CD, repeat Step 9 through Step 11 to unshare the Oracle Solaris Software CDs and to export and install each Oracle Solaris Languages CD.**

    When you export a Oracle Solaris Languages CD, an installer window appears on the machine where the CD-ROM is mounted. Ignore the installer window while you install the Oracle Solaris Languages CD. After you complete the installation of the Oracle Solaris Languages CDs, close the installer window.

Glossary

3DES ([Triple DES] Triple-Data Encryption Standard). A symmetric-key encryption method that provides a key length of 168 bits.

AES (Advanced Encryption Standard) A symmetric 128-bit block data encryption technique. The U.S. government adopted the Rijndael variant of the algorithm as its encryption standard in October 2000. AES replaces DES encryption as the government standard.

archive A file that contains a collection of files that were copied from a master system. The file also contains identification information about the archive, such as a name and the date that you created the archive. After you install an archive on a system, the system contains the exact configuration of the master system.

An archive could be a differential archive, which is a flash archive that contains only the differences between two system images, an unchanged master image and an updated master image. The differential archive contains files to be retained, modified, or deleted from the clone system. A differential update changes only the files specified and is restricted to systems that contain software consistent with the unchanged master image.

begin script A user-defined Bourne shell script, specified within the `rules` file, that performs tasks before the Oracle Solaris software is installed on the system. You can use begin scripts only with JumpStart installations.

boot To load the system software into memory and start it.

boot archive **x86 only**: A boot archive is a collection of critical files that is used to boot the Oracle Solaris OS. These files are needed during system startup before the root (`/`) file system is mounted. Two boot archives are maintained on a system:

- The boot archive that is used to boot the Oracle Solaris OS on a system. This boot archive is sometimes called the primary boot archive.
- The boot archive that is used for recovery when the primary boot archive is damaged. This boot archive starts the system without mounting the root (`/`) file system. On the GRUB menu, this boot archive is called failsafe. The archive's essential purpose is to regenerate the primary boot archive, which is usually used to boot the system.

boot environment A collection of mandatory file systems (disk slices and mount points) that are critical to the operation of the Oracle Solaris OS. These disk slices might be on the same disk or distributed across multiple disks.

The active boot environment is the one that is currently booted. Exactly one active boot environment can be booted. An inactive boot environment is not currently booted, but can be in a state of waiting for activation on the next reboot.

boot loader — **x86 only**: The boot loader is the first software program that runs after you turn on a system. This program begins the booting process.

boot server — A server system that provides client systems on the same network subnet with the programs and information that they need to start. A boot server is required to install over the network if the install server is on a different subnet than the systems on which Oracle Solaris software is to be installed.

`bootlog-cgi` program — The CGI program that enables a web server to collect and store remote client-booting and installation console messages during a WAN boot installation.

certificate authority — (CA) A trusted third-party organization or company that issues digital certificates that are used to create digital signatures and public-private key pairs. The CA guarantees that the individual who is granted the unique certificate is who she or he claims to be.

`certstore` file — A file that contains a digital certificate for a specific client system. During an SSL negotiation, the client might be asked to provide the certificate file to the server. The server uses this file to verify the identity of the client.

CGI — (Common Gateway Interface) An interface by which external programs communicate with the HTTP server. Programs that are written to use CGI are called CGI programs or CGI scripts. CGI programs handle forms or parse output the server does not normally handle or parse.

client — In the client-server model for communications, the client is a process that remotely accesses resources of a compute server, such as compute power and large memory capacity.

critical file systems — File systems that are required by the Oracle Solaris OS. When you use Live Upgrade, a feature of Oracle Solaris, these file systems are separate mount points in the `vfstab` file of the active and inactive boot environments. Example file systems are `root` (/), `/usr`, `/var`, and `/opt`. These file systems are always copied from the source to the inactive boot environment.

decryption — The process of converting coded data to plain text. See also encryption.

DES — (Data Encryption Standard) A symmetric-key encryption method that was developed in 1975 and standardized by ANSI in 1981 as ANSI X.3.92. DES uses a 56-bit key.

DHCP — (Dynamic Host Configuration Protocol) An application-layer protocol. Enables individual computers, or clients, on a TCP/IP network to extract an IP address and other network configuration information from a designated and centrally maintained DHCP server or servers. This facility reduces the overhead of maintaining and administering a large IP network.

digital certificate — A nontransferable, nonforgeable, digital file issued from a third party that both communicating parties already trust.

disc — An optical disc, as opposed to a magnetic disk, which recognizes the common spelling that is used in the compact disc (CD) market. For example, a CD-ROM or DVD-ROM is an optical disc.

disk — A round platter, or set of platters, of a magnetized medium that is organized into concentric tracks and sectors for storing data such as files. See also disc.

document root directory — The root of a hierarchy on a web server machine that contains the files, images, and data you want to present to users who are accessing the web server.

encryption The process of protecting information from unauthorized use by making the information unintelligible. Encryption is based on a code, called a key, which is used to decrypt the information. See also decryption.

`/etc` directory A directory that contains critical system configuration files and maintenance commands.

`/etc/netboot` directory The directory on a WAN boot server that contains the client configuration information and security data that are required for a WAN boot installation.

`/export` file system A file system on an OS server that is shared with other systems on a network. For example, the `/export` file system can contain the root (`/`) file system and swap space for diskless clients and the home directories for users on the network. Diskless clients rely on the `/export` file system on an OS server to boot and run.

`fdisk` partition A logical partition of a disk drive that is dedicated to a particular operating system on x86 based systems. To install the Oracle Solaris software, you must set up at least one Oracle Solaris `fdisk` partition on an x86 based system. x86 based systems allow up to four different `fdisk` partitions on a disk. These partitions can be used to hold individual operating systems. Each operating system must be located on a unique `fdisk` partition. A system can only have one Oracle Solaris `fdisk` partition per disk.

file server A server that provides the software and file storage for systems on a network.

file system In the Oracle Solaris operating system, a tree-structured network of files and directories that you can access.

finish script A user-defined Bourne shell script, specified within the `rules` file, that performs tasks after the Oracle Solaris software is installed on the system but before the system reboots. You use finish scripts with JumpStart installations.

Flash Archive An Oracle Solaris installation feature that enables you to create an archive of the files on a system, called the *master system*. You can then use the archive to install other systems, making the other systems identical in their configuration to the master system. See also *archive*.

format To put data into a structure or divide a disk into sectors for receiving data.

GRUB **x86 only**: GNU GRand Unified Bootloader (GRUB) is an open source boot loader with a simple menu interface. The menu displays a list of operating systems that are installed on a system. GRUB enables you to easily boot these various operating systems, such as the Oracle Solaris OS or Linux.

GRUB edit menu **x86 only**: A boot menu that is a submenu of the GRUB main menu. GRUB commands are displayed on this menu. These commands can be edited to change boot behavior.

GRUB main menu **x86 only**: A boot menu that lists the operating systems that are installed on a system. From this menu, you can easily boot an operating system without modifying the BIOS or `fdisk` partition settings.

hashing The process of changing a string of characters into a value or key that represents the original string.

HMAC Keyed hashing method for message authentication. HMAC is used with an iterative cryptographic hash function, such as MD5 or SHA-1, in combination with a secret shared key. The cryptographic strength of HMAC depends on the properties of the underlying hash function.

host name The name by which a system is known to other systems on a network. This name must be unique among all the systems within a particular domain (usually, this means within any single organization). A host name can be any combination of letters, numbers, and minus signs (-), but it cannot begin or end with a minus sign.

HTTP (Hypertext Transfer Protocol) (n.) The Internet protocol that fetches hypertext objects from remote hosts. This protocol is based on TCP/IP.

HTTPS A secure version of HTTP, implemented by using the Secure Sockets Layer (SSL).

initial installation An installation that overwrites the currently running software or initializes a blank disk.

An initial installation of the Oracle Solaris OS overwrites the system's disk or disks with the new version of the Oracle Solaris OS. If your system is not running the Oracle Solaris OS, you must perform an initial installation. If your system is running an upgradable version of the Oracle Solaris OS, an initial installation overwrites the disk and does not preserve the OS or local modifications.

install server A server that provides the Oracle Solaris DVD or CD images from which other systems on a network can install Oracle Solaris (also called a *media server*). You can create an install server by copying the Oracle Solaris DVD or CD images to the server's hard disk.

JumpStart A type of installation in which the Oracle Solaris software is automatically installed on a system that is based on a user-defined profile. You can create customized profiles for different types of users and systems.

JumpStart directory When you use a profile diskette for JumpStart installations, the JumpStart directory is the root directory on the diskette that contains all the essential JumpStart files. When you use a profile server for JumpStart installations, the JumpStart directory is a directory on the server that contains all the essential JumpStart files.

JumpStart installation A type of installation in which the Oracle Solaris software is automatically installed on a system by using the factory-installed JumpStart software.

key The code for encrypting or decrypting data. See also encryption.

`keystore` file A file that contains keys shared by a client and server. During a WAN boot installation, the client system uses the keys to verify the integrity of, or decrypt the data and files transmitted from, the server.

Live Upgrade An upgrade method that enables a duplicate boot environment to be upgraded while the active boot environment is still running, thus eliminating downtime of the production environment.

`menu.lst` file **x86 only**: A file that lists all the operating systems that are installed on a system. The contents of this file dictate the list of operating systems that is displayed on the GRUB menu. From the GRUB menu, you can easily boot an operating system without modifying the BIOS or `fdisk` partition settings.

miniroot A minimal, bootable root (`/`) file system that is included in Oracle Solaris installation media. A miniroot consists of the Oracle Solaris software that is required to install and upgrade systems. On x86 based systems, the miniroot is copied to the system to be used as the failsafe boot archive. See *failsafe boot archive*.

mirror See *RAID-1 volume*.

mount The process of accessing a directory from a disk that is attached to a machine that is making the mount request or a remote disk on a network. To mount a file system, you need a mount point on the local system and the name of the file system to be mounted (for example, `/usr`).

mount point A workstation directory to which you mount a file system that exists on a remote machine.

name server A server that provides a naming service to systems on a network.

naming service A distributed network database that contains key system information about all the systems on a network so that the systems can communicate with each other. With a naming service, the system information can be maintained, managed, and accessed on a network-wide basis. Without a naming service, each system has to maintain its own copy of the system information in the local `/etc` files. Oracle supports the following naming services: LDAP, NIS, and NIS+.

network installation A way to install software over the network from a system with a CD-ROM or DVD-ROM drive to a system without a CD-ROM or DVD-ROM drive. Network installations require a *name server* and an *install server*.

networked systems A group of systems (called hosts) that are connected through hardware and software so that they can communicate and share information. Referred to as a local area network (LAN). One or more servers are usually needed when systems are networked.

NIS The SunOS 4.0 (minimum) Network Information Service. A distributed network database that contains key information about the systems and the users on the network. The NIS database is stored on the master server and all the slave servers.

NIS+ The SunOS 5.0 (minimum) Network Information Service. NIS+ replaces NIS, the SunOS 4.0 (minimum) Network Information Service.

nonnetworked systems Systems that are not connected to a network or do not rely on other systems.

`/opt` file system A file system that contains the mount points for third-party and unbundled software.

Oracle Solaris DVD or CD images The Oracle Solaris software that is installed on a system, which you can access on the Oracle Solaris DVDs or CDs or an install server's hard disk to which you have copied the Oracle Solaris DVD or CD images.

Oracle Solaris installation program A graphical user interface (GUI) or command-line interface (CLI) installation program that uses wizard panels to guide you step-by-step through installing the Oracle Solaris software and third-party software.

OS server A system that provides services to systems on a network. To serve diskless clients, an OS server must have disk space set aside for each diskless client's root (/) file system and swap space (`/export/root`, `/export/swap`).

package A collection of software that is grouped into a single entity for modular installation. The Oracle Solaris software is divided into *software groups*, which are each composed of *clusters* and packages.

platform name The output of the `uname -i` command. For example, the platform name for the Ultra 60 is SUNW, Ultra-60.

primary boot archive A boot archive that is used to boot the Oracle Solaris OS on a system. This boot archive is sometimes called the primary boot archive. See *boot archive*.

private key The decryption key used in public-key encryption.

profile A text file that defines how to install the Oracle Solaris software when using the JumpStart method. For example, a profile defines which software group to install. Every rule specifies a profile that defines how a system is to be installed when the rule is matched. You usually create a different profile for every rule. However, the same profile can be used in more than one rule. See also *rules file*.

profile server A server that contains all the essential JumpStart files in a JumpStart directory.

public key The encryption key used in public-key encryption.

public-key cryptography A cryptographic system that uses two keys: a public key known to everyone, and a private key known only to the recipient of the message.

RAID-0 volume A class of volume that can be a stripe or a concatenation. These components are also called submirrors. A stripe or concatenation is the basic building block for mirrors.

RAID-1 volume A class of volume that replicates data by maintaining multiple copies. A RAID-1 volume is composed of one or more RAID-0 volumes called *submirrors*. A RAID-1 volume is sometimes called a *mirror*.

root The top level of a hierarchy of items. Root is the one item from which all other items are descended. See *root directory* or *root* (`/`) *file system*.

root (`/`) file system The top-level file system from which all other file systems stem. The root (`/`) file system is the base on which all other file systems are mounted, and is never unmounted. The root (`/`) file system contains the directories and files critical for system operation, such as the kernel, device drivers, and the programs that are used to start (boot) a system.

root directory The top-level directory from which all other directories stem.

rule A series of values that assigns one or more system attributes to a profile. A rule is used in a JumpStart installation.

`rules` file A text file that contains a rule for each group of systems or single systems that you want to install automatically. Each rule distinguishes a group of systems, based on one or more system attributes. The `rules` file links each group to a profile, which is a text file that defines how the Oracle Solaris software is to be installed on each system in the group. A `rules` file is used in a JumpStart installation. See also *profile*.

`rules.ok` file A generated version of the `rules` file. The `rules.ok` file is required by the JumpStart installation software to match a system to a profile. You *must* use the `check` script to create the `rules.ok` file.

server A network device that manages resources and supplies services to a client.

SHA1 (Secure Hashing Algorithm) The algorithm that operates on any input length less than 2^{64} to produce a message digest.

shareable file systems File systems that are user-defined files such as `/export/home` and `/swap`. These file systems are shared between the active and inactive boot environment when you use Live Upgrade. Shareable file systems contain the same mount point in the `vfstab` file in both the active and inactive boot environments. Updating shared files in the active boot environment also updates data in the inactive boot environment. Shareable file systems are shared by default, but you can specify a destination slice, and then the file systems are copied.

slice The unit into which the disk space is divided by the software.

submirror See *RAID-0 volume*.

swap space A slice or file that temporarily holds the contents of a memory area till it can be reloaded in memory. Also called the `/swap` or `swap` volume.

`sysidcfg` file A file in which you specify a set of special system configuration keywords that preconfigure a system.

system configuration file (`system.conf`) A text file in which you specify the locations of the `sysidcfg` file and the JumpStart files you want to use in a WAN boot installation.

`truststore` file A file that contains one or more digital certificates. During a WAN boot installation, the client system verifies the identity of the server that is trying to perform the installation by consulting the data in the `truststore` file.

unmount The process of removing access to a directory on a disk that is attached to a machine or to a remote disk on a network.

update An installation, or to perform an installation, on a system that changes software that is of the same type. Unlike an upgrade, an update might downgrade the system. Unlike an initial installation, software of the same type that is being installed must be present before an update can occur.

upgrade An installation that merges files with existing files and preserves modifications where possible.

An upgrade of the Oracle Solaris OS merges the new version of the Oracle Solaris OS with the existing files on the system's disk or disks. An upgrade saves as many modifications as possible that you have made to the previous version of the Oracle Solaris OS.

upgrade option An option that is presented by the Oracle Solaris installation program. The upgrade procedure merges the new version of Oracle Solaris with existing files on your disk or disks. An upgrade also saves as many local modifications as possible since the last time Oracle Solaris was installed.

`/usr` file system A file system on a standalone system or server that contains many of the standard UNIX programs. Sharing the large `/usr` file system with a server rather than maintaining a local copy minimizes the overall disk space that is required to install and run the Oracle Solaris software on a system.

`/var` file system A file system or directory (on standalone systems) that contains system files that are likely to change or grow over the life of the system. These files include system logs, `vi` files, mail files, and UUCP files.

Volume Manager A program that provides a mechanism to administer and obtain access to the data on DVD-ROMs, CD-ROMs, and diskettes.

WAN (wide area network) A network that connects multiple local area networks (LANs) or systems at different geographical sites by using telephone, fiber-optic, or satellite links.

WAN boot installation A type of installation that enables you to boot and install software over a wide area network (WAN) by using HTTP or HTTPS. The WAN boot installation method enables you to transmit an encrypted Flash Archive over a public network and perform a JumpStart installation on a remote client.

WAN boot miniroot A miniroot that has been modified to perform a WAN boot installation. The WAN boot miniroot contains a subset of the software in the Oracle Solaris miniroot. See also miniroot.

WAN boot server A web server that provides the configuration and security files that are used during a WAN boot installation.

`wanboot-cgi` program The CGI program that retrieves and transmits the data and files that are used in a WAN boot installation.

`wanboot.conf` file A text file in which you specify the configuration information and security settings that are required to perform a WAN boot installation.

`wanboot` program The second-level boot program that loads the WAN boot miniroot, client configuration files, and installation files that are required to perform a WAN boot installation. For WAN boot installations, the `wanboot` binary performs tasks similar to the `ufsboot` or `inetboot` second-level boot programs.

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