



Solaris 10 6/06 Installation Guide: Network-Based Installations



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Preface

This book describes how to install the Solaris™ Operating System (Solaris OS) 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 Solaris release supports systems that use the SPARC® and x86 families of processor architectures: UltraSPARC®, SPARC64, AMD64, Pentium, and Xeon EM64T. The supported systems appear in the *Solaris 10 Hardware Compatibility List* at <http://www.sun.com/bigadmin/hcl>. 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” points out specific 64-bit information about AMD64 or EM64T systems.
- “32-bit x86” points out specific 32-bit information about x86 based systems.

For supported systems, see the *Solaris 10 Hardware Compatibility List*.

Who Should Use This Book

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

For basic installation information, see *Solaris 10 6/06 Installation Guide: Basic Installations*.

Related Books

Table P-1 lists related information that you need when you install the Solaris software.

TABLE P-1 Related Information

Information	Description
<i>Solaris 10 6/06 Installation Guide: Basic Installations</i>	This book describes how to perform a basic Solaris installation with a graphical user interface (GUI).
<i>Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning</i>	This book describes how to use CD or DVD media to upgrade a system to the Solaris OS. This book also describes how to use the Solaris Live Upgrade feature to create and maintain boot environments, and how to upgrade systems to these boot environments.
<i>Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations</i>	This book describes how to create the files and directories necessary to perform an unattended custom JumpStart installation. This book also describes how to create RAID-1 volumes during a JumpStart installation. This book describes how to create a Solaris Flash archive and deploy the archive over the network to quickly install the Solaris OS. This book also describes how to maintain these archives, and how to quickly update clone systems by using differential Flash archives.
<i>Solaris 10 6/06 Installation Guide: Solaris Flash Archives (Creation and Installation)</i>	This book describes how to create a Solaris Flash archive and deploy the archive over the network to quickly install the Solaris OS. This book also describes how to maintain these archives, and how to quickly update clone systems by using differential Flash archives.
<i>System Administration Guide: Devices and File Systems</i>	This book describes how to back up system files.
<i>Solaris 10 6/06 Release Notes</i>	This book describes any bugs, known problems, software that is being discontinued, and patches that are related to the Solaris release.
SPARC: <i>Solaris 10 6/06 Sun Hardware Platform Guide</i> on http://docs.sun.com	This book contains information about supported hardware.
<i>Solaris 10 6/06 Package List</i>	This book lists and describes the packages in the Solaris 10 6/06 OS.
x86: Solaris Hardware Compatibility List	This list contains supported hardware information and device configuration details.

Documentation, Support, and Training

The Sun web site provides information about the following additional resources:

- Documentation (<http://www.sun.com/documentation/>)
- Support (<http://www.sun.com/support/>)
- Training (<http://www.sun.com/training/>)

Typographic Conventions

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

TABLE P-2 Typographic Conventions

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

Shell Prompts in Command Examples

The following table shows the default UNIX[®] system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

TABLE P-3 Shell Prompts

Shell	Prompt
C shell	<code>machine_name%</code>
C shell for superuser	<code>machine_name#</code>
Bourne shell and Korn shell	<code>\$</code>
Bourne shell and Korn shell for superuser	<code>#</code>



P A R T I

Planning to Install Over the Network

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

What's New in Solaris Installation

This chapter describes new features in the Solaris installation programs. To view features for all of the Solaris OS, see *Solaris 10 What's New*.

- “What's New in the Solaris 10 1/06 Release For Solaris Installation” on page 17
- “What's New in the Solaris 10 3/05 Release For Solaris Installation” on page 20

What's New in the Solaris 10 1/06 Release For Solaris Installation

This section describes the following new installation features in the Solaris 10 1/06 release.

Upgrading the Solaris OS When Non-Global Zones Are Installed

Solaris Zones partitioning technology provides the ability to configure non-global zones in a single instance of Solaris, the global zone. A non-global zone is an application execution environment in which processes are isolated from all other zones. **Starting with the Solaris 10 1/06 release** and if you are running a system with non-global zones installed, you can use standard Solaris upgrade programs to upgrade. You can use either the Solaris interactive installation program or custom JumpStart to upgrade. There are some limitations to upgrading with non-global zones installed.

- A limited number of custom JumpStart keywords are supported. For a list of supported custom JumpStart keywords, see *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.
- CD-ROMs are not distributed, but you can upgrade with a DVD-ROM or a network installation image.

- On a system with non-global zones installed, do not use Solaris Live Upgrade to upgrade your system. While you can create a boot environment with the `lucreate` command, the `luupgrade` command cannot upgrade a boot environment that has non-global zones installed. In that case, the upgrade fails and an error message is displayed.

For details on using the Solaris interactive installation program, see *Solaris 10 6/06 Installation Guide: Basic Installations*

x86: GRUB Based Booting

Starting with the Solaris 10 1/06 release, the open source GNU GRand Unified BootLoader (GRUB) has been adopted in the Solaris OS for x86 based systems. GRUB is responsible for loading a boot archive into the system's memory. A boot archive is a collection of critical files that is needed during system startup before the root (/) file system is mounted. The boot archive is used to boot the Solaris OS.

The most notable change is the replacement of the Solaris Device Configuration Assistant with the GRUB menu. The GRUB menu facilitates booting the different operating systems that are installed on your system. The GRUB menu is displayed when you boot an x86 based system. From the GRUB menu, you can select an OS instance to install by using the arrow keys. If you do not make a selection, the default OS instance is booted.

The GRUB based boot feature provides the following improvements:

- Faster boot times
- Installation from USB CD or DVD drives
- Ability to boot from USB storage devices
- Simplified DHCP setup for PXE boot (no vendor-specific options)
- Elimination of all realmode drivers
- Ability to use Solaris Live Upgrade and the GRUB menu to quickly activate and fall back to boot environments

For more information about GRUB refer to the following sections.

Task	GRUB Task	For More Information
Installation	Overview information about GRUB based booting	“x86: GRUB Based Booting (Overview)” on page 49
	Installation planning for GRUB based booting	“x86: GRUB Based Booting (Planning)” on page 52
	How to boot and install over the network with the GRUB menu	“Booting and Installing the System From the Network With a DVD Image” on page 136
	How to boot and install with the GRUB menu and the Custom JumpStart installation method	“Performing a Custom JumpStart Installation” in <i>Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations</i>
	How to use the GRUB menu and Solaris Live Upgrade to activate and fall back to boot environments	<ul style="list-style-type: none"> ■ “Activating a Boot Environment” in <i>Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning</i> ■ Chapter 10, “Failure Recovery: Falling Back to the Original Boot Environment (Tasks),” in <i>Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning</i>
	Locating the GRUB menu’s menu.lst file	“x86: Locating the GRUB Menu’s menu.lst File (Tasks)” on page 56
System Administration	How to perform system administration tasks with the GRUB menu	<ul style="list-style-type: none"> ■ <i>System Administration Guide: Basic Administration</i> ■ <i>System Administration Guide: Devices and File Systems</i> ■ bootadm(1M) ■ installgrub(1M)

Note – GNU is a recursive acronym for “GNU’s Not UNIX.” For more information, go to <http://www.gnu.org>.

Upgrade Support Changes for Solaris Releases

Starting with the Solaris 10 1/06 release, you can upgrade the Solaris OS from the Solaris 8, 9, or 10 releases. Upgrades from the Solaris 7 release are not supported.

What's New in the Solaris 10 3/05 Release For Solaris Installation

This section describes the following new installation features in the Solaris 10 3/05 release.

Solaris Installation Changes Including Installation Unification

Starting with the Solaris 10 3/05 release, several changes in the installation of the Solaris OS provide a more simplified and unified installation experience.

The changes include the following:

- This release has one installation DVD and several installation CDs. The Solaris Operating System DVD includes the content of all the installation CDs.
 - **Solaris Software 1** – This CD is the only bootable CD. From this CD, you can access both the Solaris installation graphical user interface (GUI) and the console-based installation. This CD also enables you to install selected software products from both the GUI and the console-based installation.
 - **Other Solaris Operating System CDs** – These CDs contain the following:
 - Solaris packages that the software prompts you to install if necessary
 - ExtraValue software that includes supported and unsupported software
 - Installers
 - Localized interface software and documentation
- The Solaris Installation CD no longer exists.
- For both CD and DVD media, the GUI installation is the default (if your system has enough memory). However, you can specify a console-based installation with the `text` boot option.
- The installation process has been simplified, enabling you to select the language support at boot time, but select locales later.

Note – The (noninteractive) Solaris custom JumpStart™ installation method has not changed.

To install the OS, simply insert the Solaris Software - 1 CD or the Solaris Operating System DVD and type one of the following commands.

- For the default GUI installation (if system memory permits), type **`boot cdrom`**.
- For the console-based installation, type **`boot cdrom - text`**.

For instructions about how to install the Solaris OS by using CD or DVD media with the new text boot option *Solaris 10 6/06 Installation Guide: Basic Installations*

For changes to setting up an installation server with CD media *Solaris 10 6/06 Installation Guide: Network-Based Installations*

Accessing the GUI or Console-based Installations

Starting with the Solaris 10 3/05 release, you can choose to install the software with a GUI or with or without a windowing environment. If the memory is sufficient, the GUI is displayed by default. If the memory is insufficient for the GUI, other environments are displayed by default. You can override defaults with the `nowin` or `text` boot options. However, you are limited by the amount of memory in your system or by installing remotely. Also, if the Solaris installation program does not detect a video adapter, the program is automatically displayed in a console-based environment.

For specific memory requirements, see “[System Requirements and Recommendations](#)” on page 33.

Custom JumpStart Installation Package and Patch Enhancements

Starting with the Solaris 10 3/05 release, when you install and upgrade the Solaris OS by using the custom JumpStart installation method, new customizations enable the following:

- A Solaris Flash installation with additional packages
The custom JumpStart profile `package` keyword has been enhanced to enable installing a Solaris Flash archive with additional packages. For example, you can install the same base archive on two machines, but add a different set of packages to each machine. These packages do not have to be a part of the Solaris OS distribution.
- An installation with additional packages that might not be part of the Solaris distribution
The `package` keyword has also been enhanced to enable an installation with a package that is not part of the Solaris distribution. You no longer need to write a postinstallation script to add extra packages.
- An installation with the ability to install Solaris OS patches
The new custom JumpStart profile `patch` keyword enables the installation of Solaris OS patches. This feature allows the installation of a list of patches that are specified in a patch file.

For further information, see *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

Configuring Multiple Network Interfaces During Installation

Starting with the Solaris 10 3/05 release, the Solaris installation programs enable you to configure multiple interfaces during your installation. You can preconfigure these interfaces in the `sysidcfg` file for your system. Or you can configure multiple interfaces during the installation. For more information, see the following documents:

- *Solaris 10 6/06 Installation Guide: Network-Based Installations*
- `sysidtool(1M)`
- `sysidcfg(4)`

SPARC: 64-bit Package Changes

In previous Solaris releases, the Solaris software was delivered in separate packages for 32-bit components and 64-bit components. **Starting with the Solaris 10 3/05 release**, packaging has been simplified with the delivery of most 32-bit components and 64-bit components in a single package. The combined packages retain the names of the original 32-bit packages, and the 64-bit packages are no longer delivered.

The removal of the 64-bit packages simplifies installation and increases performance:

- Reduces the number of packages, which simplifies Custom JumpStart scripts that contain lists of packages
- Simplifies the packaging system with only one package that groups software functions
- Reduces installation time because fewer packages are installed

The 64-bit packages are renamed with the following conventions:

- If a 64-bit package has a 32-bit counterpart, the 64-bit package is named with the 32-bit package name. For example, a 64-bit library such as `/usr/lib/sparcv9/libc.so.1` previously would have been delivered in `SUNWcs1x`, but now is delivered in `SUNWcs1`. The 64-bit `SUNWcs1x` package is no longer delivered.
- If a package does not have a 32-bit counterpart, the “x” suffix is removed from the name. For example, `SUNW1394x` becomes `SUNW1394`.

This change means that you might need to modify your custom JumpStart script or other package installation scripts to remove references to the 64-bit packages.

Custom JumpStart Installation Method Creates New Boot Environment

Starting with the Solaris 10 3/05 release, you can now use the JumpStart installation method to create an empty boot environment when you install the Solaris Operating System. The empty boot environment can then be populated with a Solaris Flash archive for later use.

For further information, see Chapter 11, “Custom JumpStart (Reference),” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

Reduced Networking Software Group

Starting with the Solaris 10 3/05 release, you can now create a more secure system with fewer enabled network services by selecting or specifying the Reduced Networking software group (SUNWCrnet) during your installation. The Reduced Networking software group provides system administration utilities and a multiuser text-based console. SUNWCrnet enables the system to recognize network interfaces. During the installation, you can customize your system's configuration by adding software packages and by activating network services as needed.

For further information, see *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

Modifying Disk Partition Tables by Using a Virtual Table of Contents

Starting with the Solaris 10 3/05 release, the Solaris installation program now enables you to load existing slices from the virtual table of contents (VTOC.) You can now preserve and use the system's existing disk slice tables during your installation, rather than use the installer's default disk layout.

x86: Change in Default Boot-Disk Partition Layout

Starting with the Solaris 10 3/05 release, a new feature in the Solaris installation program is a boot-disk partition layout. This layout, by default, accommodates the Service partition on Sun x86 based systems. This installation program enables you to preserve an existing Service partition.

The new default includes the following partitions.

- First partition – Service partition (existing size on system)
- Second partition – x86 boot partition (approximately 11 Mbytes)
- Third partition – Solaris Operating System partition (remaining space on the boot disk)

If you want to use this default layout, select Default when the Solaris installation program asks you to choose a boot-disk layout.

Note – If you install the Solaris OS for x86 based systems on a system that does not currently include a Service partition, the Solaris installation program does not create a new Service partition. If you want to create a Service partition on your system, first use your system's diagnostic CD to create the Service partition. After the Service partition is created, then install the Solaris Operating System.

For information about how to create the Service partition, see your hardware documentation.

For more information, see *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

Solaris Installation and Upgrade (Roadmap)

This chapter provides you with information about decisions you need to make before you install or upgrade the Solaris Operating System (Solaris OS). This chapter contains the following sections:

- “Task Map: Installing or Upgrading the Solaris Software” on page 25
- “Installing From the Network or From DVD or CDs?” on page 27
- “Initial Installation, or Upgrade?” on page 28
- “Choosing a Solaris Installation Method” on page 29
- “Sun Java System Application Server Platform Edition 8” on page 30

Note – This book uses the term *slice*, but some Solaris documentation and programs might refer to a slice as a partition.

x86: To avoid confusion, this book distinguishes between x86 `fdisk` partitions and the divisions within the Solaris `fdisk` partition. The x86 `fdisk` divisions are called partitions. The divisions within the Solaris `fdisk` partition are called slices.

Task Map: Installing or Upgrading the Solaris Software

The following task map is an overview of the steps necessary to install or upgrade the Solaris OS when using any installation program. Use this task map to identify all of the decisions that you need to make to complete the most efficient installation for your environment.

TABLE 2-1 Task Map: Installing or Upgrading the Solaris Software

Task	Description	For Instructions
Choose initial installation or upgrade.	Decide if you want to perform an initial installation or an upgrade.	“Initial Installation, or Upgrade?” on page 28.

TABLE 2-1 Task Map: Installing or Upgrading the Solaris Software (Continued)

Task	Description	For Instructions
Choose an installation program.	The Solaris OS provides several programs for installation or upgrade. Choose the installation method that is most appropriate for your environment.	“Choosing a Solaris Installation Method” on page 29.
(Solaris interactive installation program) Choose a default or custom installation.	Decide which type installation is suitable for your environment: <ul style="list-style-type: none"> ■ If you are using a graphical user interface (GUI) you can choose a default or a custom installation: <ul style="list-style-type: none"> ■ A default installation formats the hard disk and installs a preselected set of software. ■ A custom installation enables you to modify the hard disk layout and select the software that you want to install. ■ If you use a text installer (non-graphical interface), you can select the default values or edit the values to select the software you want to install. 	For information on the Solaris installation program’s choices, see Chapter 5
Review system requirements. Also, plan and allocate disk space and swap space.	Determine if your system meets the minimum requirements to install or upgrade. Allocate disk space on your system for the components of the Solaris OS that you want to install. Determine the appropriate swap-space layout for your system.	Chapter 3.
Choose to install a system from local media or from the network.	Decide on the most appropriate installation media for your environment.	“Installing From the Network or From DVD or CDs?” on page 27.
Gather information about your system.	<ul style="list-style-type: none"> ■ For the Solaris installation program, complete the worksheet to collect all of the information that you need to install or upgrade. ■ For the custom JumpStart installation method, decide which profile keywords to use in your profile. Then review the keyword descriptions to find the information about your system that you need. 	<ul style="list-style-type: none"> ■ For the Solaris installation program, see either of the following documents: <ul style="list-style-type: none"> ■ For an initial installation: “Checklist for Installation” on page 61 ■ For an upgrade: Chapter 5 ■ For the custom JumpStart installation method, see Chapter 11, “Custom JumpStart (Reference),” in Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations
(Optional) Set system parameters.	You can preconfigure system information to avoid being prompted for the information during the installation or upgrade.	Chapter 6.

TABLE 2-1 Task Map: Installing or Upgrading the Solaris Software (Continued)

Task	Description	For Instructions
(Optional) Prepare to install the Solaris software from the network.	<p>If you chose to install the Solaris software from the network, complete the following tasks.</p> <ul style="list-style-type: none"> ■ (x86 based systems) Verify that your system supports PXE ■ Create an installation server ■ Create a boot server (if necessary) ■ Configure a DHCP server (if necessary) ■ Set up systems to be installed from the network 	<p>To install over a local area network, see Chapter 9.</p> <p>To install over a wide area network, see Chapter 13.</p>
(Upgrade only) Perform tasks prior to upgrade.	Back up your system and determine if you can upgrade with disk space reallocation.	“Upgrade Planning” on page 38.
Perform an installation or upgrade.	Use the Solaris installation method that you chose to install or upgrade the Solaris software.	The chapter or chapters that provide detailed instructions for the installation programs.
Troubleshoot installation problems	Review the troubleshooting information when you encounter problems with your installation.	Appendix A .

Installing From the Network or From DVD or CDs?

The Solaris software is distributed on DVD or CD media so that you can install or upgrade systems that have access to a DVD-ROM or CD-ROM drive.

You can set up the systems to install from the network with remote DVD or CD images. You might want to set up systems this way for the following reasons:

- If you have systems that do not have local DVD-ROM or CD-ROM drives
- If you are installing several systems and do not want to insert the discs into every local drive to install the Solaris software

You can use all of the Solaris installation methods to install a system from the network. However, by installing systems from the network with the Solaris Flash installation feature or with a custom JumpStart installation, you can centralize and automate the installation process in a large enterprise. For more details about the different installation methods, refer to “[Choosing a Solaris Installation Method](#)” on page 29.

Installing the Solaris software from the network requires initial setup. For information about preparing to install from the network, choose one of the following options.

For detailed instructions about preparing to install from a local area network [Chapter 9](#)

For instructions about preparing to install over a wide area network [Chapter 13](#)

For instructions about how to install x86 based clients over the network by using PXE [“x86: Overview of Booting and Installing Over the Network With PXE” on page 115](#)

Initial Installation, or Upgrade?

You can choose to perform an initial installation or, if your system is already running the Solaris OS, you can upgrade your system.

Initial Installation

An initial installation overwrites the system’s disk with the new version of the Solaris OS. If your system is not running the Solaris OS, you must perform an initial installation.

If the system is already running the Solaris OS, you can choose to perform an initial installation. If you want to preserve any local modifications, before you install, you must back up the local modifications. After you complete the installation, you can restore the local modifications.

You can use any of the Solaris installation methods to perform an initial installation. For detailed information about the different Solaris installation methods, refer to [“Choosing a Solaris Installation Method” on page 29](#).

Upgrade

You can upgrade the Solaris OS by using two upgrade methods: standard and Solaris Live Upgrade. A standard upgrade maintains as many existing configuration parameters as possible of the current Solaris OS. Solaris Live Upgrade creates a copy of the current system. This copy can be upgraded with a standard upgrade. The upgraded Solaris OS can then be switched to become the current system by a simple reboot. If a failure occurs, you can switch back to the original Solaris OS with a reboot. Solaris Live Upgrade enables you to keep your system running while you upgrade and enables you to switch back and forth between Solaris OS releases.

For more information about upgrading and the list of upgrade methods, see [“Upgrade Planning” on page 38](#).

Choosing a Solaris Installation Method

The Solaris OS provides several programs for installation or upgrade. Each installation technology offers different features that are designed for specific installation requirements and environments. Use the following table to help you decide which installation method to use.

TABLE 2-2 Choosing Your Installation Method

Task	Installation Method	Reasons for Choosing This Program	Instructions
Install one system from CD-ROM or DVD-ROM media with an interactive program.	Solaris installation program	<ul style="list-style-type: none"> ■ This program divides tasks into panels, prompts you for information, and offers default values. ■ This program is not an efficient method when you have to install or upgrade multiple systems. For batch installations of multiple systems, use custom JumpStart or the Solaris Flash installation feature. 	<i>Solaris 10 6/06 Installation Guide: Basic Installations</i>
Install one system over a local area network.	Solaris installation program over the network	This program enables you to set up an image of the software you want to install on a server and install this image on a remote system. If you need to install multiple systems, you can use the network installation image with the custom JumpStart and Solaris Flash installation methods to efficiently install or upgrade systems on your network.	Part II
Automate the installation or upgrade of multiple systems based on profiles you create.	Custom JumpStart	This program efficiently installs multiple systems. But if you only have a few systems, the creation of a custom JumpStart environment might be time consuming. For a few systems, use the Solaris interactive installation program.	Chapter 6, “Preparing Custom JumpStart Installations (Tasks),” in <i>Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations</i>

TABLE 2-2 Choosing Your Installation Method (Continued)

Task	Installation Method	Reasons for Choosing This Program	Instructions
Replicate the same software and configuration on multiple systems.	Solaris Flash archives	<ul style="list-style-type: none"> ■ This program saves installation time by installing all Solaris packages at once on your system. Other programs install each individual Solaris package and update the package map for each package. ■ Solaris Flash archives are large files and require a significant amount of disk space. To manage different installation configurations or to change your installation configuration, you might consider using the custom JumpStart installation method. Alternatively, you can accomplish system-specific customizations by using a JumpStart finish script or an embedded Solaris Flash postdeployment script. 	Chapter 1, “Solaris Flash (Overview),” in <i>Solaris 10 6/06 Installation Guide: Solaris Flash Archives (Creation and Installation)</i>
Install systems over a wide area network (WAN) or the Internet.	WAN boot	If you want to install a Solaris Flash archive over the network, this program enables a secure installation.	Chapter 11
Upgrade a system while it is running.	Solaris Live Upgrade	<ul style="list-style-type: none"> ■ This program enables you to upgrade or add patches to avoid the system down time related to a standard upgrade ■ This program enables you to test an upgrade or new patches without affecting the current OS 	Chapter 6, “Solaris Live Upgrade (Overview),” in <i>Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning</i>
After installing the Solaris OS, create an isolated application environment.	Solaris Zones partitioning technology	This program creates isolated non-global zones that provide a secure application environment. This isolation prevents processes that are running in one zone from monitoring or affecting processes that are running in any other zones.	Chapter 16, “Introduction to Solaris Zones,” in <i>System Administration Guide: Solaris Containers-Resource Management and Solaris Zones</i>

Sun Java System Application Server Platform Edition 8

The Sun Java System Application Server Platform Edition 8 provides for broad deployment of application services and web services. This software is automatically installed with the Solaris OS. You can find documentation for the server in the following areas:

For documentation about starting the server	See <i>Sun Java System Application Server Platform Edition 8 QuickStart Guide</i> in the installation directory at <code>/docs/QuickStart.html</code>
For the full Application Server documentation set	http://docs.sun.com/db/coll/ApplicationServer8_04q2
For a tutorial	http://java.sun.com/j2ee/1.4/docs/tutorial/doc/index.html

Solaris Installation and Upgrade (Planning)

This chapter describes system requirements to install or upgrade to the Solaris OS. General guidelines for planning the disk space and default swap space allocation are also provided. This chapter contains the following sections:

- “System Requirements and Recommendations” on page 33
- “Allocating Disk and Swap Space” on page 34
- “Upgrade Planning” on page 38
- “How to Find the Version of the Solaris OS That Your System Is Running” on page 42
- “Locale Values” on page 42
- “Platform Names and Groups” on page 43
- “Upgrading When Solaris Zones are Installed on a System” on page 43
- “x86: Partitioning Recommendations” on page 46

System Requirements and Recommendations

TABLE 3-1 Memory, Swap, and Processor Recommendations

Requirement Type	Size
Memory to install or upgrade	<ul style="list-style-type: none"> ▪ SPARC: 256 MB is the recommended size. 128 MB is the minimum size. ▪ x86: 512 MB is the recommended size. 256 MB is the minimum size. <p>Note – Some optional installation features are enabled only when sufficient memory is present. For example, if you install from a DVD with insufficient memory, you install through the Solaris installation program’s text installer, not through the GUI. For more information about these memory requirements, see Table 3-2.</p>
Swap area	<p>512 MB is the default size.</p> <p>Note – You might need to customize the swap space. Swap space is based on the size of the system’s hard disk.</p>

TABLE 3-1 Memory, Swap, and Processor Recommendations (Continued)

Requirement Type	Size
Processor requirements	<ul style="list-style-type: none"> ▪ SPARC: 200-MHz or faster processor is required. ▪ x86: 120-MHz or faster processor is recommended. Hardware floating-point support is required.

You can choose to install the software with a GUI or with or without a windowing environment. If there is sufficient memory, the GUI is displayed by default. Other environments are displayed by default if memory is insufficient for the GUI. You can override defaults with the `nowin` or `text` boot options. But, you are limited by the amount of memory in your system or by installing remotely. Also if the Solaris installation program does not detect a video adapter, it automatically displays in a console-based environment. Table 3-2 describes these environments and lists minimal memory requirements for displaying them.

TABLE 3-2 Memory Requirements for Display Options

Memory	Type of Installation	Description
<ul style="list-style-type: none"> ▪ SPARC: 128–383 MB ▪ x86: 256–511 MB 	Text-based	<p>Contains no graphics, but provides a window and the ability to open other windows.</p> <p>If you install by using the <code>text</code> boot option and the system has enough memory, you are installing in a windowing environment. If you are installing remotely through a <code>tip</code> line or using the <code>nowin</code> boot option, you are limited to the console-based installation.</p>
<ul style="list-style-type: none"> ▪ SPARC: 384 MB or greater ▪ x86: 512 MB 	GUI-based	Provides windows, pull-down menus, buttons, scrollbars, and iconic images.

Allocating Disk and Swap Space

Before you install the Solaris software, you can determine if your system has enough disk space by doing some high-level planning.

General Disk Space Planning and Recommendations

Planning disk space is different for everyone. Consider allocating space for the following conditions, depending on your needs.

TABLE 3-3 General Disk Space and Swap Space Planning

Conditions for Space Allocations	Description
File systems	<p>For each file system that you create, allocate an additional 30 percent more disk space than you need to enable you to upgrade to future Solaris versions.</p> <p>By default, the Solaris installation methods create only root (/) and /swap. When space is allocated for OS services, the /export directory is also created. If you are upgrading to a major Solaris release, you might need to reslice your system or allocate double the space that you need at installation time. If you are upgrading to an update, you could prevent having to reslice your system by allocating extra disk space for future upgrades. A Solaris update release needs approximately 10 percent more disk space than the previous release. You can allocate an additional 30 percent of disk space for each file system to allow space for several Solaris updates.</p>
The /var file system	<p>If you intend to use the crash dump feature savecore(1M), allocate double the amount of your physical memory in the /var file system.</p>
Swap	<p>The Solaris installation program allocates a default swap area of 512 Mbytes under the following conditions:</p> <ul style="list-style-type: none"> ■ If you use the installation program's automatic layout of disk slices ■ If you avoid manually changing the size of the swap slice <p>By default, the Solaris installation programs allocate swap space by placing swap so that it starts at the first available disk cylinder (typically cylinder 0 on SPARC based systems). This placement provides maximum space for the root (/) file system during the default disk layout and enables the growth of the root (/) file system during an upgrade.</p> <p>If you think you might need to expand the swap area in the future, you can place the swap slice so that it starts at another disk cylinder by using one of the following methods.</p> <ul style="list-style-type: none"> ■ For the Solaris installation program, you can customize the disk layout in cylinder mode and manually assign the swap slice to the desired location. ■ For the custom JumpStart installation program, you can assign the swap slice in the profile file. For more information about the JumpStart profile file, see "Creating a Profile" in <i>Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations</i>. <p>For an overview of the swap space, see Chapter 21, "Configuring Additional Swap Space (Tasks)," in <i>System Administration Guide: Devices and File Systems</i>.</p>
A server that is providing home directory file systems	<p>By default, home directories are usually located in the /export file system.</p>
The Solaris software group you are installing	<p>A software group is a grouping of software packages. When you are planning disk space, remember that you can add or remove individual software packages from the software group that you select. For information about software groups, see "Disk Space Recommendations for Software Groups" on page 36.</p>

TABLE 3-3 General Disk Space and Swap Space Planning (Continued)

Conditions for Space Allocations	Description
Upgrade	<ul style="list-style-type: none"> ■ If you are using Solaris Live Upgrade to upgrade an inactive boot environment and want information about disk space planning, see “Solaris Live Upgrade Disk Space Requirements” in <i>Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning</i> ■ If you are using the Solaris installation program or custom Jumpstart to plan disk space, see “Upgrading With Disk Space Reallocation” on page 40. ■ If you have non-global zones installed on a system, see “Disk Space Requirements for Non-Global Zones” on page 45
Language support	For example, Chinese, Japanese, or Korean. If you plan to install a single language, allocate approximately 0.7 Gbytes of additional disk space for the language. If you plan to install all language supports, you need to allocate up to approximately 2.5 Gbytes of additional disk space for the language supports, depending on the software group you install.
Printing or mail support	Allocate additional space.
Additional software or third-party software	Allocate additional space.

Disk Space Recommendations for Software Groups

The Solaris software groups are collections of Solaris packages. Each software group includes support for different functions and hardware drivers.

- For an initial installation, you select the software group to install, based on the functions that you want to perform on the system.
- For an upgrade, you must upgrade to a software group that is installed on the system. For example, if you previously installed the End User Solaris Software Group on your system, you cannot use the upgrade option to upgrade to the Developer Solaris Software Group. However, during the upgrade you can add software to the system that is not part of the currently installed software group.

When you are installing the Solaris software, you can choose to add or remove packages from the Solaris software group that you selected. When you are selecting which packages to add or remove, you need to know about software dependencies and how the Solaris software is packaged.

The following figure shows the grouping of software packages. Reduced Network Support contains the minimal number of packages and Entire Solaris Software Group Plus OEM Support contains all the packages.

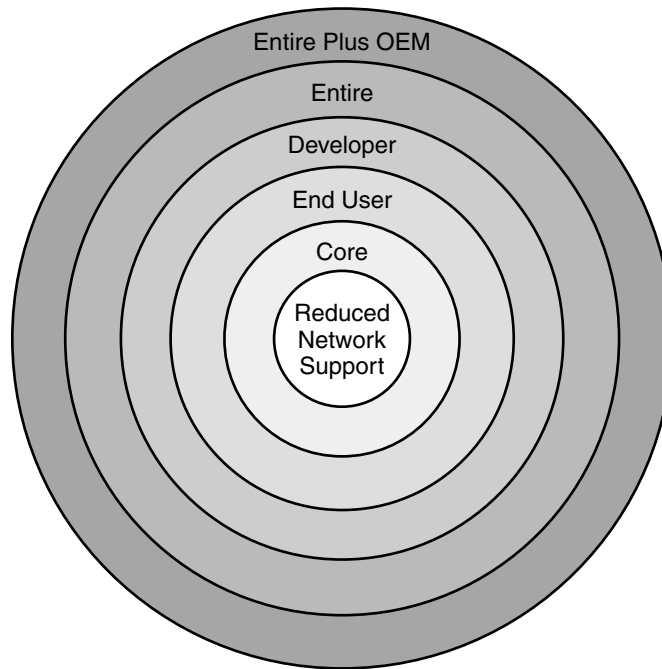


FIGURE 3-1 Solaris Software Groups

Table 3-4 lists the Solaris software groups and the recommended amount of disk space that you need to install each group.

Note – The disk space recommendations in Table 3-4 include space for the following items.

- Swap space
- Patches
- Additional software packages

You might find that the software groups require less disk space than the amount that is listed in this table.

TABLE 3-4 Disk Space Recommendations for Software Groups

Software Group	Description	Recommended Disk Space
Entire Solaris Software Group Plus OEM Support	Contains the packages for the Entire Solaris Software Group plus additional hardware drivers, including drivers for hardware that is not on the system at the time of installation.	6.8 Gbytes

TABLE 3-4 Disk Space Recommendations for Software Groups *(Continued)*

Software Group	Description	Recommended Disk Space
Entire Solaris Software Group	Contains the packages for the Developer Solaris Software Group and additional software that is needed for servers.	6.7 Gbytes
Developer Solaris Software Group	Contains the packages for the End User Solaris Software Group plus additional support for software development. The additional software development support includes libraries, include files, man pages, and programming tools. Compilers are not included.	6.6 Gbytes
End User Solaris Software Group	Contains the packages that provide the minimum code that is required to boot and run a networked Solaris system and the Common Desktop Environment.	5.3 Gbytes
Core System Support Software Group	Contains the packages that provide the minimum code that is required to boot and run a networked Solaris system.	2.0 Gbytes
Reduced Network Support Software Group	Contains the packages that provide the minimum code that is required to boot and run a Solaris system with limited network service support. The Reduced Network Support Software Group provides a multiuser text-based console and system administration utilities. This software group also enables the system to recognize network interfaces, but does not activate network services.	2.0 Gbytes

Upgrade Planning

You can upgrade a system by using one of three different upgrade methods: Solaris Live Upgrade, the Solaris installation program, and custom JumpStart.

TABLE 3-5 Solaris Upgrade Methods

Current Solaris OS	Solaris Upgrade Methods
Solaris 8, Solaris 9, Solaris 10	<ul style="list-style-type: none"> ■ Solaris Live Upgrade – Upgrades a system by creating and upgrading a copy of the running system ■ The Solaris installation program – Provides an interactive upgrade with a graphical user interface or command-line interface ■ Custom JumpStart method – Provides an automated upgrade

Upgrade Limitations

Issue	Description
Upgrading to a different software group	You cannot upgrade your system to a software group that is not installed on the system. For example, if you previously installed the End User Solaris Software Group on your system, you cannot use the upgrade option to upgrade to the Developer Solaris Software Group. However, during the upgrade you can add software to the system that is not part of the currently installed software group.
Upgrading when non-global zones are installed	When you are upgrading the Solaris OS, you can upgrade a system that has non-global zones installed. The Solaris interactive installation program and custom JumpStart programs enable an upgrade. For limitations when upgrading, see “Upgrading When Solaris Zones are Installed on a System” on page 43 .
Upgrading with Veritas file systems	<p>The Solaris interactive installation and custom JumpStart programs do not present you with the opportunity to upgrade a system when you are using Veritas VxVM file systems under these conditions:</p> <ul style="list-style-type: none"> ▪ If the root file system to be upgraded is under Veritas control. For example, if the root (/) file system is mounted on a /dev/vx/. . . device. ▪ If any Solaris software is installed on any file system that is under Veritas control. For example, if the /usr file system is mounted on a /dev/vx/. . . device. <p>To upgrade when Veritas VxVM is configured, use one of the following methods:</p> <ul style="list-style-type: none"> ▪ Use Solaris Live Upgrade “System Panics When Upgrading With Solaris Live Upgrade Running Veritas VxVm” on page 299 ▪ If you have non-global zones installed, you must migrate the affected file systems from VxVM file systems to UFS file systems

Upgrade Programs

You can perform a standard interactive upgrade with the Solaris installation program or an unattended upgrade with the custom JumpStart installation method. Solaris Live Upgrade enables you to upgrade a running system.

Upgrade Program	Description	For More Information
Solaris Live Upgrade	Enables you to create a copy of the currently running system. The copy can be upgraded and then a reboot switches the upgraded copy to become the currently running system. Using Solaris Live Upgrade reduces the downtime that is required to upgrade the Solaris OS. Also, Solaris Live Upgrade can prevent problems with upgrading. An example is the ability to recover from an upgrade if the power fails, because the copy being upgraded is not the currently running system.	To plan for disk space allocation when using Solaris Live Upgrade, see “Solaris Live Upgrade Requirements” in <i>Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning</i> .

Upgrade Program	Description	For More Information
The Solaris installation program	Guides you through an upgrade with an interactive GUI.	Chapter 2, “Installing With the Solaris Installation Program (Tasks),” in <i>Solaris 10 6/06 Installation Guide: Basic Installations</i> .
Custom JumpStart program	Provides an automated upgrade. A profile file and optional preinstallation and postinstallation scripts provide the information required. When creating a custom JumpStart profile for an upgrade, specify <code>install_type</code> upgrade. You must test the custom JumpStart profile against the system’s disk configuration and currently installed software before you upgrade. Use the <code>pfinstall -D</code> command on the system that you are upgrading to test the profile. You cannot test an upgrade profile by using a disk configuration file.	<ul style="list-style-type: none"> ■ For more information about testing the upgrade option, refer to “Testing a Profile” in <i>Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations</i> ■ For more information about creating a upgrade profile, see “Profile Examples” in <i>Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations</i> ■ For more information about performing an upgrade, see “Performing a Custom JumpStart Installation” in <i>Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations</i>

Installing a Solaris Flash Archive Instead of Upgrading

The Solaris Flash installation feature provides a method of creating a copy of the whole installation from a master system that can be replicated on many clone systems. This copy is called a Solaris Flash archive. You can install an archive by using any installation program.



Caution – A Solaris Flash archive cannot be properly created when a non-global zone is installed. The Solaris Flash feature is not compatible with Solaris Zones partitioning technology. If you create a Solaris Flash archive, the resulting archive is not installed properly when the archive is deployed under these conditions:

- The archive is created in a non-global zone
- The archive is created in a global zone that has non-global zones installed

Upgrading With Disk Space Reallocation

The upgrade option in the Solaris installation program and the `upgrade` keyword in the custom JumpStart program provide the ability to reallocate disk space. This reallocation automatically

changes the sizes of the disk slices. You can reallocate disk space if the current file systems do not have enough space for the upgrade. For example, file systems might need more space for the upgrade for the following reasons:

- The Solaris software group that is currently installed on the system contains new software in the new release. Any new software that is included in a software group is automatically selected to be installed during the upgrade.
- The size of the existing software on the system has increased in the new release.

The auto-layout feature attempts to reallocate the disk space to accommodate the new size requirements of the file system. Initially, auto-layout attempts to reallocate space, based on a set of default constraints. If auto-layout cannot reallocate space, you must change the constraints on the file systems.

Note – Auto-layout does not have the ability to “grow” file systems. Auto-layout reallocates space by the following process:

1. Backing up required files on the file systems that need to change.
2. Repartitioning the disks on the basis of the file system changes.
3. Restoring the backup files before the upgrade happens.

-
- If you are using the Solaris installation program, and auto-layout cannot determine how to reallocate the disk space, you must use the custom JumpStart program to upgrade.
 - If you are using the custom JumpStart method to upgrade and you create an upgrade profile, disk space might be a concern. If the current file systems do not contain enough disk space for the upgrade, you can use the `backup_media` and `layout_constraint` keywords to reallocate disk space. For an example of how to use the `backup_media` and `layout_constraint` keywords in a profile, refer to “Profile Examples” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

Using the Patch Analyzer When Upgrading

The Patch Analyzer performs an analysis on your system if you want to upgrade to one of these releases that follow the initial Solaris 10 3/05 release.

- Solaris 10 1/06 release
- Solaris 10 6/06 release

If you are already running the Solaris OS and have installed individual patches, upgrading to a subsequent Solaris 10 release causes the following:

- Any patches that were supplied as part of one of the releases noted above are reapplied to your system. You cannot back out these patches.
- Any patches that were previously installed on your system and are not included in one of the releases noted above are removed.

You can use the Patch Analyzer to determine which patches, if any, will be removed. For detailed instructions about using the Patch Analyzer, refer to Appendix C, “Using the Patch Analyzer When Upgrading (Tasks),” in *Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.

Backing Up Systems Before Upgrading

Backing up your existing file systems before you upgrade to the Solaris OS is highly recommended. If you copy file systems to removable media, such as tape, you can safeguard against data loss, damage, or corruption.

- For detailed instructions to back up your system, refer to Chapter 24, “Backing Up and Restoring File Systems (Overview),” in *System Administration Guide: Devices and File Systems*.
- To backup your system when non-global zones are installed, see Chapter 25, “Solaris Zones Administration (Overview),” in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

How to Find the Version of the Solaris OS That Your System Is Running

To see the version of Solaris software that is running on your system, type either of the following commands.

```
$ uname -a
```

The `cat` command provides more detailed information.

```
$ cat /etc/release
```

Locale Values

As a part of your installation, you can preconfigure the locale that you want the system to use. A *locale* determines how online information is displayed in a specific language and specific region. A language might also include more than one locale to accommodate regional differences, such as differences in the format of date and time, numeric and monetary conventions, and spelling.

You can preconfigure the system locale in a custom JumpStart profile or in the `sysidcfg` file.

Setting the locale in a profile

“Creating a Profile” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*

 Setting the locale in the `sysidcfg` file

 “Preconfiguring With the `sysidcfg` File” on page 79

List of locale values

International Language Environments Guide

Platform Names and Groups

When you are adding clients for a network installation, you must know your system architecture (platform group). If you are writing a custom JumpStart installation rules file, you need to know the platform name.

Some examples of platform names and groups follow. For a full list of SPARC based systems, see *Solaris Sun Hardware Platform Guide* at <http://docs.sun.com/>.

TABLE 3-6 Example of Platform Names and Groups

System	Platform Name	Platform Group
Sun Fire	T2000	sun4v
Sun Blade™	SUNW,Sun-Blade-100	sun4u
x86 based	i86pc	i86pc

Note – On a running system, you can also use the `uname -i` command to determine a system’s *platform name* or the `uname -m` command to determine a system’s *platform group*.

Upgrading When Solaris Zones are Installed on a System

This section provides a brief overview of Solaris Zones partitioning technology, an upgrading with non-global zones overview, and disk space planning guidelines.

For complete information on overview, planning, creating and configuring zones, see Chapter 16, “Introduction to Solaris Zones,” in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

The Solaris Zones partitioning technology is used to virtualize operating system services and provide an isolated and secure environment for running applications. A non-global zone is a virtualized operating system environment created within a single instance of the Solaris OS. When you create a non-global zone, you produce an application execution environment in which processes are isolated from the rest of the system. This isolation prevents processes that are running in one non-global zone from monitoring or affecting processes that are running in other non-global zones. Even a process running with superuser credentials cannot view or affect activity in other zones. A non-global zone also provides an abstract layer that separates applications from the physical attributes of the machine on which they are deployed. Examples of these attributes include physical device paths.

Every Solaris system contains a global zone. The global zone has a dual function. The global zone is both the default zone for the system and the zone used for system-wide administrative control. All processes run in the global zone if no non-global zones are created by the global administrator. The global zone is the only zone from which a non-global zone can be configured, installed, managed, or uninstalled. Only the global zone is bootable from the system hardware. Administration of the system infrastructure, such as physical devices, routing, or dynamic reconfiguration (DR), is only possible in the global zone. Appropriately privileged processes running in the global zone can access objects associated with the non-global zones.

Upgrading With Non-Global Zones

After the Solaris OS is installed, you can install and configure non-global zones. When you are ready to upgrade the Solaris OS, you can upgrade a system that has non-global zones installed. The Solaris interactive installation program and custom JumpStart programs enable an upgrade.

- With the Solaris interactive installation program, you can upgrade a system with non-global zones by selecting the Upgrade Install on the Select Upgrade or Initial Install panel. The installation program then analyzes your system to determine if your system is upgradable, and provides you a summary of the analysis. The installation program then prompts you to continue the upgrade. You can use this program with the following limitations:
 - You cannot customize your upgrade. For example, you cannot install additional software products, install additional locale packages, or modify the disk layout.
 - You must use the Solaris DVD or a DVD-created network installation image. You cannot use the Solaris Software CDs to upgrade a system. For more information about installing with this program, see Chapter 2, “Installing With the Solaris Installation Program (Tasks),” in *Solaris 10 6/06 Installation Guide: Basic Installations*.
- With the custom JumpStart installation program, you can upgrade by using only the `install_type` and `root_device` keywords.

Because some keywords affect non-global zones, some keywords cannot be included in a profile. For example, using keywords that add packages, reallocate disk space, or add locales would affect non-global zones. If you use these keywords, they are ignored or cause the JumpStart upgrade to fail. For a list of these keywords, see “Limiting Profile Keywords When Upgrading With Non-Global Zones” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

TABLE 3-7 Limitations When Upgrading With Non-Global Zones

Program or Condition	Description
Solaris Live Upgrade	You cannot use Solaris Live Upgrade to upgrade a system when non-global zones are installed. You can create a boot environment with the <code>lucreate</code> command, but if you use the <code>luupgrade</code> command, the upgrade fails. An error message is displayed.

TABLE 3-7 Limitations When Upgrading With Non-Global Zones (Continued)

Program or Condition	Description
Solaris Flash archives	<p>A Solaris Flash archive cannot be properly created when a non-global zone is installed. The Solaris Flash feature is not compatible with Solaris Zones partitioning technology. If you create a Solaris Flash archive, the resulting archive is not installed properly when the archive is deployed under these conditions:</p> <ul style="list-style-type: none"> ■ The archive is created in a non-global zone ■ The archive is created in a global zone that has non-global zones installed
Using a command that uses the <code>-R</code> option or equivalent must not be used in some situations.	<p>Any command that accepts an alternate root (<code>/</code>) file system by using the <code>-R</code> option or equivalent must not be used if the following are true:</p> <ul style="list-style-type: none"> ■ The command is run in the global zone. ■ The alternative root (<code>/</code>) file system refers to any path within a non-global zone. <p>An example is the <code>-R root_path</code> option to the <code>pkgadd</code> utility run from the global zone with a path to the root (<code>/</code>) file system in a non-global zone.</p> <p>For a list of utilities that accept an alternate root (<code>/</code>) file system and more information about zones, see “Restriction on Accessing A Non-Global Zone From the Global Zone” in <i>System Administration Guide: Solaris Containers-Resource Management and Solaris Zones</i>.</p>

Backing Up Your System Before Performing an Upgrade With Zones

You should back up the global and non-global zones on your Solaris system before you perform the upgrade. For information about backing up a system with zones installed, see Chapter 25, “Solaris Zones Administration (Overview),” in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

Disk Space Requirements for Non-Global Zones

When installing the global zone, be sure to reserve enough disk space for all of the zones you might create. Each non-global zone might have unique disk space requirements.

No limits are placed on how much disk space can be consumed by a zone. The global zone administrator is responsible for space restriction. Even a small uniprocessor system can support a number of zones running simultaneously. The characteristics of the packages installed in the global zone affect the space requirements of the non-global zones that are created. The number of packages and space requirements are factors.

For complete planning requirements and recommendations, see Chapter 18, “Planning and Configuring Non-Global Zones (Tasks),” in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

x86: Partitioning Recommendations

When using the Solaris OS on x86 based systems, follow these guidelines for partitioning your system.

The Solaris installation program uses a default boot-disk partition layout. These partitions are called `fdisk` partitions. An `fdisk` partition is a logical partition of a disk drive that is dedicated to a particular operating system on x86 based systems. To install the Solaris software, you must set up at least one 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 Solaris `fdisk` partition per disk.

TABLE 3-8 x86: Default Partitions

Partitions	Partition Name	Partition Size
First partition (on some systems)	Diagnostic or service partition	Existing size on system.
Second partition (on some systems)	x86 boot partition	<ul style="list-style-type: none"> ■ If you are performing an initial installation, this partition is not created. ■ If you upgrade and your system does not have an existing x86 boot partition, this partition is not created. ■ If you upgrade and your system has an x86 boot partition: <ul style="list-style-type: none"> ■ If the partition is required to bootstrap from one boot device to another, the x86 boot partition is preserved on the system. ■ If the partition is not required to boot additional boot devices, the x86 boot partition is removed. The contents of the partition are moved to the root partition.
Third partition	Solaris OS partition	Remaining space on the boot disk.

Default Boot-Disk Partition Layout Preserves the Service Partition

The Solaris installation program uses a default boot-disk partition layout to accommodate the diagnostic or service partition. If your system currently includes a diagnostic or service partition, the default boot-disk partition layout enables you to preserve this partition.

Note – If you install the Solaris OS on an x86 based system that does not currently include a diagnostic or service partition, the installation program does not create a new diagnostic or Service partition by default. If you want to create a diagnostic or service partition on your system, see your hardware documentation.

x86: GRUB Based Booting For Solaris Installation

This chapter describes the GRUB based booting on x86 based systems that relates to Solaris installation. This chapter contains the following sections:

- “x86: GRUB Based Booting (Overview)” on page 49
- “x86: GRUB Based Booting (Planning)” on page 52
- “x86: Locating the GRUB Menu’s menu.lst File (Tasks)” on page 56

x86: GRUB Based Booting (Overview)

GRUB, the open source boot loader, has been adopted as the default boot loader in the Solaris OS.

Note – GRUB based booting is not available on SPARC based systems.

The *boot loader* is the first software program that runs after you power on a system. After you power on an x86 based system, the Basic Input/Output System (BIOS) initializes the CPU, the memory, and the platform hardware. When the initialization phase has completed, the BIOS loads the boot loader from the configured boot device, and then transfers control of the system to the boot loader.

GRUB is an open source boot loader with a simple menu interface that includes boot options that are predefined in a configuration file. GRUB also has a command-line interface that is accessible from the menu interface for performing various boot commands. In the Solaris OS, the GRUB implementation is compliant with the Multiboot Specification. The specification is described in detail at <http://www.gnu.org/software/grub/grub.html>.

Because the Solaris kernel is fully compliant with the Multiboot Specification, you can boot a Solaris x86 based system by using GRUB. With GRUB, you can more easily boot and install various operating systems. For example, on one system, you could individually boot the following operating systems:

- Solaris OS
- Microsoft Windows

Note – GRUB detects Microsoft Windows partitions but does not verify that the OS can be booted.

A key benefit of GRUB is that it is intuitive about file systems and kernel executable formats, which enables you to load an operating system without recording the physical position of the kernel on the disk. With GRUB based booting, the kernel is loaded by specifying its file name, and the drive, and the partition where the kernel resides. GRUB based booting replaces the Solaris Device Configuration Assistant and simplifies the booting process with a GRUB menu.

x86: How GRUB Based Booting Works

After GRUB gains control of the system, a menu is displayed on the console. In the GRUB menu, you can do the following:

- Select an entry to boot your system
- Modify a boot entry by using the built-in GRUB edit menu
- Manually load an OS kernel from the command line

A configurable timeout is available to boot the default OS entry. Pressing any key aborts the default OS entry boot.

To view an example of a GRUB menu, see [“Description of the GRUB Main Menu”](#) on page 53.

x86: GRUB Device Naming Conventions

The device naming conventions that GRUB uses are slightly different from previous Solaris OS versions. Understanding the GRUB device naming conventions can assist you in correctly specifying drive and partition information when you configure GRUB on your system.

The following table describes the GRUB device naming conventions.

TABLE 4-1 Naming Conventions for GRUB Devices

Device Name	Description
(fd0), (fd1)	First diskette, second diskette
(nd)	Network device
(hd0, 0), (hd0, 1)	First and second fdisk partition of first bios disk
(hd0, 0, a), (hd0, 0, b)	Solaris/BSD slice 0 and 1 on first fdisk partition on the first bios disk

Note – All GRUB device names must be enclosed in parentheses. Partition numbers are counted from 0 (zero), not from 1.

For more information about `fdisk` partitions, see “Guidelines for Creating an `fdisk` Partition” in *System Administration Guide: Devices and File Systems*.

x86: Where to Find Information About GRUB Based Installations

For more information about these changes, see the following references.

TABLE 4–2 Where to Find Information on GRUB Based Installations

Topic	GRUB Menu Tasks	For More Information
Installation	To install from the Solaris OS CD or DVD media	<i>Solaris 10 6/06 Installation Guide: Basic Installations</i> .
	To install from a network installation image	Part II
	To configure a DHCP server for network installations	“Preconfiguring System Configuration Information With the DHCP Service (Tasks)” on page 98
	To install with the Custom JumpStart program	“Performing a Custom JumpStart Installation” in <i>Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations</i>
	To activate or fall back to a boot environment by using Solaris Live Upgrade	<ul style="list-style-type: none"> ■ “Activating a Boot Environment” in <i>Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning</i> ■ Chapter 10, “Failure Recovery: Falling Back to the Original Boot Environment (Tasks),” in <i>Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning</i>
System Administration	For more detailed information about GRUB and for administrative tasks	Chapter 11, “GRUB Based Booting (Tasks),” in <i>System Administration Guide: Basic Administration</i>

x86: GRUB Based Booting (Planning)

This section describes the basics of GRUB based booting and describes the GRUB menu.

When you install the Solaris OS, two GRUB menu entries are installed on the system by default. The first entry is the Solaris OS entry. The second entry is the failsafe boot archive, which is to be used for system recovery. The Solaris GRUB menu entries are installed and updated automatically as part of the Solaris software installation and upgrade process. These entries are directly managed by the OS and should not be manually edited.

During a standard Solaris OS installation, GRUB is installed on the Solaris `fdisk` partition without modifying the system BIOS setting. If the OS is not on the BIOS boot disk, you need to do one of the following:

- Modify the BIOS setting.
- Use a boot manager to bootstrap to the Solaris partition. For more details, see your boot manager.

The preferred method is to install the Solaris OS on the boot disk. If multiple operating systems are installed on the machine, you can add entries to the `menu.lst` file. These entries are then displayed in the GRUB menu the next time you boot the system.

For additional information on multiple operating systems, see “How Multiple Operating Systems Are Supported in the GRUB Boot Environment” in *System Administration Guide: Basic Administration*.

x86: Performing a GRUB Based Installation From the Network

Performing a GRUB based network boot requires a DHCP server that is configured for PXE clients and an install server that provides `tftp` service. The DHCP server must be able to respond to the DHCP classes, `PXELient` and `GRUBClient`. The DHCP response must contain the following information:

- IP address of the file server
- Name of the boot file (`pxegrub`)

Note – `rpc.bootparamd`, which is usually a requirement on the server side for performing a network boot, is not required for a GRUB based network boot.

If no PXE or DHCP server is available, you can load GRUB from CD-ROM or local disk. You can then manually configure the network in GRUB and download the multiboot program and the boot archive from the file server.

For more information, see “[x86: Overview of Booting and Installing Over the Network With PXE](#)” on page 115.

Description of the GRUB Main Menu

When you boot an x86 based system, the GRUB menu is displayed. This menu provides a list of boot entries to choose from. A *boot entry* is an OS instance that is installed on your system. The GRUB menu is based on the `menu.lst` file, which is a configuration file. The `menu.lst` file is created by the Solaris installation program and can be modified after installation. The `menu.lst` file dictates the list of OS instances that are shown in the GRUB menu.

- If you install or upgrade the Solaris OS, the GRUB menu is automatically updated. The Solaris OS is then displayed as a new boot entry.
- If you install an OS other than the Solaris OS, you must modify the `menu.lst` configuration file to include the new OS instance. Adding the new OS instance enables the new boot entry to appear in the GRUB menu the next time that you boot the system.

EXAMPLE 4-1 GRUB Main Menu

In the following example, the GRUB main menu shows the Solaris and Microsoft Windows operating systems. A Solaris Live Upgrade boot environment is also listed that is named `second_disk`. See the following for descriptions of each menu item.

```
GNU GRUB version 0.95 (616K lower / 4127168K upper memory)
+-----+
|Solaris                                     |
|Solaris failsafe                           |
|second_disk                                |
|second_disk failsafe                       |
|Windows                                     |
+-----+
```

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.

Solaris	Specifies the Solaris OS.
Solaris failsafe	Specifies a boot archive that can be used for recovery if the Solaris OS is damaged.
second_disk	Specifies a Solaris Live Upgrade boot environment. The <code>second_disk</code> boot environment was created as a copy of the Solaris OS. It was upgraded and activated with the <code>luactivate</code> command. The boot environment is available for booting.
Windows	Specifies the Microsoft Windows OS. GRUB detects these partitions but does not verify that the OS can be booted.

Description of GRUB menu.lst File

The GRUB menu.lst file lists the contents of the GRUB main menu. The GRUB main menu lists boot entries for all the OS instances that are installed on your system, including Solaris Live Upgrade boot environments. The Solaris software upgrade process preserves any changes that you make to this file.

Any revisions made to the menu.lst file are displayed on the GRUB main menu, along with the Solaris Live Upgrade entries. Any changes that you make to the file become effective at the next system reboot. You can revise this file for the following reasons:

- To add to the GRUB menu entries for operating systems other than Solaris
- To customize booting behavior such as specifying the default OS on the GRUB menu



Caution – Do not use the GRUB menu.lst file to modify Solaris Live Upgrade entries. Modifications could cause Solaris Live Upgrade to fail.

Although you can use the menu.lst file to customize booting behavior such as booting with the kernel debugger, the preferred method for customization is to use the eeprom command. If you use the menu.lst file to customize, the Solaris OS entries might be modified during a software upgrade. Changes to the file would then be lost.

For information about how to use the eeprom command, see “How to Set Solaris Boot Parameters by Using the eeprom Command” in *System Administration Guide: Basic Administration*.

EXAMPLE 4-2 Menu.lst File

Here is a sample of a menu.lst file:

```
default 0
timeout 10
title Solaris
  root (hd0,0,a)
  kernel /platform/i86pc/multiboot -B console=ttya
  module /platform/i86pc/boot_archive
title Solaris failsafe
  root (hd0,0,a)
  kernel /boot/multiboot -B console=ttya -s
  module /boot/x86.miniroot.safe
#----- second_disk - ADDED BY LIVE UPGRADE - DO NOT EDIT -----
title second_disk
  root (hd0,1,a)
  kernel /platform/i86pc/multiboot
  module /platform/i86pc/boot_archive
title second_disk failsafe
  root (hd0,1,a)
  kernel /boot/multiboot kernel/unix -s
```

EXAMPLE 4-2 Menu.lst File (Continued)

```

    module /boot/x86.miniroot-safe
#----- second_disk ----- END LIVE UPGRADE -----
title Windows
    root (hd0,0)
    chainloader -1

```

default	Specifies which item to boot if the timeout expires. To change the default, you can specify another item in the list by changing the number. The count begins with zero for the first title. For example, change the default to 2 to boot automatically to the <code>second_disk</code> boot environment.
timeout	Specifies the number of seconds to wait for user input before booting the default entry. If no timeout is specified, you are required to choose an entry.
title <i>OS name</i>	Specifies the name of the operating system. <ul style="list-style-type: none"> ■ If this is a Solaris Live Upgrade boot environment, <i>OS name</i> is the name you gave the new boot environment when it was created. In the previous example, the Solaris Live Upgrade boot environment is named <code>second_disk</code>. ■ If this is a failsafe boot archive, this boot archive is used for recovery when the primary OS is damaged. In the previous example, Solaris failsafe and <code>second_disk</code> failsafe are the recovery boot archives for the Solaris and <code>second_disk</code> operating systems.
root (hd0,0,a)	Specifies on which disk, partition, and slice to load files. GRUB automatically detects the file system type.
kernel /platform/i86pc/multiboot	Specifies the multiboot program. The kernel command must always be followed by the multiboot program. The string after multiboot is passed to the Solaris OS without interpretation.

For a complete description of multiple operating systems, see “How Multiple Operating Systems Are Supported in the GRUB Boot Environment” in *System Administration Guide: Basic Administration*.

Locating the menu.lst File To Change the GRUB Menu

You must always use the `bootadm` command to locate the GRUB menu's `menu.lst` file. The `list-menu` subcommand finds the active GRUB menu. The `menu.lst` file 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. If you want to make changes to this file, see “x86: Locating the GRUB Menu's menu.lst File (Tasks)” on page 56.

x86: Locating the GRUB Menu's menu.lst File (Tasks)

The GRUB menu can be updated. For example, you might want to change the default time for how fast the default OS is booted. Or, you might want to add another OS to the GRUB menu.

Typically, the active GRUB menu's menu.lst file is located at /boot/grub/menu.lst. In some situations, the GRUB menu.lst file resides elsewhere. For example, in a system that uses Solaris Live Upgrade, the GRUB menu.lst file might be on a boot environment that is not the currently running boot environment. Or if you have upgraded a system with an x86 boot partition, the menu.lst file might reside in the /stubboot directory. Only the active GRUB menu.lst file is used to boot the system. In order to modify the GRUB menu that is displayed when you boot the system, the active GRUB menu.lst file must be modified. Changing any other GRUB menu.lst file has no effect on the menu that is displayed when you boot the system. To determine the location of the active GRUB menu.lst file, use the bootadm command. The list-menu subcommand displays the location of the active GRUB menu. The following procedures determine the location of the GRUB menu's menu.lst file.

For more information about the bootadm command, see bootadm(1M) man page.

▼ Locating the GRUB Menu's menu.lst file

In the following procedure, the system contains two operating systems: Solaris and a Solaris Live Upgrade boot environment, second_disk. The Solaris OS has been booted and contains the GRUB menu.

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 To locate the menu.lst file, type:

```
# /sbin/bootadm list-menu
```

The location and contents of the file are displayed.

The location for the active GRUB menu is: /boot/grub/menu.lst

```
default 0
timeout 10
0 Solaris
1 Solaris failsafe
2 second_disk
3 second_disk failsafe
```


▼ Locating the GRUB Menu's menu.lst File When the active menu.lst file is in Another Boot Environment

In the following procedure, the system contains two operating systems: Solaris and a Solaris Live Upgrade boot environment, `second_disk`. In this example, the `menu.lst` file does not exist in the currently running boot environment. The `second_disk` boot environment has been booted. The Solaris boot environment contains the GRUB menu. The Solaris boot environment is not mounted.

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 To locate the menu.lst file, type:

```
# /sbin/bootadm list-menu
```

The location and contents of the file are displayed.

```
The location for the active GRUB menu is: /dev/dsk/device_name(not mounted)
```

```
The filesystem type of the menu device is <ufs>
```

```
default 0
```

```
timeout 10
```

```
0 Solaris
```

```
1 Solaris failsafe
```

```
2 second_disk
```

```
3 second_disk failsafe
```

3 Because the file system containing the menu.lst file is not mounted, mount the file system. Specify the UFS file system and the device name.

```
# /usr/sbin/mount -F ufs /dev/dsk/device_name /mnt
```

Where `device_name` specifies the location of the root (`/`) file system on the disk device of the boot environment that you want to mount. The device name is entered in the form of `/dev/dsk/cwtxdysz`. For example:

```
# /usr/sbin/mount -F ufs /dev/dsk/c0t1d0s0 /mnt
```

You can access the GRUB menu at `/mnt/boot/grub/menu.lst`

4 Unmount the filesystem

```
# /usr/sbin/umount /mnt
```

Note – If you mount a boot environment or a file system of a boot environment, ensure that the file system or file systems are unmounted after use. If these file systems are not unmounted, future Solaris Live Upgrade operations on that boot environment might fail.

▼ Locating the GRUB Menu's menu.lst File When a Solaris Live Upgrade Boot Environment is Mounted

In the following procedure, the system contains two operating systems: Solaris and a Solaris Live Upgrade boot environment, `second_disk`. The `second_disk` boot environment has been booted. The Solaris boot environment contains the GRUB menu. The Solaris boot environment is mounted at `/.alt.Solaris`.

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 To locate the menu.lst file, type:

```
# /sbin/bootadm list-menu
```

The location and contents of the file are displayed.

The location for the active GRUB menu is:

```
/.alt.Solaris/boot/grub/menu.lst
default 0
timeout 10
0 Solaris
1 Solaris failsafe
2 second_disk
3 second_disk failsafe
```

Since the boot environment containing the GRUB menu is already mounted, then you can access the menu.lst file at `/.alt.Solaris/boot/grub/menu.lst`.

▼ Locating the GRUB Menu's menu.lst File When Your System Has an x86 Boot Partition

In the following procedure, the system contains two operating systems: Solaris and a Solaris Live Upgrade boot environment, `second_disk`. The `second_disk` boot environment has been booted. Your system has been upgraded and an x86 boot partition remains. The boot partition is mounted at `/stubboot` and contains the GRUB menu. For an explanation of x86 boot partitions, see “[x86: Partitioning Recommendations](#)” on page 46.

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 To locate the menu.lst file, type:

```
# /sbin/bootadm list-menu
```

The location and contents of the file are displayed.

The location for the active GRUB menu is:

```
/stubboot/boot/grub/menu.lst
```

```
default 0
```

```
timeout 10
```

```
0 Solaris
```

```
1 Solaris failsafe
```

```
2 second_disk
```

```
3 second_disk failsafe
```

You can access the menu.lst file at /stubboot/boot/grub/menu.lst.

Gathering Information Before Installation or Upgrade (Planning)

This chapter contains checklists to help you gather all of the information that you need to install or upgrade your system.

- “Checklist for Installation” on page 61
- “Checklist for Upgrading” on page 68

Checklist for Installation

Use the following checklist to gather the information that you need to install the Solaris OS. You do not need to gather all of the information that is requested on the worksheet. You only need to collect the information that applies to your system.

TABLE 5-1 Installation Checklist

Information for Installation	Description or Example	Answer — Defaults are noted with an asterisk (*)
Network connection	Is the system connected to a network?	Networked/Non-networked
DHCP	Can the system use Dynamic Host Configuration Protocol (DHCP) to configure its network interfaces? DHCP provides the network parameters that are necessary for installation.	Yes/No*

TABLE 5-1 Installation Checklist (Continued)

Information for Installation		Description or Example	Answer — Defaults are noted with an asterisk (*)
If you are not using DHCP, note the network address.	IP Address	<p>If you are not using DHCP, supply the IP address for the system.</p> <p>Example: 172.31.255.255</p> <p>To find this information on a running system, type the following command.</p> <p># ypmatch host-name hosts</p>	
	Subnet	<p>If you are not using DHCP, is the system part of a subnet?</p> <p>If yes, what is the netmask of the subnet?</p> <p>Example: 255.255.255.0</p> <p>To find this information on a running system, type the following command.</p> <p># more /etc/netmasks</p>	
	IPv6	<p>Do you want to enable IPv6 on this machine?</p> <p>IPv6 is a part of the TCP/IP Internet protocol that facilitates IP addressing by adding better security and increasing Internet addresses.</p>	Yes/No*
Host Name		<p>Host name that you choose for the system.</p> <p>To find this information on a running system, type the following command.</p> <p># uname -n</p>	
Kerberos		<p>Do you want to configure Kerberos security on this machine?</p> <p>If yes, gather this information:</p> <p style="text-align: right;">Default Realm:</p> <p style="text-align: right;">Administration Server:</p> <p style="text-align: right;">First KDC:</p> <p style="text-align: right;">(Optional) Additional KDCs:</p> <p>The Kerberos service is a client-server architecture that provides secure transactions over networks.</p>	Yes/No*

TABLE 5-1 Installation Checklist (Continued)

Information for Installation	Description or Example	Answer — Defaults are noted with an asterisk (*)
If the system uses a name service, provide the following information.	<p>Name Service</p> <p>Which name service should this system use?</p> <p>To find this information on a running system, type the following command.</p> <pre># cat /etc/nsswitch.conf</pre> <p>A naming service stores information in a central place, which enables users, machines, and applications to communicate across the network. Examples of information that is stored are host names and addresses or user names and passwords.</p>	NIS+/NIS/DNS/ LDAP/None
	<p>Domain Name</p> <p>Provide the name of the domain in which the system resides.</p> <p>To find this information on a running system, type the following command.</p> <pre># domainname</pre>	
	<p>NIS+ and NIS</p> <p>Do you want to specify a name server or let the installation program find one?</p> <p>If you want to specify a name server, provide the following information.</p> <p style="text-align: right;">Server's host name:</p> <ul style="list-style-type: none"> ■ For NIS clients, type the following command to display the server's host name. <pre># ypwhich</pre> <ul style="list-style-type: none"> ■ For NIS+ clients, type the following command to display the server's host name. <pre># nisping</pre> <p style="text-align: right;">Server's IP Address:</p> <ul style="list-style-type: none"> ■ For NIS clients, type the following command to display the server's IP address. <pre># ypmatch nameserver-name hosts</pre> <ul style="list-style-type: none"> ■ For NIS+ clients, type the following command to display the server's IP address. <pre># nismatch nameserver-name hosts.org_dir</pre> <p>Network Information Service (NIS) makes network administration more manageable by providing centralized control over a variety of network information, such as machine names and addresses.</p>	Specify One/Find One*

TABLE 5-1 Installation Checklist (Continued)

Information for Installation	Description or Example	Answer — Defaults are noted with an asterisk (*)
	<p>DNS</p> <p>Provide IP addresses for the DNS server. You must enter at least one IP address, but you can enter up to three addresses.</p> <p style="text-align: right;">Server's IP Address:</p> <p>To display the server's IP address, type the following command.</p> <p># getent ipnodes dns</p> <p>You can enter a list of domains to search when a DNS query is made.</p> <p style="text-align: right;">List of domains to be searched:</p> <p>The domain name system (DNS) is the name service that the Internet provides for TCP/IP networks. DNS provides host names to the IP address service. DNS simplifies communication by using machine names instead of numerical IP addresses. DNS also serves as a database for mail administration.</p>	
	<p>LDAP</p> <p>Provide the following information about your LDAP profile.</p> <p style="text-align: right;">Profile Name:</p> <p style="text-align: right;">Profile Server:</p> <p>If you specify a proxy credential level in your LDAP profile, gather this information.</p> <p style="text-align: right;">Proxy-bind distinguished name:</p> <p style="text-align: right;">Proxy-bind password:</p> <p>Lightweight Directory Access Protocol (LDAP) defines a relatively simple protocol for updating and searching directories that are running over TCP/IP.</p>	

TABLE 5-1 Installation Checklist (Continued)

Information for Installation	Description or Example	Answer — Defaults are noted with an asterisk (*)
Default Route	<p>Do you want to specify a default route IP address or let the Solaris installation program find one?</p> <p>The default route provides a bridge that forwards traffic between two physical networks. An IP address is a unique number that identifies each host on a network.</p> <p>You have the following choices:</p> <ul style="list-style-type: none"> ■ You can specify the IP address. An <code>/etc/default/router</code> file is created with the specified IP address. When the system is rebooted, the specified IP address becomes the default route. ■ You can let the Solaris installation program detect an IP address. However, the system must be on a subnet that has a router that advertises itself by using the ICMP router discovery protocol. If you are using the command-line interface, the software detects an IP address when the system is booted. ■ You can choose None if you do not have a router or do not want the software to detect an IP address at this time. The software automatically tries to detect an IP address on reboot. 	Detect one*/Specify one/None
Time Zone	How do you want to specify your default time zone?	Geographic region* Offset from GMT Time zone file
Root Password	Provide the root password for the system.	
Locales	For which geographic regions do you want to install support?	
SPARC: Power Management (only available on SPARC systems that support Power Management)	<p>Do you want to use Power Management?</p> <p>Note – If your system has Energy Star version 3 or later, you are not prompted for this information.</p>	Yes*/No
Automatic reboot or CD/DVD ejection	Reboot automatically after software installation?	Yes*/No
	Eject CD/DVD automatically after software installation?	Yes*/No

TABLE 5-1 Installation Checklist (Continued)

Information for Installation	Description or Example	Answer — Defaults are noted with an asterisk (*)
Default or Custom Install	<p>Do you want to perform a default installation, or customize the installation?</p> <ul style="list-style-type: none"> ■ Select Default installation to format the entire hard disk and install a preselected set of software. ■ Select Custom installation to modify the hard disk layout and select the software that you want to install. <p>Note – The text installer does not prompt you to select a Default or Custom Installation. To perform a default installation, accept the default values that are provided in the text installer. To perform a custom installation, edit the values in the text installer screens.</p>	Default installation*/Custom installation
Software Group	Which Solaris Software Group do you want to install?	Entire Plus OEM Entire* Developer End User Core Reduced Networking
Custom Package Selection	<p>Do you want to add or remove software packages from the Solaris Software Group that you install?</p> <p>Note – When you select which packages to add or remove, you need to know about software dependencies and how Solaris software is packaged.</p>	
Select Disks	<p>On which disks do you want to install the Solaris software?</p> <p>Example: c0t0d0</p>	
x86: fdisk partitioning	<p>Do you want to create, delete, or modify a Solaris fdisk partition?</p> <p>Each disk that is selected for file system layout must have a Solaris fdisk partition.</p> <p>If your system currently has a service partition, the Solaris installation program preserves the service partition by default. If you do not want to preserve the service partition, you must customize the fdisk partitions. For more information about preserving a service partition, see “Default Boot-Disk Partition Layout Preserves the Service Partition” on page 46.</p> <p style="text-align: right;">Select Disks for fdisk Partition Customization?</p> <p style="text-align: right;">Customize fdisk partitions?</p>	<p>Yes/No*</p> <p>Yes/No*</p>

TABLE 5-1 Installation Checklist (Continued)

Information for Installation	Description or Example	Answer — Defaults are noted with an asterisk (*)
Preserve Data	Do you want to preserve any data that exists on the disks where you are installing the Solaris software?	Yes/No*
Auto-layout File Systems	<p>Do you want the installation program to automatically lay out file systems on your disks?</p> <p>If yes, which file systems should be used for auto-layout?</p> <p>Example: /, /opt, /var</p> <p>If no, you must provide file system configuration information.</p> <p>Note – The Solaris installation GUI lays out file systems automatically by default.</p>	Yes*/No
Mount Remote File Systems	<p>Does this system need to access software on another file system?</p> <p>If yes, provide the following information about the remote file system.</p> <p style="text-align: right;">Server:</p> <p style="text-align: right;">IP Address:</p> <p style="text-align: right;">Remote File System:</p> <p style="text-align: right;">Local Mount Point:</p>	Yes/No*
If you are installing through a <code>tip</code> line, follow these instructions.	<p>Ensure that your window display is at least 80 columns wide and 24 rows long. For more information, see <code>tip(1)</code>.</p> <p>To determine the current dimensions of your <code>tip</code> window, use the <code>stty</code> command. For more information, see the man page, <code>stty(1)</code>.</p>	
Check your Ethernet connection.	If the system is part of a network, verify that an Ethernet connector or similar network adapter is connected to your system.	
Review the planning chapter and other relevant documentation.	<ul style="list-style-type: none"> ■ Review the entire planning chapter or specific sections in Chapter 3. ■ Review the <i>Solaris 10 6/06 Release Notes</i> on http://docs.sun.com and vendor release notes to ensure that the software you use is supported in the new Solaris release. ■ Review the <i>Solaris 10 6/06 Sun Hardware Platform Guide</i> to ensure that your hardware is supported. ■ Review the documentation that accompanied your system to ensure that your system and devices are supported by the Solaris release. 	

Checklist for Upgrading

Use the following checklist to gather the information that you need to upgrade the Solaris OS. You do not need to gather all of the information that is requested on the checklist. You only need to collect the information that applies to your system. If you are performing the upgrade over the network, the installation program provides the information for you, based on the current system configuration.

You cannot change basic system identification, such as host name or IP address. The installation program might prompt you for basic system identification, but you must enter the original values. If you use the Solaris installation program to upgrade, the upgrade fails if you attempt to change any of the values.

TABLE 5-2 Upgrade Checklist

Information for Upgrade		Description or Example	Answer – Defaults are noted with an asterisk (*)
Network connection		Is the system connected to a network?	Networked/Nonnetworked
DHCP		Can the system use Dynamic Host Configuration Protocol (DHCP) to configure its network interfaces? DHCP provides the network parameters that are necessary for installation.	Yes/No*
If you are not using DHCP, note the network address.	IP Address	If you are not using DHCP, supply the IP address for the system. Example: 172.31.255.255 To find this information on a running system, type the following command. # ypmatch host-name hosts	
	Subnet	If you are not using DHCP, is the system part of a subnet? If yes, what is the netmask of the subnet? Example: 255.255.255.0 To find this information on a running system, type the following command. # more /etc/netmasks	
	IPv6	Do you want to enable IPv6 on this machine? IPv6 is a part of the TCP/IP Internet protocol that facilitates IP addressing by adding better security and increasing Internet addresses.	Yes/No*

TABLE 5-2 Upgrade Checklist (Continued)

Information for Upgrade		Description or Example	Answer – Defaults are noted with an asterisk (*)
Host Name		<p>Host name that you choose for the system.</p> <p>To find this information on a running system, type the following command.</p> <p># uname -n</p>	
Kerberos		<p>Do you want to configure Kerberos security on this machine?</p> <p>If yes, gather this information:</p> <p style="text-align: right;">Default Realm:</p> <p style="text-align: right;">Administration Server:</p> <p style="text-align: right;">First KDC:</p> <p style="text-align: right;">(Optional) Additional KDCs:</p> <p>The Kerberos service is a client-server architecture that provides secure transactions over networks.</p>	Yes/No*
If the system uses a name service, provide the following information.	Name Service	<p>Which name service should this system use?</p> <p>To find this information on a running system, type the following command.</p> <p># cat /etc/nsswitch.conf</p> <p>A naming service stores information in a central place, which enables users, machines, and applications to communicate across the network. Examples of information that is stored are host names and addresses or user names and passwords.</p>	NIS+/NIS/DNS/ LDAP/None
	Domain Name	<p>Provide the name of the domain in which the system resides.</p> <p>To find this information on a running system, type the following command.</p> <p># domainname</p>	

TABLE 5-2 Upgrade Checklist (Continued)

Information for Upgrade	Description or Example	Answer – Defaults are noted with an asterisk (*)
	<p>NIS+ and NIS</p> <p>Do you want to specify a name server or let the installation program find one?</p> <p>If you want to specify a name server, provide the following information.</p> <p style="text-align: right;">Server's host name:</p> <ul style="list-style-type: none"> ■ For NIS clients, type the following command to display the server's host name. <p style="padding-left: 2em;"># ypwhich</p> <ul style="list-style-type: none"> ■ For NIS+ clients, type the following command to display the server's host name. <p style="padding-left: 2em;"># nisping</p> <p style="text-align: right;">Server's IP Address:</p> <ul style="list-style-type: none"> ■ For NIS clients, type the following command to display the server's IP address. <p style="padding-left: 2em;"># ypmatch nameserver-name hosts</p> <ul style="list-style-type: none"> ■ For NIS+ clients, type the following command to display the server's IP address. <p style="padding-left: 2em;"># nismatch nameserver-name hosts.org_dir</p> <p>Network Information Service (NIS) makes network administration more manageable by providing centralized control over a variety of network information, such as machine names and addresses.</p>	<p>Specify one/Find one*</p>

TABLE 5-2 Upgrade Checklist (Continued)

Information for Upgrade	Description or Example	Answer – Defaults are noted with an asterisk (*)
DNS	<p>Provide IP addresses for the DNS server. You must enter at least one IP address, but you can enter up to three addresses.</p> <p style="text-align: right;">Server's IP Address:</p> <p>To display the server's IP address, type the following command.</p> <p># getent ipnodes dns</p> <p>You can enter a list of domains to search when a DNS query is made.</p> <p style="text-align: right;">List of domains to be searched:</p> <p>The domain name system (DNS) is the name service that the Internet provides for TCP/IP networks. DNS provides host names to the IP address service. DNS simplifies communication by using machine names instead of numerical IP addresses. DNS also serves as a database for mail administration.</p>	
LDAP	<p>Provide the following information about your LDAP profile.</p> <p style="text-align: right;">Profile Name:</p> <p style="text-align: right;">Profile Server:</p> <p>If you specify a proxy credential level in your LDAP profile, gather this information.</p> <p style="text-align: right;">Proxy-bind distinguished name:</p> <p style="text-align: right;">Proxy-bind password:</p> <p>Lightweight Directory Access Protocol (LDAP) defines a relatively simple protocol for updating and searching directories that are running over TCP/IP.</p>	

TABLE 5-2 Upgrade Checklist (Continued)

Information for Upgrade	Description or Example	Answer – Defaults are noted with an asterisk (*)
Default Route	<p>Do you want to specify a default route IP address or let the Solaris installation program find one?</p> <p>The default route provides a bridge that forwards traffic between two physical networks. An IP address is a unique number that identifies each host on a network.</p> <p>You have the following choices:</p> <ul style="list-style-type: none"> ■ You can specify the IP address. An <code>/etc/defaultrouter</code> file is created with the specified IP address. When the system is rebooted, the specified IP address becomes the default route. ■ You can let the Solaris installation program detect an IP address. However, the system must be on a subnet that has a router that advertises itself by using the ICMP router discovery protocol. If you are using the command-line interface, the software detects an IP address when the system is booted. ■ You can choose None if you do not have a router or do not want the software to detect an IP address at this time. The software automatically tries to detect an IP address on reboot. 	Detect one*/Specify one/None
Time Zone	How do you want to specify your default time zone?	Geographic region* Offset from GMT Time zone file
Root Password	Provide the root password for the system.	

TABLE 5-2 Upgrade Checklist (Continued)

Information for Upgrade	Description or Example	Answer – Defaults are noted with an asterisk (*)
Upgrading a system with non-global zones	<p>You can use the Solaris 10 DVD or a DVD-based network installation image to upgrade a system that has non-global zones installed. If you choose to upgrade a system with non-global zones installed, you cannot customize your upgrade.</p> <p>Note – In the Solaris 10 6/06 release, you cannot upgrade a system with non-global zones installed with the Solaris Software - 1 CD or the Solaris Live Upgrade installation method.</p> <p>If your system has more than one root (/) partition or disk, the installation program prompts you to select a root partition to upgrade.</p> <p style="text-align: right;">Root (/) to upgrade:</p>	Yes/No
Default or Custom Install	<p>Do you want to perform a default installation, or customize the installation?</p> <ul style="list-style-type: none"> ■ Select Default installation to format the entire hard disk and install a preselected set of software. ■ Select Custom installation to modify the hard disk layout and select the software that you want to install. <p>Note – The text installer does not prompt you to select a Default or Custom Installation. To perform a default installation, accept the default values that are provided in the text installer. To perform a custom installation, edit the values in the text installer screens.</p>	Default installation*/Custom installation
Locales	For which geographic regions do you want to install support?	
SPARC: Power Management (only available on SPARC systems that support Power Management)	<p>Do you want to use Power Management?</p> <p>Note – If your system has Energy Star version 3 or later, you are not prompted for this information.</p>	Yes/No
Automatic reboot or CD/DVD ejection	<p>Reboot automatically after software installation?</p> <p>Eject CD/DVD automatically after software installation?</p>	<p>Yes*/No</p> <p>Yes*/No</p>

TABLE 5-2 Upgrade Checklist (Continued)

Information for Upgrade	Description or Example	Answer – Defaults are noted with an asterisk (*)
Disk space reallocation	<p>Do you want the installation program to automatically re-layout the systems on your disks?</p> <p>If yes, which file system should be used for auto-layout?</p> <p>Example: /, /opt, /var</p> <p>If no, you must provide information for the system configuration.</p>	Yes/No*
If you are installing through a <code>tip</code> line, follow these instructions.	<p>Ensure that your window display is at least 80 columns wide and 24 rows long. For more information, see <code>tip(1)</code>.</p> <p>To determine the current dimensions of your <code>tip</code> window, use the <code>stty</code> command. For more information, see the man page, <code>stty(1)</code>.</p>	
Check your Ethernet connection.	If the system is part of a network, verify that an Ethernet connector or similar network adapter is connected to your system.	
Solaris Live Upgrade use	<ul style="list-style-type: none"> ■ Determine your resource requirements for creating a new boot environment and upgrading it. For detailed information, refer to Chapter 7, “Solaris Live Upgrade (Planning),” in <i>Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning</i>. ■ Determine the requirements if you are using RAID-1 volumes. For detailed information, refer to “Guidelines for Selecting Slices for File Systems” in <i>Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning</i>. 	
Check the system for the existence of Prestoserve software.	If you begin the upgrade process by shutting down the system with the <code>init 0</code> command and you’re using Prestoserve software, you might lose data. Refer to the Prestoserve documentation for shutdown instructions.	
Check for patches needed.	The most recent patch list is provided at http://sunsolve.sun.com .	

TABLE 5-2 Upgrade Checklist (Continued)

Information for Upgrade	Description or Example	Answer – Defaults are noted with an asterisk (*)
Review the planning chapter and other relevant documentation.	<ul style="list-style-type: none"> ■ Review the entire planning chapter or specific sections in Chapter 3. ■ Review the <i>Solaris 10 6/06 Release Notes</i> on http://docs.sun.com and vendor release notes to ensure that the software you use is supported in the new Solaris release. ■ Review the <i>Solaris 10 6/06 Sun Hardware Platform Guide</i> to ensure that your hardware is supported. ■ Review the documentation that accompanied your system to ensure that your system and devices are supported by the Solaris release. 	

Preconfiguring System Configuration Information (Tasks)

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

- “Advantages of Preconfiguring System Configuration Information” on page 77
- “Ways to Preconfigure System Configuration Information” on page 78
- “Preconfiguring With the `sysidcfg` File” on page 79
- “Preconfiguring With the Name Service” on page 95
- “Preconfiguring System Configuration Information With the DHCP Service (Tasks)” on page 98
- “SPARC: Preconfiguring Power Management Information” on page 109

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 name service. Before the installation tools prompt you for configuration information, they check for the information in the `sysidcfg` file and then in the name service databases.

When the Solaris installation program or the custom JumpStart installation program detects preconfigured system information, the installation program does not prompt you to enter the information. For example, you have several systems and you do not want a time zone prompt every time you install the Solaris 10 6/06 software on one of the systems. You can specify the time zone in the `sysidcfg` file or the name service databases. When you install the Solaris 10 6/06 software, the installation program does not prompt you to type a time zone.

Ways to Preconfigure System Configuration Information

You can choose one of the following ways to preconfigure system configuration information. You can add the system configuration information to either of the following.

- A `sysidcfg` file on a remote system or diskette
- The name 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 98.

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

TABLE 6-1 Methods to Preconfigure System Configuration Information

Preconfigurable System Information	Preconfigurable With the <code>sysidcfg</code> File?	Preconfigurable With the Name Service?
Name 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 name service rather than create a different <code>sysidcfg</code> file for each system.	
Internet Protocol (IP) address	Yes	Yes
	Because this information is system specific, edit the name service rather than create a different <code>sysidcfg</code> 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

TABLE 6-1 Methods to Preconfigure System Configuration Information *(Continued)*

Preconfigurable System Information	Preconfigurable With the <code>sysidcfg</code> File?	Preconfigurable With the Name Service?
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 Solaris installation program, but not through the <code>sysidcfg</code> file or the name service.	
x86: Monitor type	Yes	No
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 (autoshtutdown)	No	No
You cannot preconfigure Power Management through the <code>sysidcfg</code> file or the name service. “ SPARC: Preconfiguring Power Management Information ” on page 109 contains details.		

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 81.

You must create a unique `sysidcfg` file for every system that requires different configuration information. 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 following.

- 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 Solaris 10 6/06 software.

- UFS or PCFS diskette – Place the `sysidcfg` file in the root (`/`) directory on the 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.

Note – If you are performing a custom JumpStart installation and you want to use a `sysidcfg` file on a diskette, you must place the `sysidcfg` file on the profile diskette. To create a profile diskette, see “Creating a Profile Diskette for Standalone Systems” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced 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.

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.	<code>pointer=MS-S</code> <code>display=ati {size=15-inch}</code>
Keywords are not case sensitive.	<code>TIMEZONE=US/Central</code> <code>terminal=sun-cmd</code>
Enclose all dependent keywords in curly braces (<code>{}</code>) to tie them to their associated independent keyword.	<code>name_service=NIS</code> <code>{domain_name=marquee.central.example.com</code> <code>name_server=connor(192.168.112.3)}</code>
You can optionally enclosed values in single (<code>'</code>) or double quotes (<code>"</code>).	<code>network_interface='none'</code>
For all keywords except the <code>network_interface</code> 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.	<code>name_service=NIS</code> <code>name_service=DNS</code>

sysidcfg File Keywords

Table 6–2 lists the keywords you can use to configure system information in the `sysidcfg` file.

TABLE 6–2 Keywords You Can Use in `sysidcfg`

Configuration Information	Keyword
Name service, domain name, name server	“ <code>name_service</code> Keyword” on page 81
Network interface, host name, Internet Protocol (IP) address, netmask, DHCP, IPv6	“ <code>network_interface</code> Keyword” on page 84
Root password	“ <code>root_password</code> Keyword” on page 89
Security policy	“ <code>security_policy</code> Keyword” on page 89
Language in which to display the install program and desktop	“ <code>system_locale</code> Keyword” on page 90
Terminal type	“ <code>terminal</code> Keyword” on page 90
Time zone	“ <code>timezone</code> Keyword” on page 90
Date and time	“ <code>timeserver</code> Keyword” on page 90
x86: Monitor type	“ <code>x86: monitor</code> Keyword” on page 91
x86: Keyboard language, keyboard layout	“ <code>x86: keyboard</code> Keyword” on page 91
x86: Graphics card, screen size, color depth, display resolution	“ <code>x86: display</code> Keyword” on page 91
x86: Pointing device, number of buttons, IRQ level	“ <code>x86: pointer</code> Keyword” on page 92

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

`name_service` Keyword

You can use the `name_service` keyword to configure the name 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 {}.

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

NIS Syntax for `name_service` Keyword

Use the following syntax to configure the system to use the NIS name service.

```
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 6-1 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)*.

NIS+ Syntax for `name_service` Keyword

Use the following syntax to configure the system to use the NIS name service.

```
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 6-2 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 (NIS+)*.

DNS Syntax for `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.

`search=domain-name` (Optional) Specifies additional domains to search for name service information. You can specify up to six domain names to search. The total length of each search entry cannot exceed 250 characters.

EXAMPLE 6-3 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 name 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 `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 quotes.

`password` (Optional) Specifies the client proxy password.

EXAMPLE 6-4 Specifying an LDAP Server With the `name_service` Keyword

The following 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`.

```
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 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 in the following ways.

- 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 98.

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 or value
                    {dhcp protocol_ipv6=yes-or-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 <code>ifconfig</code> 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.
<i>value</i>	Instructs the installation program to configure a specific interface, such as <code>hme0</code> or <code>eri1</code> .
<code>protocol_ipv6=<i>yes-or-no</i></code>	Instructs the installation program to configure the system to either use 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 or value
                    {hostname=host_name
                    default_route=ip_address
                    ip_address=ip_address
                    netmask=netmask
                    protocol_ipv6=yes_or_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 <code>ifconfig</code> 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.

<i>value</i>	Instructs the installation program to configure a specific interface, such as <code>hme0</code> or <code>eri1</code> .
<code>hostname=host_name</code>	(Optional) Specifies the host name of the system.
<code>default_route=ip_address</code> or <code>NONE</code>	(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.

<code>ip_address=ip_address</code>	(Optional) Specifies the IP address of the system.
<code>netmask=netmask</code>	(Optional) Specifies the netmask value for the system.
<code>protocol_ipv6=yes_or_no</code>	(Optional) Instructs the installation program to configure the system to either use IPv6 or to not use IPv6.

Note – To perform an unattended custom 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 6-5 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 6-6 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`.

EXAMPLE 6-6 Configuring a Single Interface By Specifying Configuration Information With the `network_interface` Keyword (Continued)

- 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 in the following ways.

- **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 98.

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-or-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-or-no Instructs the installation program to configure the system to
                          either use IPv6 or to 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_or_no}

value                    Instructs the installation program to configure a
                          specific interface, such as hme0 or eri1.
```

<code>primary</code>	(Optional) Specifies <i>value</i> as the primary interface.
<code>hostname=host_name</code>	(Optional) Specifies the host name of the system.
<code>default_route=ip_address</code> or <code>NONE</code>	(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.

<code>ip_address=ip_address</code>	(Optional) Specifies the IP address of the system.
<code>netmask=netmask</code>	(Optional) Specifies the netmask value for the system.
<code>protocol_ipv6=yes_or_no</code>	(Optional) Instructs the installation program to configure the system to either use IPv6 or to not use IPv6.

Note – To perform an unattended custom 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 6-7 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 6-7 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}
```

root_password Keyword

You can specify the root password to the system in the `sysidcfg` file. To specify the root password, use 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. If you want to configure the system to use Kerberos, 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 6-8 Configuring the System to Use Kerberos With the `security_policy` Keyword

The following 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`.

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

`system_locale` Keyword

You can use the `system_locale` keyword to specify the language in which to display the install program and desktop. Use the following syntax to specify a locale.

```
system_locale=locale
```

locale specifies the language that you want the system to use to display the installation panels and screens. 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. Use the following syntax to specify the terminal type.

```
terminal=terminal_type
```

terminal_type specifies the terminal type for the system. 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. Use the following syntax.

```
timezone=timezone
```

In the previous example, *timezone* specifies the time zone value for the system. 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 6-9 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.

Note – Do not set `timeserver=hostname` or `ip-address` if you are running a name service.

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. Use the following syntax.

```
timeserver=hostname or ip-address
```

hostname is the host name of the time server system. *ip-address* specifies the IP address of the time server.

x86: monitor Keyword

For x86 based systems, you can configure the monitor information with the `monitor` keyword. Use the following syntax with the `monitor` keyword.

```
monitor=monitor_type
```

To set the value for the `monitor` keyword, run the `kdmconfig -d` command on the system you want to install. Copy the line of output that includes the `monitor` keyword, and include this line in the `sysidcfg` file.

For more information, see the `kdmconfig(1M)`

x86: keyboard Keyword

For x86 based systems, you can configure the keyboard language and layout information with the `keyboard` keyword. Use the following syntax with the `keyboard` keyword.

```
keyboard=keyboard_language {layout=value}
```

To set the value for the `keyboard` keyword, run the `kdmconfig -d` command on the system you want to install. Copy the line of output that includes the `keyboard` keyword, and include this line in the `sysidcfg` file.

For more information, see the `kdmconfig(1M)`

x86: display Keyword

For x86 based systems, you can configure the following information with the `display` keyword.

- Graphics card
- Screen size
- Color depth
- Display resolution

Use the following syntax with the `display` keyword.

```
display=graphics_card {size=screen_size
                        depth=color_depth
                        resolution=screen_resolution}
```

To set the appropriate values for the `display` keyword, run the `kdmconfig -d` command on the system you want to install. Copy the line of output that includes the `display` keyword, and include this line in the `sysidcfg` file.

For more information, see the `kdmconfig(1M)`

x86: pointer Keyword

For x86 based systems, you can configure the following mouse information with the `pointer` keyword.

- Pointing device
- Number of buttons
- IRQ level

Use the following syntax with the `pointer` keyword.

```
pointer=pointing_device {nbuttons=number_buttons irq=value}
```

To set the value for the `pointer` keyword, run the `kdmconfig -d` command on the system you want to install. Copy the line of output that includes the `pointer` keyword, and include this line in the `sysidcfg` file.

For more information, see the `kdmconfig(1M)`

▼ **To Create a `sysidcfg` Configuration File**

- 1 Create a file called `sysidcfg` in a text editor.**
- 2 Type the `sysidcfg` keywords you want.**
- 3 Save the `sysidcfg` file.**

Note – If you create more than one `sysidcfg` file, you must save each file in a separate directory or on a separate diskette.

- 4 Make the `sysidcfg` file available to clients through the following:**
 - A shared NFS file system. Use `add_install_client(1M)` with the `-p` option to set up the system to install from the network.

- The root (/) directory on a UFS diskette or PCFS diskette.

Example 6-10 SPARC: `sysidcfg` File

The following is an example of a `sysidcfg` file for a SPARC based system. The host name, IP address, and netmask of this system has been preconfigured by editing the name service. Because all of the system configuration information is preconfigured in this file, you can use a custom JumpStart profile to perform a custom JumpStart installation.

```
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)}
root_password=m4QP0WNY
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=krbadm.in.example.COM
                          kdc=kdc1.example.COM,
                          kdc2.example.COM}
```

Example 6-11 x86: `sysidcfg` File

The following sample `sysidcfg` file is for a group of x86 based systems that all use the same type of keyboard, graphics cards, and pointing devices. The device information (keyboard, display, and pointer) was obtained by running the `kdmconfig(1M)` command with the `-d` option. If the following example `sysidcfg` file is used, a prompt that asks you to select a language (`system_locale`) is displayed before installation can proceed.

```
keyboard=ATKBD {layout=US-English}
display=ati {size=15-inch}
pointer=MS-S
timezone=US/Central
timeserver=timehost1
terminal=ibm-pc
name_service=NIS {domain_name=marquee.central.example.com
                  name_server=nmsvr2(172.25.112.3)}
root_password=URFUni9
```

Example 6–12 `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.

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

More Information**Continuing the Installation**

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 7](#).

If you plan to use the `sysidcfg` file in a WAN boot installation, you need to perform additional tasks. For more information, see [Chapter 11](#).

If you plan to use the `sysidcfg` file in a custom JumpStart installation, you need to create a profile and a `rules.ok` file. For more information, see Chapter 5, “Custom JumpStart (Overview),” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

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

Preconfiguring With the Name Service

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

System Information to Preconfigure	Name Service Database
Host name and Internet Protocol (IP) address	hosts
Date and time	hosts. Specify the <code>timehost</code> 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 procedure for your name service to preconfigure the locale for a system:

- [“To Preconfigure the Locale Using NIS” on page 95](#)
- [“To Preconfigure the Locale Using NIS+” on page 97](#)

▼ To Preconfigure the Locale Using NIS

- 1 **Become superuser on the name server.**
- 2 **Change `/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.**

3 Create the file `/etc/locale` and make one entry for each domain or specific system:

locale domain_name

Or

locale system_name

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

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

```
fr example.com
```


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

```
fr_BE myhost
```

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

4 Make the 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.

More Information

Continuing the Installation

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 7](#).

If you plan to use the NIS name service in a custom JumpStart installation, you need to create a profile and a `rules.ok` file. For more information, see Chapter 5, “Custom JumpStart (Overview),” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced 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)*.

▼ 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)*.

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

2 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'
```

3 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.

<i>locale</i>	The locale you want to install on the system and use on the desktop after the system is rebooted. <i>International Language Environments Guide</i> contains a list of valid locales.
<i>comment</i>	The comment field. Use double quotation marks to begin and end comments that are longer than one word.

Note – Locales are available on the Solaris DVD or 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.

More Information

Continuing the Installation

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 7](#).

If you plan to use the NIS+ name service in a custom JumpStart installation, you need to create a profile and a `rules.ok` file. For more information, see Chapter 5, “Custom JumpStart (Overview),” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced 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 Solaris OS on certain client systems on your network. All SPARC based systems that are supported by the Solaris OS and x86 based systems that meet the hardware requirements for running the 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 6-3 Task Map: Preconfiguring System Configuration Information With the DHCP Service

Task	Description	Instructions
Set up an install server.	Set up a Solaris server to support clients that must install the Solaris OS from the network.	Chapter 7
Set up client systems for Solaris installation over the network by using DHCP.	Use <code>add_install_client -d</code> to add DHCP network installation support for a class of client (of a certain machine type, for example) or a particular client ID.	Using Solaris DVD: “Adding Systems to Be Installed From the Network With a DVD Image” on page 131 Using Solaris CD: “Adding Systems to Be Installed From the Network With a CD Image” on page 167 <code>add_install_client(1M)</code>
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 <i>System Administration Guide: IP Services</i>
Configure the DHCP server.	Use DHCP Manager to configure your DHCP server	Chapter 14, “Configuring the DHCP Service (Tasks),” in <i>System Administration Guide: IP Services</i>
Create DHCP options for installation parameters and macros that include the options.	Use DHCP Manager or <code>dhtadm</code> 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 Solaris Installation Parameters” on page 99

Creating DHCP Options and Macros for 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 on 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 131](#).
- For network installations that use CD media, see [“Adding Systems to Be Installed From the Network With a CD Image” on page 167](#).

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 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 6–4](#) to configure and install x86 based systems. These options are not platform specific, and can be used to install the Solaris OS on a variety of x86 based systems. Use these options to install the Solaris 10 release on x86 based systems by using DHCP. For a complete list of standard options, see `dhcp_inittab(4)`.
- [Table 6–5](#) lists options that you can use to install Sun 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 *System Administration Guide: 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 *System Administration Guide: IP Services*](#).

TABLE 6–4 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

TABLE 6-4 Values for Standard DHCP Options (Continued)

Option Name	Code	Data Type	Granularity	Maximum	Description
BootSrvA	N/A	IP address	1	1	IP address of boot server
DNSdomain	15	ASCII	1	0	DNS domain name
DNSserv	6	IP address	1	0	List of DNS name servers
NISdomain	40	ASCII	1	0	NIS domain name
NISservs	41	IP address	1	0	IP address of NIS server
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

TABLE 6-5 Values for Creating Vendor Category Options for Solaris Clients

Name	Code	Data Type	Granularity	Maximum	Vendor Client Classes*	Description
<i>The following Vendor category options are required to enable a DHCP server to support Solaris installation clients. The options are used in the Solaris client's startup scripts.</i>						
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.						
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

TABLE 6-5 Values for Creating Vendor Category Options for Solaris Clients (Continued)

Name	Code	Data Type	Granularity	Maximum	Vendor Client Classes *	Description
<i>The following options can be used by the client startup scripts, but are not required by the scripts.</i>						
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.						
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 <i>server:/path</i>
SjumpsCF	14	ASCII text	1	0	SUNW.Sun-Blade-1000, SUNW.Sun-Fire-880, SUNW.i86pc	Path to JumpStart configuration file in the format <i>server:/path</i>
SbootURI	16	ASCII text	1	0	SUNW.Sun-Blade-1000, SUNW.Sun-Fire-880, SUNW.i86pc	Path to the standalone boot file or path to the WAN boot file. For the standalone 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 standalone boot file. Supported protocols: tftp (inetboot), http (wanboot). For example, use the following format. tftp://inetboot.sun4u

TABLE 6-5 Values for Creating Vendor Category Options for Solaris Clients *(Continued)*

Name	Code	Data Type	Granularity	Maximum	Vendor Client Classes*	Description
SHTTProxy	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
<i>The following options are not currently used by the Solaris client startup scripts. You can use them only if you edit the startup scripts.</i>						
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.						
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 Solaris installation for clients.

TABLE 6-6 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

TABLE 6-6 Sample Macros to Support Network Installation Clients (Continued)

Macro Name	Contains These Options and Macros
SUNW.i86pc	i86pc macro Note – The SUNW.i86pc vendor client class is only valid for the Solaris 10 3/05 release and compatible versions.
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.
01client-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 *System Administration Guide: 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 104 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 107 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. This is a limitation of the current Solaris DHCP protocol implementation. Generally, you should pass the minimum amount of vendor information needed. You should 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 6-5](#) and the macros that are listed in [Table 6-6](#).

▼ How to Create Options to Support 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 7](#).
- Configure your DHCP server. If you have not configured your DHCP server, see Chapter 13, “Planning for DHCP Service (Tasks),” in *System Administration Guide: IP Services*.

1 Become superuser on the DHCP server system.

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 dialog box opens.

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, [Table 6-4](#), and [Table 6-5](#) to check the option names and values for options you must create. Notice that the vendor client classes are only suggested values. You should create classes to indicate the actual client types that need to obtain Solaris installation parameters from the DHCP service. See “Working With DHCP Options (Task Map)” in *System Administration Guide: IP Services* for information about how to determine a client’s vendor client class.

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 dialog box opens.

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 6-4](#) and [Table 6-5](#) for the values.

10 Repeat [Step 7](#) through [Step 9](#) until you have created all the options.

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

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

▼ How to Create Macros to Support 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 7](#).
- Configure your DHCP server. If you have not configured your DHCP server, see Chapter 13, “Planning for DHCP Service (Tasks),” in *System Administration Guide: 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 Solaris Installation (DHCP Manager)” on page 104.

1 Select the Macros tab in DHCP Manager.

2 Choose Create from the Edit menu.

The Create Macro dialog box opens.

3 Type the name of a macro.

See [Table 6–6](#) for macro names you might use.

4 Click the Select button.

The Select Option dialog box opens.

5 Select Vendor in the Category list.

The Vendor options you created are listed.

6 Select an option you want to add to the macro and click OK.

7 Type a value for the option.

See [Table 6–4](#) and [Table 6–5](#) 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.

More Information **Continuing the Installation**

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 7](#).

If you plan to use DHCP in a WAN boot installation, you need to perform additional tasks. For more information, see [Chapter 11](#).

If you plan to use DHCP in a custom JumpStart installation, you need to create a profile and a `rules.ok` file. For more information, see Chapter 5, “Custom JumpStart (Overview),” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

See Also For more information about DHCP, see Part III, “DHCP,” in *System Administration Guide: 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 6–13](#) to create all the options listed in [Table 6–4](#) and [Table 6–5](#) 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 6–13 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 \
'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 \
```

EXAMPLE 6-13 Sample Script to Support Network Installation (Continued)

```
'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.
```

EXAMPLE 6-13 Sample Script to Support Network Installation (Continued)

```

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.
# 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 `netinstaloptions`, type the following command.

```
# dhtadm -B netinstaloptions
```

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 `dhtadm(1M)`. For more information about the `dhcptab` file, see `dhcptab(4)`.

SPARC: Preconfiguring Power Management Information

You can use the *Power Management* software that is provided in the 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 Solaris 10 6/06 OS 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 Solaris installation program GUI, the installation program prompts you to enable or disable the Power Management software. The 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 custom JumpStart installation, you can

preconfigure the Power Management information by using a finish script to create an `/autoshtutdown` or `/noautoshtutdown` file on the system. When the system reboots, the `/autoshtutdown` file enables Power Management and the `/noautoshtutdown` 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/autoshtutdown
```

Finish scripts are described in “Creating Finish Scripts” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

P A R T I I

Installing Over a Local Area Network

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

Preparing to Install From the Network (Overview)

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

- “[Planning for a Network Installation Introduction](#)” on page 113
- “[x86: Overview of Booting and Installing Over the Network With PXE](#)” on page 115

For information on how to install a client over a wide area network, see [Chapter 11](#).

Planning for a Network Installation Introduction

This section provides you with information you need before you can perform an installation from the network. Network installations enable you to install the Solaris software from a system, called an install server, that has access to the Solaris 10 6/06 disc images. You copy the contents of the Solaris 10 6/06 DVD or CD media to the install server’s hard disk. Then, you can install the Solaris software from the network by using any of the Solaris installation methods.

Required Servers for Network Installation

To install the 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 Solaris 10 6/06 disc images from which you can install Solaris 10 6/06 software on other systems on the network. You create an install server by copying the images from the following media:
 - Solaris DVD
 - Solaris Software CDs

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

You can enable a single install server to provide disc images for different 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.

- [“SPARC: To Create a SPARC Install Server With SPARC or x86 DVD Media” on page 119](#)
- [“x86: To Create an x86 Install Server With SPARC or x86 DVD Media” on page 124](#)
- [“SPARC: To Create a SPARC Install Server With SPARC or x86 CD Media” on page 147](#)
- [“Creating a Cross-Platform Install Server for CD Media” on page 160](#)
- **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 Solaris 10 6/06 software is to be installed is located in 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 Solaris 10 6/06 boot software for multiple releases, including the Solaris 10 6/06 boot software for different platforms. For example, a SPARC boot server can provide the Solaris 9 and Solaris 10 6/06 boot software for SPARC based systems. The same SPARC boot server can also provide the Solaris 10 6/06 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 98](#).

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 129](#)
- [“Creating a Boot Server on a Subnet With a CD Image” on page 165](#)
- **(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` command and the `-d` option. The `-d` option enables you to set up client systems for Solaris installation from the network by using DHCP.

For information on DHCP options for installation parameters, see [“Preconfiguring System Configuration Information With the DHCP Service \(Tasks\)” on page 98](#).

- **(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.

Figure 7-1 illustrates the servers that are typically used for network installation. Note that this sample network does not include a DHCP server.

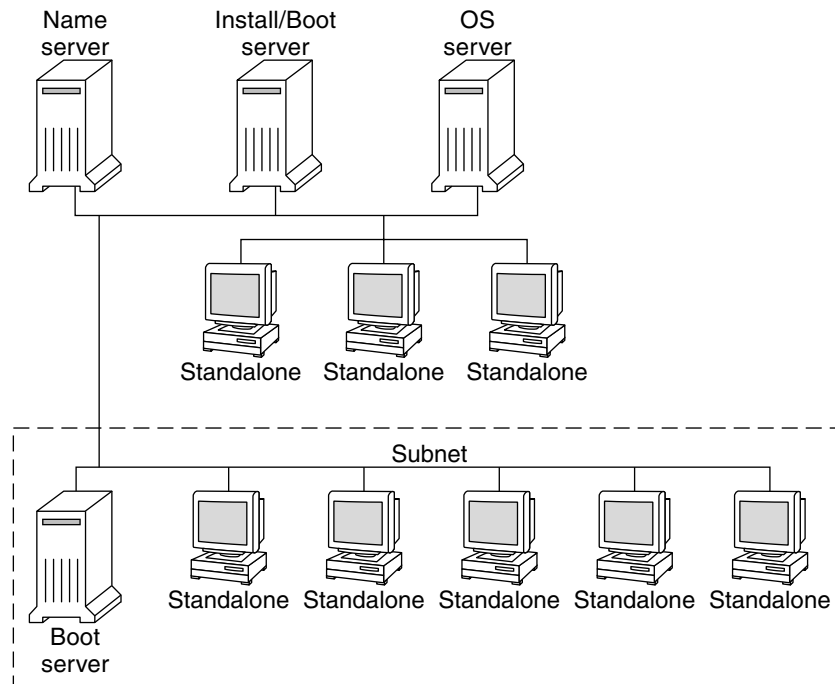


FIGURE 7-1 Network Installation Servers

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

This section provides an overview of the Preboot Execution Environment (PXE).

x86: What is PXE?

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.

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

x86: Guidelines for Booting With PXE

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 `e1x1(7D)` and `iprb(7D)` man pages for more information.

Preparing to Install 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 Solaris software from the network. Network installations enable you to install the Solaris software from a system that has access to the Solaris 10 6/06 disc images, called an install server, to other systems on the network. You copy the contents of the Solaris 10 6/06 DVD media to the install server’s hard disk. Then, you can install the Solaris software from the network by using any of the Solaris installation methods.

This chapter covers the following topics:

- “Task Map: Preparing to Install From the Network With DVD Media” on page 117
- “Creating an Install Server With DVD Media” on page 119
- “Creating a Boot Server on a Subnet With a DVD Image” on page 129
- “Adding Systems to Be Installed From the Network With a DVD Image” on page 131
- “Booting and Installing the System From the Network With a DVD Image” on page 136

Task Map: Preparing to Install From the Network With DVD Media

TABLE 8-1 Task Map: Setting Up an Install Server With DVD Media

Task	Description	For Instructions
(x86 only): Verify that your system supports PXE.	<p>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.</p> <p>If your x86 based system does not support PXE, you must boot the system from a local DVD or CD.</p>	Check your hardware manufacturer’s documentation or the system BIOS.

TABLE 8-1 Task Map: Setting Up an Install Server With DVD Media (Continued)

Task	Description	For Instructions
Choose an installation method.	The Solaris OS provides several methods for installation or upgrade. Choose the installation method that is most appropriate for your environment.	“Choosing a Solaris Installation Method” on page 29
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 5
(Optional) Preconfigure system information.	You can preconfigure system information to avoid being prompted for the information during the installation or upgrade.	Chapter 6
Create an install server.	Use the <code>setup_install_server(1M)</code> command to copy the Solaris DVD to the install server’s hard disk.	“Creating an Install Server With DVD Media” on page 119
(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 <code>setup_install_server</code> command with the <code>-b</code> option to set up a boot server. If you are using Dynamic Host Configuration Protocol (DHCP), a boot server is not necessary.	“Creating a Boot Server on a Subnet With a DVD Image” on page 129
Add systems to be installed from the network.	Use the <code>add_install_client</code> 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 131
(Optional) Configure the DHCP server.	If you want to use DHCP to provide system configuration and installation parameters, 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 <i>System Administration Guide: IP Services</i> “Preconfiguring System Configuration Information With the DHCP Service (Tasks)” on page 98
Install the system over the network.	Begin the installation by booting the system from the network.	“Booting and Installing the System From the Network With a DVD Image” on page 136

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 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.

Note – If you want use the Solaris DVD media to set up an install server on a system that is running the Solaris 7 OS, you must first apply one of the following patches.

- Solaris 7 *SPARC Platform Edition* operating environment - Patch ID 107259-03
 - Solaris 7 *Intel Platform Edition* operating environment - Patch ID 107260-03
-

▼ SPARC: To Create a SPARC Install Server With SPARC or x86 DVD Media

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* for detailed information about managing removable media without the Volume Manager.

1 On the SPARC system that is to become the install server, become superuser.

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

2 Insert the Solaris DVD in the SPARC system's drive.

3 Create a directory to contain the DVD image.

```
# mkdir -p install_dir_path
```

4 Change to the Tools directory on the mounted disc.

- For SPARC DVD media, type:

```
# cd /cdrom/cdrom0/s0/Solaris_10/Tools
```

- For x86 DVD media, type:

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

In the previous examples, **cdrom0** is the path to the drive that contains the Solaris OS DVD media.

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

```
# ./setup_install_server install_dir_path
```

install_dir_path Specifies the directory where the DVD image is to be copied

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

6 Decide if you need to make the install server available for mounting.

- If the install server is on the same subnet as the system to be installed or you are using DHCP, you do not need to create a boot server. Proceed to [Step 7](#).
- If the install server is not on the same subnet as the system to be installed and you are not using DHCP, complete the following steps.

a. Verify that the path to the install server's image is shared appropriately.

```
# share | grep install_dir_path
```

install_dir_path Specifies the path to the installation image where the DVD image was copied

- 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, continue.

b. Make the install server available to the boot server by adding this entry to the `/etc/dfs/dfstab` file.

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

c. Verify that the `nfsd` daemon is running.

- If the install server is running the Solaris 10 6/06 OS, or compatible version, type the following command.

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


If the `nfsd` daemon is online, continue to [Step d](#). 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 to [Step d](#). If the `nfsd` daemon is not running, start it.

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

d. Share the install server.

```
# shareall
```

7 Change directories to root (/).

```
# cd /
```

8 Eject the 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 SPARC based installation images, use the `patchadd -c` command to patch the files that are located in the miniroot.

```
# patchadd -C install_dir_path path-to-patch/patch-id
```

install_dir_path Specifies the path to the network installation miniroot.

path-to-patch 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.



Caution – Don't use the `patchadd -C` command unless you have read the Patch README instructions or have contacted your local Sun support office.

- For x86 based installation images, follow these steps to patch an x86 network installation miniroot.

Note – These steps assume that you have a system on your network that is running the Solaris 10 6/06 for x86 release, and that system is accessible over the network.

- a. On a system that is running the Solaris 10 6/06 for x86 release, log in as superuser.
- b. Change to the `Tools` directory of the installation image you created in [Step 5](#).

```
# 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`.

- c. Create a new installation image, and place that image on the system that is running the Solaris 10 6/06 for x86 release.

```
# ./setup_install_server remote_install_dir_path
```

remote_install_dir_path Specifies the path on the Solaris 10 6/06 for x86 system in which to create the new installation image.

This command creates a new installation image on the Solaris 10 6/06 for x86 system. In order to patch this image, you must temporarily place this image on a system that is running the Solaris 10 6/06 for x86 release.

- d. On the Solaris 10 6/06 for x86 system, unpack the network installation boot archive.

```
# /boot/solaris/bin/root_archive unpackmedia remote_install_dir_path \  
destination_dir
```

remote_install_dir_path Specifies the path to the x86 network installation image on the Solaris 10 6/06 for x86 system.

destination_dir Specifies the path to the directory to contain the unpacked boot archive.

- e. On the Solaris 10 6/06 for x86 system, patch the unpacked boot archive.

```
# patchadd -C destination_dir path-to-patch/patch-id
```

path-to-patch 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 `patchadd(1M)`.



Caution – Don't use the `patchadd -C` command unless you have read the Patch README instructions or have contacted your local Sun support office.

- f. On the Solaris 10 6/06 for x86 system, pack the x86 boot archive.

```
# /boot/solaris/bin/root_archive packmedia destination_dir \  
remote_install_dir_path
```

g. Copy the patched miniroot to the installation image on the install server.

```
# cp remote_install_dir_path/boot/x86.miniroot \
install-server-path/install_dir_path/boot/x86.miniroot
```

10 Decide if you need to create a boot server.

- 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 131.](#)
- 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 129.](#)

Example 8-1 SPARC: Creating a SPARC Install Server With a SPARC DVD

The following example illustrates how to create an install server by copying the Solaris DVD to the install server's `/export/home/dvdsparc` directory. This example assumes that the install server is running the Solaris 10 6/06 OS.

```
# mkdir -p /export/home/dvdsparc
# cd /cdrom/cdrom0/s0/Solaris_10/Tools
# ./setup_install_server /export/home/dvdsparc
```

If you need a separate boot server, type these commands:

Add the following path to the `/etc/dfs/dfstab` file:

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

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 /
```

Example 8-2 x86: Creating a SPARC Install Server With an x86 DVD

The following example illustrates how to create an install server by copying the Solaris DVD to the install server's `/export/home/dvdx86` directory. This example assumes that the install server is running the Solaris 10 6/06 OS.

```
# mkdir -p /export/home/dvdx86
# cd /cdrom/cdrom0/Solaris_10/Tools
# ./setup_install_server /export/home/dvdx86
```

Add the following path to the `/etc/dfs/dfstab` file:

```
share -F nfs -o ro,anon=0 -d "install server directory" /export/home/dvdx86
```

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 /
```

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 [“To Add Systems to Be Installed From the Network With `add_install_client` \(DVD\)”](#) on page 132.

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 DVD Image”](#) on page 129.

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

▼ x86: To Create an x86 Install Server With SPARC or x86 DVD Media

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* for detailed information about managing removable media without the Volume Manager.

1 On the x86 system that is to become the install server, become superuser.

The system must include a DVD-ROM drive and be part of the site’s network and name service. If you use a name service, the system must also be in the NIS, NIS+, DNS, or LDAP name service. If you do not use a name service, you must distribute information about this system by following your site’s policies.

2 Insert the Solaris DVD into the system’s drive.

3 Create a directory to contain the boot image.

```
# mkdir -p install_dir_path
```

`install_dir_path` 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
```

In the previous example, `cdrom0` is the path to the drive that contains the Solaris OS DVD media.

5 Copy the disc in the drive to the install server's hard disk by using the `setup_install_server` command:

```
# ./setup_install_server install_dir_path
```

`install_dir_path` Specifies the directory where the DVD image is to be copied

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

6 Decide if you need to make the install server available for mounting.

- If the install server is on the same subnet as the system to be installed or you are using DHCP, you do not need to create a boot server. Proceed to [Step 7](#).
- If the install server is not on the same subnet as the system to be installed and you are not using DHCP, complete the following steps.

a. Verify that the path to the install server's image is shared appropriately.

```
# share | grep install_dir_path
```

`install_dir_path` Specifies the installation image where the DVD image was copied

- 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, continue.

b. Make the install server available to the boot server by adding this entry to the `/etc/dfs/dfstab` file.

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

c. Verify that the `nfsd` daemon is running.

- If the install server is running the Solaris 10 6/06 OS, or compatible version, type the following command.

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

If the `nfsd` daemon is online, continue to [Step d](#). 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 to [Step d](#). If the `nfsd` daemon is not running, start it.

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

d. Share the install server.

```
# shareall
```

7 Change directories to root (/).

```
# cd /
```

8 Eject the 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`.

- For SPARC based installation images, use the `patchadd -C` command to patch the files that are located in the miniroot.

```
# patchadd -C install_dir_path path-to-patch/patch-id
```

install_dir_path Specifies the path to the network installation miniroot.

path-to-patch 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.



Caution – Don't use the `patchadd -C` command unless you have read the Patch README instructions or have contacted your local Sun support office.

- For x86 based installation images, follow these steps to patch an x86 network installation miniroot.

a. If the installation server is not running the Solaris 10 6/06 for x86 release, log in as superuser to another system on the network that is running the Solaris 10 6/06 for x86 release.

To patch a Solaris 10 6/06 for x86 miniroot, your system must be running the Solaris 10 6/06 for x86 release.

If your installation server is running the Solaris 10 6/06 for x86 release, go to [Step d](#).

b. Change to the `Tools` directory of the installation image you created in [Step 5](#).

```
# 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`.

c. Create a new installation image, and place that image on the system that is running the Solaris 10 6/06 for x86 release.

```
# ./setup_install_server remote_install_dir_path
```

remote_install_dir_path Specifies the path on the Solaris 10 6/06 for x86 system in which to create the new installation image.

This command creates a new installation image on the Solaris 10 6/06 for x86 system. In order to patch this image, you must temporarily place this image on a system that is running the Solaris 10 6/06 for x86 release.

d. Unpack the network installation boot archive.

```
# /boot/solaris/bin/root_archive unpackmedia install_dir_path \
  destination_dir
```

install_dir_path Specifies the path to the x86 network installation image. If you created a new installation image in [Step c](#), specify the path to the new image on the Solaris 10 6/06 for x86 system.

destination_dir Specifies the path to the directory to contain the unpacked boot archive.

e. Patch the unpacked boot archive.

```
# patchadd -C destination_dir path-to-patch/patch-id
```

path-to-patch 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 `patchadd(1M)`.



Caution – Don't use the `patchadd -C` command unless you have read the Patch README instructions or have contacted your local Sun support office.

f. Pack the x86 boot archive.

```
# /boot/solaris/bin/root_archive packmedia destination_dir \
  install_dir_path
```

g. If necessary, copy the patched miniroot to the installation image on the install server.

If you patched the miniroot on a remote Solaris 10 6/06 for x86 system, you must copy the patched miniroot to the install server.

```
# cp remote_install_dir_path/boot/x86.miniroot \
install-server-path/install_dir_path/boot/x86.miniroot
```

10 Decide if you need to create a boot server.

- **If the install server is on the same subnet as the system to be installed or you are using DHCP, you do not need to create a boot server. See [“Adding Systems to Be Installed From the Network With a DVD Image” on page 131](#).**
- **If the install server is not on the same subnet as the system to be installed and you are not using DHCP, you must create a boot server. For detailed instructions on how to create a boot server, refer to [“Creating a Boot Server on a Subnet With a DVD Image” on page 129](#).**

Example 8-3 x86: Creating an x86 Install Server With an x86 DVD

The following examples illustrate how to create an x86 install server by copying the Solaris Operating System for x86 Platforms DVD to the install server's `/export/home/dvdx86` directory. This example assumes that the install server is running the Solaris 10 6/06 OS.

Set up the installation server.

```
# mkdir -p /export/home/dvdx86
# cd /cdrom/cdrom0/Solaris_10/Tools
# ./setup_install_server /export/home/dvdx86
```

Add the following path to the `/etc/dfs/dfstab` file:

```
share -F nfs -o ro,anon=0 -d "install server directory" /export/home/dvdx86
```

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 /
```

Example 8-4 Creating an x86 Install Server With a SPARC DVD

The following example illustrates how to create an x86 install server by copying the Solaris Operating System for SPARC Platforms DVD to the install server's `/export/home/dvdsparc` directory. This example assumes that the install server is running the Solaris 10 6/06 OS.

```
# mkdir -p /export/home/dvdsparc
# cd /cdrom/cdrom0/Solaris_10/Tools
```



```
# ./setup_install_server /export/home/dvdsparc
```

Add the following path to the `/etc/dfs/dfstab` file:

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

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 /
```

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 [“To Add Systems to Be Installed From the Network With `add_install_client` \(DVD\)”](#) on page 132.

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 165.

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 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 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 131.
- 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.

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

1 On the system you intend to make the boot server for the subnet, log in and become superuser.

The system must have access to a remote Solaris 10 6/06 disc image, which is normally the install server. If you use a name service, the system should also be in a name service. If you do not use a name service, you must distribute information about this system by following your site's policies.

2 Mount the Solaris DVD from the install server.

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

server_name:path

Is 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 Solaris DVD 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

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

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 -k` 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 131.

Example 8–5 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 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
```

More Information**Continuing the Installation**

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 131](#).

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

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

- 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 name service to preconfigure system information
- The profile in the JumpStart directory on the profile server if you are using the custom JumpStart installation method

Use the following `add_install_client` procedure for setting up install servers and clients. Also, see the example procedures for the following:

- If you are using DHCP to set installation parameters for a SPARC client, see [Example 8–6](#).
- If your install server and client are on the same subnet, see [Example 8–7](#).
- If your install server and your client are not on the same subnet and you are not using DHCP, see [Example 8–8](#).

- If you are using DHCP to set installation parameters for x86 clients, see [Example 8–9](#).
- If you want to use a specific serial port to display output during the installation of an x86 based system, see [Example 8–10](#).

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

▼ 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 system that you want to install from the network.

Use the following `add_install_client` procedure for set up an x86 client 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.

- Install server
- Boot server if it is required
- `sysidcfg` file if you use a `sysidcfg` file to preconfigure system information
- Name server if you use a name service to preconfigure system information
- The profile in the JumpStart directory on the profile server if you are using the custom JumpStart installation method

1 On the install server or boot server, become superuser.

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

- Host name
- IP address
- Ethernet address

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

3 Change to the `Tools` directory on the Solaris DVD image:

```
# cd /install_dir_path/Solaris_10/Tools
```

install_dir_path Specifies the path to the Tools directory

4 Set up the client system so it can 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 "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 the -d only, 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 the -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 Solaris Installation Parameters” on page 99](#).

-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 Solaris DVD image.

-c *jumpstart_server:jumpstart_dir_path*

Specifies a JumpStart directory for custom 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 Solaris 10 6/06 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 Solaris 10 6/06 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 Solaris Installation Parameters”](#) on page 99.

client_name

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

platform_group

Is the platform group of the system to be installed. For more information, see [“Platform Names and Groups”](#) on page 43.

Example 8–6 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 on how to use DHCP to set installation parameters for network installations, see [“Preconfiguring System Configuration Information With the DHCP Service \(Tasks\)”](#) on page 98.

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

Example 8–7 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.

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

Example 8–8 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 a Solaris Operating System for SPARC Platforms DVD image in `/export/home/dvdsparc`.

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

Example 8–9 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 is used to specify 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 a Solaris Operating System for x86 Platforms DVD image in `/export/home/dvdx86`.

```
x86_install_server# cd /export/boot/dvdx86/Solaris_10/Tools
x86_install_server# ./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 on how to use DHCP to set installation parameters for network installations, see [“Preconfiguring System Configuration Information With the DHCP Service \(Tasks\)”](#) on page 98.

Example 8–10 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.

Use this set of commands to add the client.

```
install_server# cd /export/boot/dvdx86/Solaris_10/Tools
install_server# ./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 `eeeprom(1M)` man page.

More Information**Continuing the Installation**

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 98.

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

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

Booting and 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.

- See [“SPARC: To Boot the Client Over the Network \(DVD\)”](#) on page 136 for instructions about how to boot and install SPARC based systems over the network.
- See [“x86: To Boot the Client Over the Network With GRUB \(DVD\)”](#) on page 138 for instructions about how to boot and install x86 based systems over the network.

▼ **SPARC: To Boot 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 [“SPARC: To Create a SPARC Install Server With SPARC or x86 DVD Media”](#) on page 119.
- 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 129. 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 98.
- 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”](#) on page 61.
 - 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 79.

- Set up a name server if you use a name service to preconfigure system information. For information about how to preconfigure information with a name service, see [“Preconfiguring With the Name Service”](#) on page 95.
- Create a profile in the JumpStart directory on the profile server if you are using the custom JumpStart installation method. For information about how to set up a custom JumpStart installation, see Chapter 6, “Preparing Custom JumpStart Installations (Tasks),” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced 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 Solaris interactive installation GUI, type the following command.

```
ok boot net - install
```

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

```
ok boot net - text
```

- To install with the 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 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. See [Chapter 6](#) for more information.
- If you did not preconfigure all the system information, use the [“Checklist for Installation”](#) on page 61 to help you answer the configuration questions.

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

4 If you are prompted, answer any additional questions to complete your installation.

- If you preconfigured all of the installation options, the installation program does not prompt you to enter any installation information. See [Chapter 6](#) for more information.
- If you did not preconfigure all the installation options, use the [“Checklist for Installation”](#) on page 61 to help you answer the installation questions.

- **If you are upgrading a system that has non-global zones installed, follow these steps.**
 - a. **When you are prompted to select initial installation or upgrade, choose Upgrade. Click Next.**
 - b. **If your system has multiple root (/) partitions, select the partition that you want to upgrade on the Select Version to Upgrade panel.**

The Solaris installation program displays a message that indicates that you cannot customize your upgrade. The Solaris installation program analyzes your system to determine if the system can be upgraded. The Ready to Upgrade panel is displayed.

If your system has only one root partition, the Solaris installation program does not prompt you to select a partition to upgrade. The partition is automatically selected.
 - c. **If you want to continue the upgrade, click Install Now on the Ready to Upgrade panel.**

The Solaris installation program begins to upgrade your system.

If you do not want to continue the upgrade, click Back to perform an initial installation.

See Also For information about how to complete an interactive installation with the Solaris installation GUI, see “To Install or Upgrade With the Solaris Installation Program With GRUB” in *Solaris 10 6/06 Installation Guide: Basic Installations*.

▼ **x86: To Boot the Client Over the Network With GRUB (DVD)**

The 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 4](#).

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 “[x86: To Create an x86 Install Server With SPARC or x86 DVD Media](#)” on page 124.
- 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 129. 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 98.

- 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](#)” on page 61.
 - 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 79.
 - Set up a name server if you use a name service to preconfigure system information. For information about how to preconfigure information with a name service, see “[Preconfiguring With the Name Service](#)” on page 95.
 - Create a profile in the JumpStart directory on the profile server if you are using the custom JumpStart installation method. For information about how to set up a custom JumpStart installation, see Chapter 6, “[Preparing Custom JumpStart Installations \(Tasks\)](#),” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

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

Note – If you are upgrading a system that has non-global zones installed, you cannot customize your upgrade.

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 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 10 6/06 /sol_10_x86                               |
|                                                         |
|                                                         |
+-----+
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 Solaris OS from the network, select the appropriate 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 “[x86: To Create an x86 Install Server With SPARC or x86 DVD Media](#)” on page 124.

- **To install the Solaris OS from the network with specific boot arguments, follow these 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 “[To Add Systems to Be Installed From the Network With `add_install_client` \(DVD\)](#)” on page 132.

- a. **On the GRUB menu, select the installation option you want to edit, then press 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/sol_10_x86/boot \
module /platform/i86pc/boot_archive
```

- b. **Use the arrow keys to select the boot entry that you want to edit, then press 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 10-1](#).

- 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 Solaris installation program checks the default boot disk for the requirements to install or upgrade the system. If the 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.

6 Select an installation type.

The installation selection screen displays the following options.

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.

- **To install the Solaris OS, choose from the following options.**
 - **To install with the 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.

If you want to perform an unattended custom JumpStart installation (option 2), see *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

For detailed information about the Solaris installation GUI and text installer, see “[System Requirements and Recommendations](#)” on page 33.

The system configures the devices and interfaces, and searches for configuration files. The `kdmconfig` utility detects the drivers that are necessary to configure the keyboard, display, and mouse on your system. The installation program begins. Go to [Step 7](#) to continue the installation.

- **To perform system administration tasks before your installation, choose from the following options.**
 - **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 Solaris OS to run on your system. Follow the instructions for your driver update or ITU to install the update.

- **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 *System Administration Guide: Basic Administration*.

After you perform these system administration tasks, the previous list of options is displayed. Select the appropriate option to continue the installation.

7 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. See [Chapter 6](#) for more information.
- If you did not preconfigure all the system information, use the “[Checklist for Installation](#)” on [page 61](#) to help you answer the configuration questions.

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

8 If you are prompted, answer any additional questions to complete your installation.

- **If you preconfigured all of the installation options, the installation program does not prompt you to enter any installation information. See [Chapter 6](#) for more information.**
- **If you did not preconfigure all the installation options, use the “[Checklist for Installation](#)” on [page 61](#) to help you answer the installation questions.**
- **If you are upgrading a system that has non-global zones installed, follow these steps.**

a. **When you are prompted to select initial installation or upgrade, choose Upgrade. Click Next.**

b. **If your system has multiple root (/) partitions, select the partition that you want to upgrade on the Select Version to Upgrade panel.**

The Solaris installation program displays a message that indicates that you cannot customize your upgrade. The Solaris installation program analyzes your system to determine if the system can be upgraded. The Ready to Upgrade panel is displayed.

If your system has only one root partition, the Solaris installation program does not prompt you to select a partition to upgrade. The partition is automatically selected.

c. **If you want to continue the upgrade, click Install Now on the Ready to Upgrade panel.**

The Solaris installation program begins to upgrade your system.

If you do not want to continue the upgrade, click Back to perform an initial installation.

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

**More
Information****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 the Solaris Boot Behavior by Editing the GRUB Menu” in *System Administration Guide: Basic Administration*.

See Also

For information about how to complete an interactive installation with the Solaris installation GUI, see “To Install or Upgrade With the Solaris Installation Program With GRUB” in *Solaris 10 6/06 Installation Guide: Basic Installations*.

Preparing to Install From the Network With CD Media (Tasks)

This chapter describes how to use CD media to set up your network and systems to install the Solaris software from the network. Network installations enable you to install the Solaris software from a system that has access to the Solaris 10 6/06 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 Solaris software from the network by using any of the Solaris installation methods. This chapter covers the following topics:

- “Task Map: Preparing to Install From the Network With CD Media” on page 145
- “SPARC: Creating a SPARC Install Server With CD Media” on page 147
- “x86: Creating an x86 Install Server With CD Media” on page 154
- “Creating a Cross-Platform Install Server for CD Media” on page 160
- “Creating a Boot Server on a Subnet With a CD Image” on page 165
- “Adding Systems to Be Installed From the Network With a CD Image” on page 167
- “Booting and Installing the System From the Network With a CD Image” on page 171

Task Map: Preparing to Install From the Network With CD Media

TABLE 9-1 Task Map: Setting Up an Install Server With CD Media

Task	Description	For Instructions
(x86 only): Verify that your system supports PXE.	<p>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.</p> <p>If your x86 based system does not support PXE, you must boot the system from a local DVD or CD.</p>	Check your hardware manufacturer's documentation or the system BIOS.

TABLE 9-1 Task Map: Setting Up an Install Server With CD Media (Continued)

Task	Description	For Instructions
Choose an installation method.	The Solaris OS provides several methods for installation or upgrade. Choose the installation method that is most appropriate for your environment.	“Choosing a Solaris Installation Method” on page 29
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 5
(Optional) Preconfigure system information.	You can preconfigure system information to avoid being prompted for the information during the installation or upgrade.	Chapter 6
Create an install server.	Use the <code>setup_install_server(1M)</code> command to copy the Solaris Software - 1 CD to the install server’s hard disk. Use the <code>add_to_install_server(1M)</code> command to copy additional Solaris Software CDs and the Solaris Languages CD to the install server’s hard disk.	<ul style="list-style-type: none"> ■ “SPARC: Creating a SPARC Install Server With CD Media” on page 147 ■ “x86: To Create an x86 Install Server With x86 CD Media” on page 155 ■ “Creating a Cross-Platform Install Server for CD Media” on page 160
(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 <code>setup_install_server</code> command with the <code>-b</code> option to set up a boot server. If you are using Dynamic Host Configuration Protocol (DHCP), a boot server is not necessary.	“Creating a Boot Server on a Subnet With a CD Image” on page 165
Add systems to be installed from the network.	Use the <code>add_install_client</code> 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 167
(Optional) Configure the DHCP server.	If you want to use DHCP to provide system configuration and installation parameters, 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 <i>System Administration Guide: IP Services</i> “Preconfiguring System Configuration Information With the DHCP Service (Tasks)” on page 98

TABLE 9-1 Task Map: Setting Up an Install Server With CD Media (Continued)

Task	Description	For Instructions
Install the system over the network.	Begin the installation by booting the system from the network.	“Booting and Installing the System From the Network With a CD Image” on page 171

SPARC: Creating a SPARC Install Server With 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 Solaris software on a system from the network. You do not always need to set up a separate 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 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: To Create a SPARC Install Server With SPARC or x86 CD Media

Use this procedure to create a SPARC install server with SPARC or x86 CD media.

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* for detailed information about managing removable media without the Volume Manager.

Before You Begin

If you want to upgrade a system that has non-global zones installed, you cannot use a CD-based network installation image to upgrade the system. You must create a network installation image from the Solaris DVD. For instructions about how to create a network installation image from a DVD, see [Chapter 8](#).

1 On the system that is to become the install server, become superuser.

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

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

3 Create a directory for the CD image.

```
# mkdir -p install_dir_path
```

install_dir_path Specifies the directory where the CD image is to be copied

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

- If you are creating an installation image from the Solaris Software for SPARC Platforms - 1 CD, type the following command.

```
# cd /cdrom/cdrom0/s0/Solaris_10/Tools
```

- If you are creating an installation image from the Solaris Software for x86 Platforms - 1 CD, type the following command.

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

In the previous examples, `cdrom0` is the path to the drive that contains the Solaris OS CD media.

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

```
# ./setup_install_server install_dir_path
```

install_dir_path Specifies the directory where the CD image is to be copied

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

6 Decide if you need to make the install server available for mounting.

- If the install server is on the same subnet as the system to be installed or you are using DHCP, you do not need to create a boot server. Proceed to [Step 7](#).

- If the install server is not on the same subnet as the system to be installed and you are not using DHCP, complete the following steps.

- a. Verify that the path to the install server's image is shared appropriately.

```
# share | grep install_dir_path
```

install_dir_path Specifies the path to the installation image where the CD image was copied

- 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, continue.**
 - b. Make the install server available by adding this entry to the `/etc/dfs/dfstab` file.**

```
share -F nfs -o ro,anon=0 -d "install server directory" install_dir_path
```
 - c. Verify that the `nfsd` daemon is running.**
 - **If the install server is running the Solaris 10 6/06 OS, or compatible version, type the following command.**

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

If the `nfsd` daemon is online, continue to [Step d](#). 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 to [Step d](#). If the `nfsd` daemon is not running, start it.

```
# /etc/init.d/nfs.server start
```
 - d. Share the install server.**

```
# shareall
```
- 7 Change directories to root (/).**

```
# cd /
```
- 8 Eject the Solaris Software - 1 CD.**
- 9 Insert the Solaris Software - 2 CD in the system's CD-ROM drive.**
- 10 Change to the `Tools` directory on the mounted CD.**
 - a. If you are creating an installation image from the Solaris Software for SPARC Platforms - 1 CD, type the following command.**

```
# cd /cdrom/cdrom0/s0/Solaris_10/Tools
```
 - b. If you are creating an installation image from the Solaris Software for x86 Platforms - 1 CD, type the following command.**

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

In the previous examples, `cdrom0` is the path to the drive that contains the Solaris OS CD media.

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

```
# ./add_to_install_server install_dir_path
```

install_dir_path Specifies the directory where the CD image is to be copied

12 Change directories to root (/).

```
# cd /
```

13 Eject the Solaris Software - 2 CD.**14 Repeat Step 9 through Step 13 for each Solaris Software CD that you want to install.****15 Insert the Solaris Languages CD in the system's CD-ROM drive.****16 Change to the Tools directory on the mounted CD.**

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

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

```
# ./add_to_install_server install_dir_path
```

install_dir_path Specifies the directory where the CD image is to be copied

18 Change directories to root (/).

```
# cd /
```

19 (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 SPARC based installation images, use the `patchadd -C` command to patch the files that are located in the miniroot.

```
# patchadd -C install_dir_path path-to-patch/patch-id
```

install_dir_path Specifies the path to the network installation miniroot.

path-to-patch 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.



Caution – Don't use the `patchadd -C` command unless you have read the Patch README instructions or have contacted your local Sun support office.

- For x86 based installation images, follow these steps to patch an x86 network installation miniroot.

Note – These steps assume that you have a system on your network that is running the Solaris 10 6/06 for x86 release, and that system is accessible over the network.

a. On a system that is running the Solaris 10 6/06 for x86 release, log in as superuser.

b. Change to the `Tools` directory of the installation image you created in [Step 4](#).

```
# 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`.

c. Create a new installation image, and place that image on the system that is running the Solaris 10 6/06 for x86 release.

```
# ./setup_install_server remote_install_dir_path
```

remote_install_dir_path Specifies the path on the Solaris 10 6/06 for x86 system in which to create the new installation image.

This command creates a new installation image on the Solaris 10 6/06 for x86 system. In order to patch this image, you must temporarily place this image on a system that is running the Solaris 10 6/06 for x86 release.

d. On the Solaris 10 6/06 for x86 system, unpack the network installation boot archive.

```
# /boot/solaris/bin/root_archive unpackmedia remote_install_dir_path \
destination_dir
```

remote_install_dir_path Specifies the path to the x86 network installation image on the Solaris 10 6/06 for x86 system.

destination_dir Specifies the path to the directory to contain the unpacked boot archive.

e. On the Solaris 10 6/06 for x86 system, patch the unpacked boot archive.

```
# patchadd -C destination_dir path-to-patch/patch-id
```

path-to-patch 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 `patchadd(1M)`.



Caution – Don't use the `patchadd -C` command unless you have read the Patch README instructions or have contacted your local Sun support office.

f. On the Solaris 10 6/06 for x86 system, pack the x86 boot archive.

```
# /boot/solaris/bin/root_archive packmedia destination_dir \
  remote_install_dir_path
```

g. Copy the patched miniroot to the installation image on the install server.

```
# cp remote_install_dir_path/boot/x86.miniroot \
  install-server-path/install_dir_path/boot/x86.miniroot
```

20 Decide if you need to create a boot server.

- 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 167.](#)
- 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 165.](#)

Example 9–1 SPARC: Creating a SPARC Install Server With SPARC CD Media

The following example illustrates how to create an install server by copying the following CDs to the install server's `/export/home/cdsparc` directory. This example assumes that the install server is running the Solaris 10 6/06 OS.

- Solaris Software for SPARC Platforms CDs
- Solaris Languages for SPARC Platforms CD

Insert the Solaris Software for SPARC Platforms - 1 CD in the system's CD-ROM drive.

```
# mkdir -p /export/home/cdsparc
# cd /cdrom/cdrom0/s0/Solaris_10/Tools
# ./setup_install_server /export/home/cdsparc
```

- If you have a separate boot server, add these steps.
 1. Add the following path to the `/etc/dfs/dfstab` file.


```
share -F nfs -o ro,anon=0 -d "install server directory" \
  /export/home/cdsparc
```
 2. 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
```

3. Continue with the following steps.

- If you do not need a boot server or have completed the steps for a separate boot server, continue.

```
# cd /
```

Eject the Solaris Software for SPARC Platforms - 1 CD. Insert the Solaris Software for SPARC Platforms - 2 CD in the CD-ROM drive.

```
# cd /cdrom/cdrom0/Solaris_10/Tools
# ./add_to_install_server /export/home/cdsparc
# cd /
```

Repeat the previous commands for each Solaris Software CD that you want to install.

Insert the Solaris Languages for SPARC Platforms CD in the CD-ROM drive.

```
# cd /cdrom/cdrom0/Tools
# ./add_to_install_server /export/home/cdsparc
```

Example 9-2 Creating a SPARC Install Server With x86 CD Media

Use the following example to create an x86 network installation image on a SPARC based install server. The following example illustrates how to create a cross platform install server by copying the Solaris Software for x86 Platforms CDs to the install server's `/export/home/cdx86` directory. This example assumes that the install server is running the Solaris 10 6/06 OS.

- Solaris Software for x86 Platforms CDs
- Solaris Languages for x86 Platforms CD

Insert the Solaris Software for x86 Platforms - 1 CD in the system's CD-ROM drive.

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

- If you have a separate boot server, add these steps.

1. Add the following path to the `/etc/dfs/dfstab` file.

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

2. 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
```

3. Continue with the following steps.

- If you do not need a boot server or have completed the steps for a separate boot server, continue.

```
# cd /
```

Eject the Solaris Software for x86 Platforms - 1 CD. Insert the Solaris Software for x86 Platforms - 2 CD in the CD-ROM drive.

```
# cd /cdrom/cdrom0/Solaris_10/Tools
# ./add_to_install_server /export/home/cdsparc
# cd /
```

Repeat the previous commands for each Solaris Software for x86 Platforms CD that you want to install.

Insert the Solaris Languages for x86 Platforms CD in the CD-ROM drive.

```
# cd /cdrom/cdrom0/Tools
# ./add_to_install_server /export/home/cdsparc
```

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 167](#).

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 165](#).

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

x86: Creating an x86 Install Server With 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 Solaris software on a system from the network. You do not always need to set up a separate 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 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.

▼ x86: To Create an x86 Install Server With x86 CD Media

This procedure creates an x86 install server with x86 CD media.

If you want to create a SPARC network installation image, see “[SPARC: To Create a SPARC Install Server With SPARC or x86 CD Media](#)” on page 147.

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* for detailed information about managing removable media without the Volume Manager.

Before You Begin If you want to upgrade a system that has non-global zones installed, you cannot use a CD-based network installation image to upgrade the system. You must create a network installation image from the Solaris DVD. For instructions about how to create a network installation image from a DVD, see [Chapter 8](#).

1 On the system that is to become the install server, become superuser.

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

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

3 Create a directory for the CD image.

```
# mkdir -p install_dir_path
```

install_dir_path 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
```

In the previous example, **cdrom0** is the path to the drive that contains the Solaris OS CD media.

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

```
# ./setup_install_server install_dir_path
```

install_dir_path Specifies the directory where the CD image is to be copied

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

6 Decide if you need to make the install server available for mounting.

- If the install server is on the same subnet as the system to be installed or you are using DHCP, you do not need to create a boot server. Proceed to [Step 7](#).
- If the install server is not on the same subnet as the system to be installed and you are not using DHCP, complete the following steps.

a. Verify that the path to the install server's image is shared appropriately.

```
# share | grep install_dir_path
```

install_dir_path Specifies the path to the installation image where the CD image was copied

- 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, continue.

b. Make the install server available by adding this entry to the `/etc/dfs/dfstab` file.

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

c. Verify that the `nfsd` daemon is running.

- If the install server is running the Solaris 10 6/06 OS, or compatible version, type the following command.

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

If the `nfsd` daemon is online, continue to [Step d](#). 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 to [Step d](#). If the `nfsd` daemon is not running, start it.

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

d. Share the install server.

```
# shareall
```

7 Change directories to root (/).

```
# cd /
```

8 Eject the Solaris Software - 1 CD.**9 Insert the 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
```

install_dir_path Specifies the directory where the CD image is to be copied

12 Change directories to root (/).

```
# cd /
```

13 Eject the Solaris Software - 2 CD.**14 Repeat [Step 9](#) through [Step 13](#) for each Solaris Software CD that you want to install.****15 Insert the Solaris Languages CD in the system's CD-ROM drive.****16 Change to the `Tools` directory on the mounted CD:**

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

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

```
# ./add_to_install_server install_dir_path
```

install_dir_path Specifies the directory where the CD image is to be copied

18 Change directories to root (/).

```
# cd /
```

19 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. Follow these substeps to patch an x86 network installation miniroot.

- a. **If the installation server is not running the Solaris 10 6/06 for x86 release, log in as superuser to another system on the network that is running the Solaris 10 6/06 for x86 release.**

To patch a Solaris 10 6/06 for x86 miniroot, your system must be running the Solaris 10 6/06 for x86 release.

b. Change to the `Tools` directory of the installation image you created in Step 5.

```
# 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`.

c. Create a new installation image, and place that image on the system that is running the Solaris 10 6/06 for x86 release.

```
# ./setup_install_server remote_install_dir_path
```

remote_install_dir_path Specifies the path on the Solaris 10 6/06 for x86 system in which to create the new installation image.

This command creates a new installation image on the Solaris 10 6/06 for x86 system. In order to patch this image, you must temporarily place this image on a system that is running the Solaris 10 6/06 for x86 release.

d. Unpack the network installation boot archive.

```
# /boot/solaris/bin/root_archive unpackmedia install_dir_path \  
destination_dir
```

install_dir_path Specifies the path to the x86 network installation image.

destination_dir Specifies the path to the directory to contain the unpacked boot archive.

e. Patch the unpacked boot archive.

```
# patchadd -C destination_dir path-to-patch/patch-id
```

path-to-patch 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 `patchadd(1M)`.



Caution – Don't use the `patchadd -C` command unless you have read the Patch README instructions or have contacted your local Sun support office.

f. Pack the x86 boot archive.

```
# /boot/solaris/bin/root_archive packmedia destination_dir \  
install_dir_path
```

g. If necessary, copy the patched miniroot to the installation image on the install server.

If you patched the miniroot on a remote Solaris 10 6/06 6/06 for x86 system, you must copy the patched miniroot to the install server.

```
# cp remote_install_dir_path/boot/x86.miniroot \
install-server-path/install_dir_path/boot/x86.miniroot
```

20 Decide if you need to create a boot server.

- 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 167.](#)
- 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 165.](#)

Example 9–3 x86: Creating an x86 Install Server With x86 CD Media

The following examples illustrate how to create an install server by copying the following CDs to the install server’s `/export/home/cdx86` directory. This example assumes that the install server is running the Solaris 10 6/06 OS.

- Solaris Software for x86 Platforms CDs
- Solaris Languages for x86 Platforms CD

Insert the Solaris Software for x86 Platforms - 1 CD in the system’s CD-ROM drive.

Set up an install server.

```
# mkdir -p /export/home/dvdx86
# cd /cdrom/cdrom0/Solaris_10/Tools
# ./setup_install_server /export/home/cdx86
```

- If you have a separate boot server, add these steps.
 1. Add the following path to the `/etc/dfs/dfstab` file:


```
share -F nfs -o ro,anon=0 -d "install server directory" \
/export/home/cdx86
```
 2. 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
```
 3. Continue with the following steps.
- If you do not need a boot server or have completed the steps for a separate boot server, continue with the following steps.

```
# cd /
```

Eject the Solaris Software for x86 Platforms - 1 CD. Insert the Solaris Software for x86 Platforms - 2 CD in the CD-ROM drive.

```
# cd /cdrom/cdrom0/Solaris_10/Tools
# ./add_to_install_server /export/home/cdx86
# cd /
```

Repeat the previous commands for each Solaris Software CD that you want to install.

Insert the Solaris Languages for x86 Platforms CD in the CD-ROM drive.

```
# cd /cdrom/cdrom0/Tools
# ./add_to_install_server /export/home/cdx86
```

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 167](#).

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 165](#).

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

Creating a Cross-Platform Install Server for CD Media

This section explains how to create an x86 network installation image on a SPARC system.

A remote x86 system is not required to create a SPARC install server with x86 CD media. See [“SPARC: To Create a SPARC Install Server With SPARC or x86 CD Media” on page 147](#) for more information.

▼ To Create a SPARC Install Server on an x86 System With SPARC CD Media

Use this procedure to create a SPARC install server on an x86 system with SPARC CD media.

In this procedure, *x86-system* is the x86 system that is to be the install server and *remote-SPARC-system* is the remote SPARC system to be used with the SPARC CD media.

Before You Begin You need the following items to perform this task.

- An x86 system
- A SPARC system with a CD-ROM drive
- A set of CDs for the remote SPARC system
 - Solaris Software for SPARC Platforms CDs
 - Solaris Languages for SPARC Platforms CD

If you want to upgrade a system that has non-global zones installed, you cannot use a CD-based network installation image to upgrade the system. You must create a network installation image from the Solaris DVD. For instructions about how to create a network installation image from a DVD, see [Chapter 8](#).

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* for detailed information about managing removable media without the Volume Manager.

1 On the remote SPARC system, become superuser.

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

2 On the remote SPARC system, insert the Solaris Software for SPARC Platforms - 1 CD into the system's drive.

3 On the remote SPARC system, add the following entries to the `/etc/dfs/dfstab` file.

```
share -F nfs -o ro,anon=0 /cdrom/cdrom0/s0
share -F nfs -o ro,anon=0 /cdrom/cdrom0/s1
```

4 On the remote SPARC system, start the NFS daemon.

- **If the install server is running the Solaris 10 6/06 OS, or compatible version, type the following command.**

```
remote-SPARC-system# svcadm enable svc:/network/nfs/server
```

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

```
remote-SPARC-system# /etc/init.d/nfs.server start
```

- 5 On the remote SPARC system, verify that the CD is available to other systems by using the share command.**

```
remote-SPARC-system# share
- /cdrom/cdrom0/sol_10_sparc/s0 ro,anon=0 " "
- /cdrom/cdrom0/sol_10_sparc/s1 ro,anon=0 " "
```

In the previous sample output, `sol_10_sparc` refers to the Solaris 10 6/06 OS on SPARC based systems. This text string varies for each version of the Solaris OS.

- 6 On the x86 system that is to be the SPARC install server, become superuser.**

- 7 Verify that the CD is properly exported on the remote x86 system.**

```
x86-system# showmount -e remote-SPARC-system
export list for remote-SPARC-system:
/cdrom/sol_10_sparc/s0 (everyone)
/cdrom/sol_10_sparc/s1 (everyone)
```

- 8 On the x86 system, change to the Tools directory on the mounted disc:**

```
x86-system# cd /net/remote-SPARC-system/cdrom/sol_10_sparc/s0/Solaris_10/Tools
```

- 9 On the x86 system, copy the disc in the drive to the install server's hard disk in the directory you've created by using the `setup_install_server` command:**

```
x86-system# ./setup_install_server install_dir_path
```

`install_dir_path` Specifies the directory where the disc image is to be copied. The directory must be empty.

Note – The `setup_install_server` command indicates whether you have enough disk space available for the Solaris Software disc images. To determine available disk space, use the `df -k1` command.

- 10 On the x86 system, change to the top directory.**

```
x86-system# cd /
```

- 11 On the x86 system, unmount both directories.**

```
x86-system# umount /net/remote-SPARC-system/cdrom/sol_10_sparc/s0
```

- 12 On the SPARC system, unshare both CD-ROM slices.**

```
remote-SPARC-system# unshare /cdrom/cdrom0/s0
remote-SPARC-system# unshare /cdrom/cdrom0/
```

- 13 On the SPARC system, eject the Solaris Software for SPARC Platforms - 1 CD.**

- 14 Insert the Solaris Software for SPARC Platforms - 2 CD into the x86 system's CD-ROM drive.
- 15 On the x86 system, change to the `Tools` directory on the mounted CD:

```
x86-system# cd /cdrom/cdrom0/Solaris_10/Tools
```
- 16 On the x86 system, copy the CD to the install server's hard disk:

```
x86-system# ./add_to_install_server install_dir_path
```

install_dir_path Specifies the directory where the CD image is to be copied
- 17 Eject the Solaris Software for SPARC Platforms - 2 CD.
- 18 Repeat [Step 14](#) through [Step 17](#) for each Solaris Software CD you want to install.
- 19 On the x86 system, insert the Solaris Languages for SPARC Platforms CD into the x86 system's CD-ROM drive and mount the CD.
- 20 On the x86 system, change to the `Tools` directory on the mounted CD:

```
x86-system# cd /cdrom/cdrom0/Tools
```
- 21 On the x86 system, copy the CD to the install server's hard disk:

```
x86-system# ./add_to_install_server install_dir_path
```

install_dir_path Specifies the directory where the CD image is to be copied
- 22 Decide if you want to patch the files that are located in the miniroot (`Solaris_10/Tools/Boot`) on the net install image that was created by `setup_install_server`.
 - If no, proceed to the next step.
 - If yes, use the `patchadd -C` command to patch the files that are located in the miniroot.



Caution – Don't use the `patchadd -C` unless you have read the Patch README instructions or have contacted your local Sun support office.

- 23 Decide if you need to create a boot server.
 - If the install server is on the same subnet as the system to be installed or you are using DHCP, you do not need to create a boot server. See [“Adding Systems to Be Installed From the Network With a CD Image” on page 167](#).

- **If the install server is not on the same subnet as the system to be installed and you are not using DHCP, you must create a boot server. For detailed instructions on how to create a boot server, refer to “To Create a Boot Server on a Subnet With a CD Image” on page 165.**

Example 9–4 Creating a SPARC Install Server on an x86 System With SPARC CD Media

The following example illustrates how to create a SPARC install server on an x86 system that is named `richards`. The following SPARC CDs are copied from a remote SPARC system that is named `simpson` to the x86 install server’s `/export/home/cdsparc` directory.

- Solaris Software for SPARC Platforms CDs
- Solaris Languages for SPARC Platforms CD

This example assumes that the install server is running the Solaris 10 6/06 OS.

On the remote SPARC system, insert the Solaris Software for SPARC Platforms - 1 CD, then type the following commands:

```
simpson (remote-SPARC-system)# share -F nfs -o ro,anon=0 /cdrom/cdrom0/s0
simpson (remote-SPARC-system)# share -F nfs -o ro,anon=0 /cdrom/cdrom0/s1
simpson (remote-SPARC-system)# svcadm enable svc:/network/nfs/server
```

On the x86 system:

```
richards (x86-system)# cd /net/simpson/cdrom/sol_10_sparc/s0//Solaris_10/Tools
richards (x86-system)# ./setup_install_server /export/home/cdsparc
richards (x86-system)# cd /
richards (x86-system)# umount /net/simpson/cdrom/sol_10_sparc/s0/
```

On the remote SPARC system:

```
simpson (remote-SPARC-system) unshare /cdrom/cdrom0/s0
simpson (remote-SPARC-system) unshare /cdrom/cdrom0/s1
```

On the x86 system:

```
richards (x86-system)# cd /cdrom/cdrom0/Solaris_10/Tools
richards (x86-system)# ./add_to_install_server /export/home/cdsparc
```

Repeat the previous commands for each Solaris Software for x86 Platforms CD that you want to install.

```
richards (x86-system)# cd /cdrom/cdrom0/Tools
richards (x86-system)# ./add_to_install_server /export/home/cdsparc
```

In this example, each CD is inserted and automatically mounted before each of the commands. After each command, the CD is removed.

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 167](#).

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 165](#).

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 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 Solaris software.

- 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 167](#).
- 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.

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

- 1 **On the system you intend to make the boot server for the subnet, log in and become superuser.**

The system must include a local CD-ROM drive or have access to the remote Solaris 10 6/06 disc images, which are normally on the install server. If you use a name service, the system should be in the name service. If you do not use a name service, you must distribute information about this system by following your site's policies.

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

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

server_name:path Is 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 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

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

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 -k` command.

6 Change directories to root (`/`).

```
# cd /
```

7 Unmount the installation image.

```
# umount /mnt
```

Example 9–5 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 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.

More Information

Continuing the Installation

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 167.

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

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

- 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 name service to preconfigure system information
- The profile in the JumpStart directory on the profile server if you are using the custom JumpStart installation method

Use the following `add_install_client` procedure for setting up install servers and clients.

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

▼ 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.

Use the following `add_install_client` procedure for set up an x86 client 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 name service to preconfigure system information
- The profile in the JumpStart directory on the profile server if you are using the custom JumpStart installation method

- 1 On the install server or boot server, become superuser.
- 2 If you use the NIS, NIS+, DNS, or LDAP name service, verify that the following information about the system to be installed has been added to the name service:

- Host name
- IP address
- Ethernet address

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

- 3 Change to the `Tools` directory on the Solaris 10 6/06 CD image on the install server:

```
# cd /install_dir_path/Solaris_10/Tools
```

install_dir_path Specifies the path to the `Tools` directory

- 4 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 the `-d` only, 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 the `-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 Solaris Installation Parameters” on page 99](#).

`-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 Solaris 10 6/06 CD image

`-c jumpstart_server:jumpstart_dir_path`

Specifies a JumpStart directory for custom 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 Solaris 10 6/06 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 Solaris 10 6/06 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 Solaris Installation Parameters”](#) on page 99.

`client_name`

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

`platform_group`

Is the platform group of the system to be installed. A detailed list of platform groups appears in [“Platform Names and Groups”](#) on page 43.

Example 9–6 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 on how to use DHCP to set installation parameters for network installations, see [“Preconfiguring System Configuration Information With the DHCP Service \(Tasks\)”](#) on page 98.

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

Example 9–7 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.

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

Example 9–8 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 Solaris 10 6/06 CD image in */export/home/cdsparc*.

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

Example 9–9 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 is used to specify 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 a Solaris Operating System for x86 Platforms DVD image in */export/home/cdx86*.

```
x86_install_server# cd /export/boot/cdx86/Solaris_10/Tools
x86_install_server# ./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 on how to use DHCP to set installation parameters for network installations, see [“Preconfiguring System Configuration Information With the DHCP Service \(Tasks\)”](#) on page 98.

Example 9–10 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.

```
install server# cd /export/boot/cdx86/Solaris_10/Tools
install server# ./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.

More Information

Continuing the Installation

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 98.

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

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

Booting and Installing the System From the Network With a CD Image

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

- See “[SPARC: To Boot the Client Over the Network \(CDs\)](#)” on page 171 for instructions about how to boot and install SPARC based systems over the network.
- See “[x86: To Boot the Client Over the Network With GRUB \(CDs\)](#)” on page 174 for instructions about how to boot and install x86 based systems over the network.

▼ SPARC: To Boot 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: To Create a SPARC Install Server With SPARC or x86 CD Media](#)” on page 147.

- 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 165](#). 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 98](#).
- 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” on page 61](#).
 - 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 79](#).
 - Set up a name server if you use a name service to preconfigure system information. For information about how to preconfigure information with a name service, see [“Preconfiguring With the Name Service” on page 95](#).
 - Create a profile in the JumpStart directory on the profile server if you are using the custom JumpStart installation method. For information about how to set up a custom JumpStart installation, see Chapter 6, “Preparing Custom JumpStart Installations (Tasks),” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

Note – If you want to upgrade a system that has non-global zones installed, you cannot use a CD-based network installation image to upgrade the system. You must create a network installation image from the Solaris DVD. For instructions about how to create a network installation image from a DVD, see [Chapter 8](#).

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 Solaris interactive installation GUI, type the following command.


```
ok boot net - install
```
- To install with the Solaris interactive text installer in a desktop session, type the following command.


```
ok boot net - text
```
- To install with the 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 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. See [Chapter 6](#) for more information.
- If you did not preconfigure all the system information, use the “[Checklist for Installation](#)” on [page 61](#) to help you answer the configuration questions.

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

4 If you are prompted, answer any additional questions to complete your installation.

- **If you preconfigured all of the installation options, the installation program does not prompt you to enter any installation information. See [Chapter 6](#) for more information.**
- **If you did not preconfigure all the installation options, use the “[Checklist for Installation](#)” on [page 61](#) to help you answer the installation questions.**
- **If you are upgrading a system that has non-global zones installed, follow these steps.**

a. **When you are prompted to select initial installation or upgrade, choose Upgrade. Click Next.**

b. **If your system has multiple root (/) partitions, select the partition that you want to upgrade on the Select Version to Upgrade panel.**

The Solaris installation program displays a message that indicates that you cannot customize your upgrade. The Solaris installation program analyzes your system to determine if the system can be upgraded. The Ready to Upgrade panel is displayed.

If your system has only one root partition, the Solaris installation program does not prompt you to select a partition to upgrade. The partition is automatically selected.

c. **If you want to continue the upgrade, click Install Now on the Ready to Upgrade panel.**

The Solaris installation program begins to upgrade your system.

If you do not want to continue the upgrade, click Back to perform an initial installation.

See Also For information about how to complete an interactive installation with the Solaris installation GUI, see “To Install or Upgrade With the Solaris Installation Program With GRUB” in *Solaris 10 6/06 Installation Guide: Basic Installations*.

▼ x86: To Boot the Client Over the Network With GRUB (CDs)

The 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 4](#).

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 [“x86: To Create an x86 Install Server With SPARC or x86 DVD Media” on page 124](#).
- 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 129](#). 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 98](#).
- 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” on page 61](#).
 - 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 79](#).
 - Set up a name server if you use a name service to preconfigure system information. For information about how to preconfigure information with a name service, see [“Preconfiguring With the Name Service” on page 95](#).
 - Create a profile in the JumpStart directory on the profile server if you are using the custom JumpStart installation method. For information about how to set up a custom JumpStart installation, see Chapter 6, “Preparing Custom JumpStart Installations (Tasks),” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

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

Note – If you want to upgrade a system that has non-global zones installed, you cannot use a CD-based network installation image to upgrade the system. You must create a network installation image from the Solaris DVD. For instructions about how to create a network installation image from a DVD, see [Chapter 8](#).

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 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 10 6/06 /sol_10_x86                               |
|                                                         |
|                                                         |
+-----+
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 Solaris OS from the network, select the appropriate 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 [“x86: To Create an x86 Install Server With SPARC or x86 DVD Media”](#) on page 124.

- **To install the Solaris OS from the network with specific boot arguments, follow these 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 “To Add Systems to Be Installed From the Network With `add_install_client` (DVD)” on page 132.

a. On the GRUB menu, select the installation option you want to edit, then press 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/sol_10_x86/boot \
module /platform/i86pc/boot_archive
```

b. Use the arrow keys to select the boot entry that you want to edit, then press 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 10–1](#).

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 Solaris installation program checks the default boot disk for the requirements to install or upgrade the system. If the 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.

6 Select an installation type.

The installation selection screen displays the following options.

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.

- **To install the Solaris OS, choose from the following options.**
 - **To install with the 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.

If you want to perform an unattended custom JumpStart installation (option 2), see *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

For detailed information about the Solaris installation GUI and text installer, see “[System Requirements and Recommendations](#)” on page 33.

The system configures the devices and interfaces, and searches for configuration files. The `kdmconfig` utility detects the drivers that are necessary to configure the keyboard, display, and mouse on your system. The installation program begins. Go to [Step 7](#) to continue the installation.

- **To perform system administration tasks before your installation, choose from the following options.**
 - **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 Solaris OS to run on your system. Follow the instructions for your driver update or ITU to install the update.
 - **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 *System Administration Guide: Basic Administration*.

After you perform these system administration tasks, the previous list of options is displayed. Select the appropriate option to continue the installation.

7 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. See [Chapter 6](#) for more information.
- If you did not preconfigure all the system information, use the “[Checklist for Installation](#)” on page 61 to help you answer the configuration questions.

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

- 8 If you are prompted, answer any additional questions to complete your installation.**
- **If you preconfigured all of the installation options, the installation program does not prompt you to enter any installation information. See [Chapter 6](#) for more information.**
 - **If you did not preconfigure all the installation options, use the “[Checklist for Installation](#)” on [page 61](#) to help you answer the installation questions.**
 - **If you are upgrading a system that has non-global zones installed, follow these steps.**
 - a. **When you are prompted to select initial installation or upgrade, choose Upgrade. Click Next.**
 - b. **If your system has multiple root (/) partitions, select the partition that you want to upgrade on the Select Version to Upgrade panel.**

The Solaris installation program displays a message that indicates that you cannot customize your upgrade. The Solaris installation program analyzes your system to determine if the system can be upgraded. The Ready to Upgrade panel is displayed.

If your system has only one root partition, the Solaris installation program does not prompt you to select a partition to upgrade. The partition is automatically selected.
 - c. **If you want to continue the upgrade, click Install Now on the Ready to Upgrade panel.**

The Solaris installation program begins to upgrade your system.

If you do not want to continue the upgrade, click Back to perform an initial installation.
- 9 After the system boots and installs over the network, instruct the system to boot from the disk drive on subsequent boots.**

More Information

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 the Solaris Boot Behavior by Editing the GRUB Menu” in *System Administration Guide: Basic Administration*.

See Also

For information about how to complete an interactive installation with the Solaris installation GUI, see “To Install or Upgrade With the Solaris Installation Program With GRUB” in *Solaris 10 6/06 Installation Guide: Basic Installations*.

Preparing to Install 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” on page 179
- “x86: GRUB Menu Commands for Installation” on page 180

Network Installation Commands

This table describes the commands you use to install Solaris software over the network. The table also indicates to which platform the commands apply.

Command	Platform	Description
<code>add_install_client</code>	All	A command that adds network installation information about a system to an install server or boot server from the network. The <code>add_install_client(1M)</code> man page contains more information.
<code>setup_install_server</code>	All	A script that copies the Solaris 10 6/06 DVD or CDs to an install server's local disk or copies the boot software to a boot server. The <code>setup_install_server(1M)</code> man page contains more information.
(CD media only) <code>add_to_install_server</code>	All	A script that copies additional packages within a product tree on the CDs to the local disk on an existing install server. The <code>add_to_install_server(1M)</code> man page contains more information.
<code>mount</code>	All	A command that enables the mounting of file systems and shows the mounted file systems, including the file system on the Solaris DVD or Solaris Software and Solaris Languages CDs. The <code>mount(1M)</code> man page contains more information.
<code>showmount -e</code>	All	A command that lists all the shared file systems that are located on a remote host. The <code>showmount(1M)</code> man page contains more information.

Command	Platform	Description
<code>uname -i</code>	All	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 Solaris software. The <code>uname(1)</code> man page contains more information.
<code>patchadd -C net_install_image</code>	All	A command to add patches to the files that are located in the miniroot, <code>Solaris_10/Tools/Boot</code> , on a net installation image of a DVD or CD that is created by <code>setup_install_server</code> . This facility enables you to patch Solaris installation commands and other miniroot-specific commands. <code>net_install_image</code> is the absolute path name of the net installation image. The <code>patchadd(1M)</code> man page contains more information. Caution – Don't use the <code>patchadd -C</code> command unless you have read the Patch README instructions or have contacted your local Sun support office.
<code>reset</code>	SPARC	An Open Boot PROM command for resetting the system and rebooting the machine. Or, 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 <code>reset</code> at the <code>ok</code> or <code>></code> PROM prompt.
<code>banner</code>	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 <code>ok</code> or <code>></code> 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/sol_10_x86/boot
module /platform/i86pc/boot_archive
```

You can edit this command line to customize your boot and installation. The following list describes several common commands you might want to use. For a complete list of boot arguments that you can use with the `-B`, see the `eeprom(1M)` man page.

TABLE 10-1 x86: GRUB Menu Commands and Options

Command/Option	Description and Examples
install	Insert this option before the -B option to perform a custom JumpStart installation. kernel /Solaris_10_x86/multiboot install -B install_media=192.168.2.1:/export/sol_10_x86/boot module /platform/i86pc/boot_archive

TABLE 10-1 x86: GRUB Menu Commands and Options (Continued)

Command/Option	Description and Examples
<code>url ask</code>	<p>Specifies the location of the custom JumpStart files or prompts you for the location. Insert either option with the <code>install</code> option.</p> <ul style="list-style-type: none"> ■ <code>url</code> - Specifies the path to the files. You can specify a URL for files that are located in the following places: <ul style="list-style-type: none"> ■ Local hard disk <pre>file://jumpstart_dir_path/compressed_config_file</pre> For example: <pre>kernel /Solaris_10_x86/multiboot install file://jumpstart/config.tar -B install_media=192.168.2.1:/export/sol_10_x86/boot module /platform/i86pc/boot_archive</pre> ■ NFS server <pre>nfs://server_name:IP_address/jumpstart_dir_path/compressed_config_file</pre> For example: <pre>kernel /Solaris_10_x86/multiboot install myserver:192.168.2.1/jumpstart/config.tar -B install_media=192.168.2.1:/export/sol_10_x86/boot module /platform/i86pc/boot_archive</pre> ■ HTTP server <pre>http://server_name:IP_address/jumpstart_dir_path/ compressed_config_file&proxy_info</pre> <ul style="list-style-type: none"> ■ If you placed a <code>sysidcfg</code> file in the compressed configuration file, you must specify the IP address of the server that contains the file, as in the following example: <pre>kernel /Solaris_10_x86/multiboot install http://192.168.2.1/jumpstart/config.tar -B install_media=192.168.2.1:/export/sol_10_x86/boot module /platform/i86pc/boot_archive</pre> ■ 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: <pre>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/sol_10_x86/boot module /platform/i86pc/boot_archive</pre>

TABLE 10-1 x86: GRUB Menu Commands and Options (Continued)

Command/Option	Description and Examples
<code>url ask</code> (continued)	<ul style="list-style-type: none"> ask - When used with the <code>install</code> 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 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 custom 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. <pre>kernel /Solaris_10_x86/multiboot install ask -B install_media=192.168.2.1:/export/sol_10_x86/boot module /platform/i86pc/boot_archive</pre>
<code>dhcp</code>	<p>Insert this option before the <code>-B</code> 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 <code>dhcp</code>, the system uses the <code>/etc/bootparams</code> file or the name service <code>bootparams</code> database. For example, you would not specify <code>dhcp</code> if you wanted keep a static IP address.</p> <pre>kernel /Solaris_10_x86/multiboot dhcp -B install_media=192.168.2.1:/export/sol_10_x86/boot module /platform/i86pc/boot_archive</pre>
<code>- text</code>	<p>Insert this option before the <code>-B</code> option to perform a text-based installation in a desktop session.</p> <pre>kernel /Solaris_10_x86/multiboot - text -B install_media=192.168.2.1:/export/sol_10_x86/boot module /platform/i86pc/boot_archive</pre>
<code>- nowin</code>	<p>Insert this option before the <code>-B</code> option to perform a text-based installation in a console session.</p> <pre>kernel /Solaris_10_x86/multiboot - nowin -B install_media=192.168.2.1:/export/sol_10_x86/boot module /platform/i86pc/boot_archive</pre>
<code>"console=serial-console"</code>	<p>Use this argument with the <code>-B</code> option to instruct the system to use a serial console, such as <code>ttya</code> (COM1) or <code>ttyb</code> (COM2).</p> <pre>kernel /Solaris_10_x86/multiboot -B "console=ttya" install_media=192.168.2.1:/export/sol_10_x86/boot module /platform/i86pc/boot_archive</pre>

TABLE 10-1 x86: GRUB Menu Commands and Options (Continued)

Command/Option	Description and Examples
"ata-dma-enable=[0 1]"	<p>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.</p> <pre>kernel /Solaris_10_x86/multiboot -B "ata-dma-enable=0" install_media=192.168.2.1:/export/sol_10_x86/boot module /platform/i86pc/boot_archive</pre>
"acpi-enum=[0 1]"	<p>Use this argument with the -B option to enable or disable Advanced Configuration and Power Interface (ACPI) power management.</p> <pre>kernel /Solaris_10_x86/multiboot -B "acpi-enum=0" install_media=192.168.2.1:/export/sol_10_x86/boot module /platform/i86pc/boot_archive</pre>
"acpi-cd-dma-enabled=[0 1]"	<p>Use this argument with the -B option to enable or disable DMA for CD or DVD drives during the installation.</p> <pre>kernel /Solaris_10_x86/multiboot -B "acpi-cd-dma-enabled=0" install_media=192.168.2.1:/export/sol_10_x86/boot module /platform/i86pc/boot_archive</pre>

P A R T I I I

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).

WAN Boot (Overview)

This chapter provides an overview of the WAN boot installation method. This chapter describes the following topics.

- “What Is WAN Boot?” on page 187
- “When to Use WAN Boot” on page 188
- “How WAN Boot Works (Overview)” on page 188
- “Security Configurations Supported by WAN Boot (Overview)” on page 192

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 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 Solaris Flash archive over a public network to a remote SPARC based client. The WAN boot programs then install the client system by performing a custom 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 Solaris miniroot that has been modified to perform a WAN boot installation. The WAN boot miniroot, like the Solaris miniroot, contains a kernel and just enough software to install the Solaris environment. The WAN boot miniroot contains a subset of the software in the Solaris miniroot.
- Custom 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 custom JumpStart installation on the client system.
- Solaris Flash archive – A Solaris Flash 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 custom JumpStart installation method to install a Solaris 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.

You then install the archive on the client by using the custom JumpStart installation method.

You can protect the transfer of the previously listed 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 188.

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 7](#).

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

[Figure 11–1](#) 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.

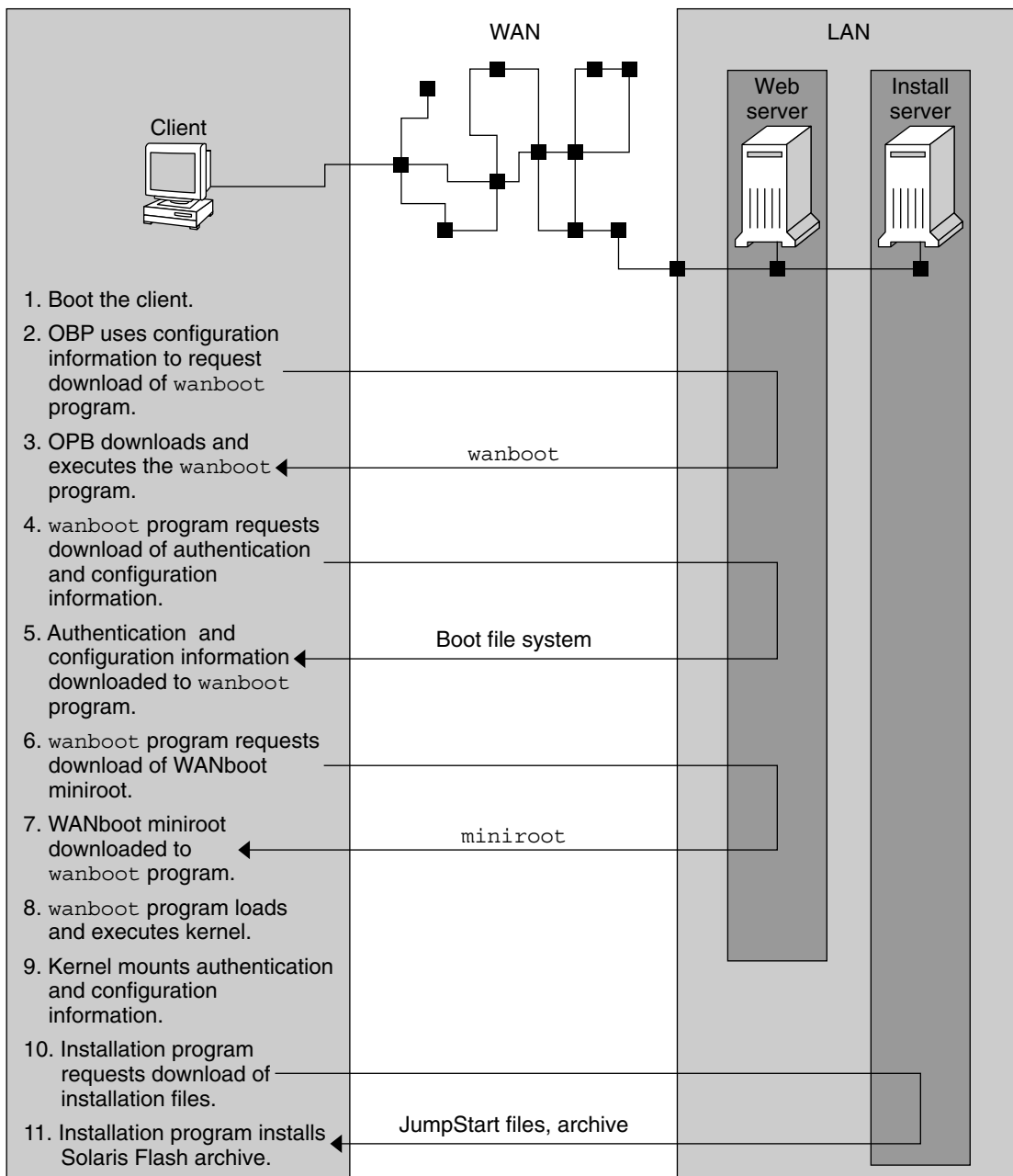


FIGURE 11-1 Sequence of Events in a WAN Boot Installation

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 the Hyper Text Transfer Protocol (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 Solaris installation program.
10. The installation program requests the download of a Solaris Flash archive and custom JumpStart files from an install server.
The installation program downloads the archive and custom JumpStart files over an HTTP or HTTPS connection.
11. The installation program performs a custom JumpStart installation to install the Solaris 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 [“\(Optional\) To Create a Hashing Key and an Encryption Key” on page 223](#).

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.

Your site might not permit the use of encryption keys. To determine if your site permits encryption, ask your site’s security administrator. If your site permits encryption, ask your security administrator which type of encryption key, either 3DES or AES, you should use.

For instructions on how to use encryption keys, see [“\(Optional\) To Create a Hashing Key and an Encryption Key” on page 223](#).

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 202](#). For instructions about how to use digital certificates in your WAN boot installation, see [“\(Optional\) To Use Digital Certificates for Server and Client Authentication” on page 221](#).

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 those systems you want to install over a public network, you might choose the configuration in [“Secure WAN Boot Installation Configuration” on page 192](#). For less critical systems, or systems on semi-private networks, consider the configuration that is described in [“Insecure WAN Boot Installation Configuration” on page 193](#).

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 13–1](#).

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 a HMAC SHA1 hashing key with this configuration. However, the Solaris 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 13-2](#).

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” on page 195
- “WAN Boot Security Limitations” on page 202
- “Gathering Information for WAN Boot Installations” on page 203

WAN Boot Requirements and Guidelines

The section describes the system requirements to perform a WAN boot installation.

TABLE 12-1 System Requirements for WAN Boot Installation

System and Description	Requirements
<p>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.</p>	<ul style="list-style-type: none"> ■ Operating system – Solaris 9 12/03 OS, or compatible version ■ Must be configured as web server ■ Web server software must support HTTP 1.1 ■ If you want to use digital certificates, the web server software must support HTTPS
<p>Install server – The install server provides the Solaris Flash archive and custom JumpStart files that are required to install the client.</p>	<ul style="list-style-type: none"> ■ Available disk space – space for each Solaris Flash archive ■ Media drive – CD-ROM or DVD-ROM drive ■ Operating system – Solaris 9 12/03 OS, or compatible version <p>If the install server is a different system than the WAN boot server, the install server must meet these additional requirements.</p> <ul style="list-style-type: none"> ■ 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 12-1 System Requirements for WAN Boot Installation (Continued)

System and Description	Requirements
Client system – The remote system you want to install over a WAN	<ul style="list-style-type: none"> ■ Memory - Minimum of 512 Mbytes of RAM ■ CPU – UltraSPARC II processor minimum ■ Hard disk – At least 2 Gbytes of hard disk space ■ OBP – WAN boot-enabled PROM <p>If the client does not have the appropriate PROM, the client must have a CD-ROM drive.</p> <p>To determine if your client has a WAN boot-enabled PROM, see “To Check the Client OBP for WAN Boot Support” on page 212.</p>
(Optional) DHCP server – You can use a DHCP server to provide client configuration information.	<p>If you are using a SunOS DHCP server, you must perform one of the following tasks.</p> <ul style="list-style-type: none"> ■ Upgrade the server to be an EDHCP server. ■ Rename Sun vendor options to satisfy the eight-character limit on options. For more information about the WAN installation-specific Sun vendor options, see “(Optional) Providing Configuration Information With a DHCP Server” on page 240. <p>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 <i>System Administration Guide: IP Services</i>.</p>
(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.	<p>Must be configured as web server.</p> <p>Note – If you use HTTPS during your installation, the logging server must be the same system as the WAN boot server.</p>
(Optional) Proxy server – You can configure the WAN boot feature to use an HTTP proxy during the download of the installation data and files.	<p>If the installation uses HTTPS, the proxy server must be configured to tunnel HTTPS.</p>

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 Common Gateway Interface (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 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 Solaris Flash archive.
- 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 Solaris 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
- Custom JumpStart files
- Solaris 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 Solaris OS across your network, you might create subdirectories for each release.

Figure 12–1 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.

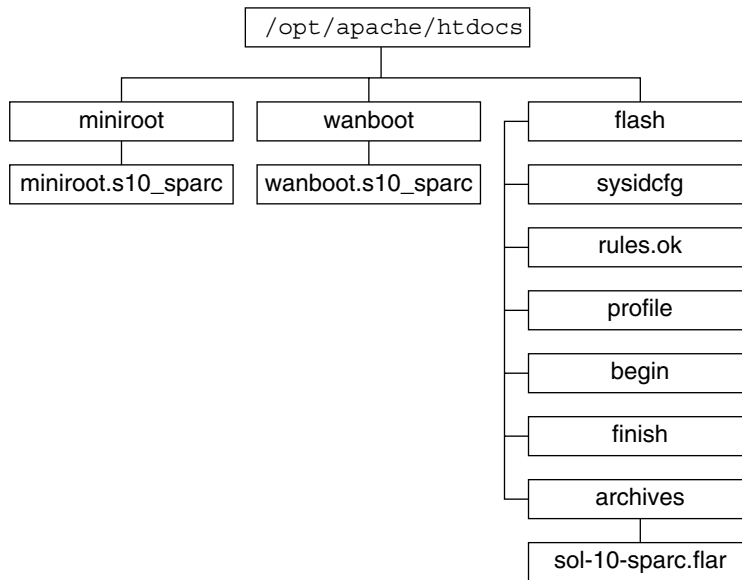


FIGURE 12–1 Sample Structure for Document Root Directory

This sample document directory uses the following structure.

- The `/opt/apache/htdocs` directory is the document root directory.
- The WAN boot miniroot (mini root) directory contains the WAN boot miniroot.
- The wanboot directory contains the wanboot program.
- The Solaris Flash (flash) directory contains the custom JumpStart files that are required to install the client and the subdirectory archives. The archives directory contains the Solaris 10 6/06 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 Custom JumpStart Installation Files” on page 226.

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`. Have the subdirectory follow this naming convention.

`/etc/netboot/net-ip`

In this example, *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`. Have the subdirectory follow this naming convention.

`/etc/netboot/net-ip/client-ID`

In this example, *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 custom 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 199](#) 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.

- [“To Create the System Configuration File” on page 233](#)
- [“To Create the `wanboot.conf` File” on page 235](#)
- [“\(Optional\) To Create a Hashing Key and an Encryption Key” on page 223](#)
- [“\(Optional\) To Use Digital Certificates for Server and Client Authentication” on page 221](#)

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.

[Figure 12–2](#) demonstrates how you can set up the `/etc/netboot` directory to customize your WAN boot installations.

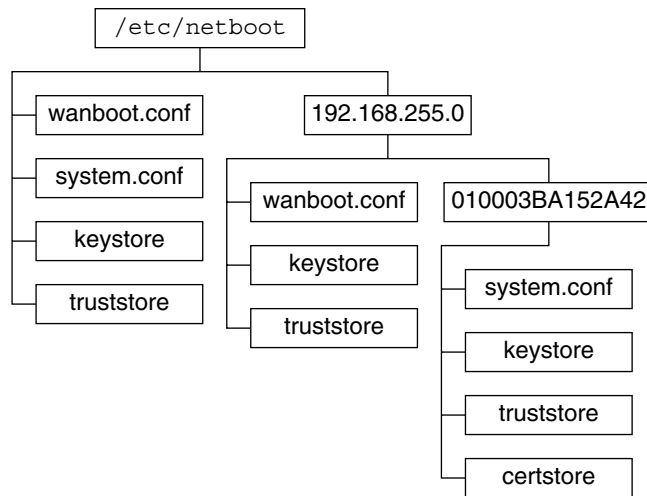


FIGURE 12-2 Sample /etc/netboot Directory

The /etc/netboot directory layout in [Figure 12-2](#) 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 on how to use PKCS#12 certificates during your WAN boot installation, see [“\(Optional\) To Use Digital Certificates for Server and Client Authentication” on page 221](#).

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 Solaris Flash archive before you perform your installation. Before you perform your installation, check the integrity of your Solaris binaries against the Solaris Fingerprint Database at <http://sunsolve.sun.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 name service** – If you use a name 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.

Use the following worksheets to record the WAN boot installation information for your network.

- [Table 12-2](#)
- [Table 12-3](#)

TABLE 12-2 Worksheet for Collecting Server Information

Information Needed	Notes
Install server information	
▪ Path to the WAN boot miniroot on install server	
▪ Path to the custom JumpStart files on the install server	
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	

TABLE 12-2 Worksheet for Collecting Server Information *(Continued)*

Information Needed	Notes
Optional server information	
■ URL of the boot log-cgi script on logging server	
■ IP address and TCP port number of the network's proxy server	

TABLE 12-3 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	

Preparing to Install With WAN Boot (Tasks)

This chapter describes the following tasks that are necessary to prepare your network for a WAN boot installation.

- “Preparing to Install Over a Wide Area Network (Task Maps)” on page 205
- “Configuring the WAN Boot Server” on page 209
- “Creating the Custom JumpStart Installation Files” on page 226
- “Creating the Configuration Files” on page 233
- “(Optional) Providing Configuration Information With a DHCP Server” on page 240
- “(Optional) To Configure the WAN Boot Logging Server” on page 219

Preparing to Install Over a Wide Area Network (Task Maps)

The following tables list the tasks you need to perform to prepare for a WAN boot installation.

- For a list of the tasks you need to perform to prepare for a secure WAN boot installation, see [Table 13-1](#).
For a description of a secure WAN boot installation over HTTPS, see [“Secure WAN Boot Installation Configuration” on page 192](#).
- For a list of the tasks you need to perform to prepare for an insecure WAN boot installation, see [Table 13-2](#).
For a description of an insecure WAN boot installation, see [“Insecure WAN Boot Installation Configuration” on page 193](#).

To use a DHCP server or a logging server, complete the optional tasks that are listed at the bottom of each table.

TABLE 13-1 Task Map: Preparing to Perform a Secure WAN Boot Installation

Task	Description	For Instructions
Decide what security features you want to use in your installation.	Review the security features and configurations to decide what level of security you want to use in your WAN boot installation.	“Protecting Data During a WAN Boot Installation” on page 190 “Security Configurations Supported by WAN Boot (Overview)” on page 192
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 203
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 209
Create the WAN boot miniroot.	Use the <code>setup_install_server</code> command to create the WAN boot miniroot.	“SPARC: To Create a WAN Boot Miniroot” on page 210
Verify that the client system supports WAN boot.	Check the client OBP for boot argument support of WAN boot.	“To Check the Client OBP for WAN Boot Support” on page 212
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 214
Install the wanboot - cgi program on the WAN boot server.	Copy the wanboot - cgi program to the WAN boot server’s CGI directory.	“To Copy the wanboot - cgi Program to the WAN Boot Server” on page 218
(Optional) Set up the logging server.	Configure a dedicated system for displaying boot and installation log messages.	“(Optional) To Configure the WAN Boot Logging Server” on page 219
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 216
Configure the web server to use secure HTTP for a more secure WAN boot installation.	Identify the web server requirements that are necessary to perform a WAN installation with HTTPS.	“(Optional) Protecting Data by Using HTTPS” on page 220
Format digital certificates for a more secure WAN boot installation.	Split PKCS#12 file into a private key and a certificate to use with the WAN installation.	“(Optional) To Use Digital Certificates for Server and Client Authentication” on page 221

TABLE 13-1 Task Map: Preparing to Perform a Secure WAN Boot Installation *(Continued)*

Task	Description	For Instructions
Create a hashing key and an encryption key for a more secure WAN boot installation.	Use the <code>wanbootutil keygen</code> command to create HMAC SHA1, 3DES, or AES keys.	“(Optional) To Create a Hashing Key and an Encryption Key” on page 223
Create the Solaris Flash archive.	Use the <code>flarcreate</code> command to create an archive of the software that you want to install on the client.	“To Create the Solaris Flash Archive” on page 226
Create the installation files for the custom JumpStart installation.	Use a text editor to create the following files: <ul style="list-style-type: none"> ■ <code>sysidcfg</code> ■ <code>profile</code> ■ <code>rules.ok</code> ■ <code>begin scripts</code> ■ <code>finish scripts</code> 	“To Create the <code>sysidcfg</code> File” on page 228 “To Create the Profile” on page 229 “To Create the rules File” on page 231 “(Optional) Creating Begin and Finish Scripts” on page 233
Create the system configuration file.	Set the configuration information in the <code>system.conf</code> file.	“To Create the System Configuration File” on page 233
Create the WAN boot configuration file.	Set the configuration information in the <code>wanboot.conf</code> file.	“To Create the <code>wanboot.conf</code> File” on page 235
(Optional) Configure the DHCP server to support a WAN boot installation.	Set Sun vendor options and macros in the DHCP server.	“Preconfiguring System Configuration Information With the DHCP Service (Tasks)” on page 98

TABLE 13-2 Task Map: Preparing to Perform an Insecure WAN Boot Installation

Task	Description	For Instructions
Decide what security features you want to use in your installation.	Review the security features and configurations to decide what level of security you want to use in your WAN boot installation.	“Protecting Data During a WAN Boot Installation” on page 190 “Security Configurations Supported by WAN Boot (Overview)” on page 192
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 203
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 209

TABLE 13-2 Task Map: Preparing to Perform an Insecure WAN Boot Installation *(Continued)*

Task	Description	For Instructions
Create the WAN boot miniroot.	Use the <code>setup_install_server</code> command to create the WAN boot miniroot.	“SPARC: To Create a WAN Boot Miniroot” on page 210
Verify that the client system supports WAN boot.	Check the client OBP for boot argument support of WAN boot.	“To Check the Client OBP for WAN Boot Support” on page 212
Install the <code>wanboot</code> program on the WAN boot server.	Copy the <code>wanboot</code> program to the document root directory of the WAN boot server.	“Installing the <code>wanboot</code> Program on the WAN Boot Server” on page 214
Install the <code>wanboot - cgi</code> program on the WAN boot server.	Copy the <code>wanboot - cgi</code> program to the WAN boot server’s CGI directory.	“To Copy the <code>wanboot - cgi</code> Program to the WAN Boot Server” on page 218
(Optional) Set up the logging server.	Configure a dedicated system for displaying boot and installation log messages.	“(Optional) To Configure the WAN Boot Logging Server” on page 219
Set up the <code>/etc/netboot</code> hierarchy.	Populate the <code>/etc/netboot</code> hierarchy with the configuration and security files that are required for a WAN boot installation.	“Creating the <code>/etc/netboot</code> Hierarchy on the WAN Boot Server” on page 216
(Optional) Create a hashing key.	Use the <code>wanbootutil keygen</code> command to create HMAC SHA1 key. For insecure installations that check data integrity, complete this task to create an HMAC SHA1 hashing key.	“(Optional) To Create a Hashing Key and an Encryption Key” on page 223
Create the Solaris Flash archive.	Use the <code>flarcreate</code> command to create an archive of the software that you want to install on the client.	“To Create the Solaris Flash Archive” on page 226
Create the installation files for the custom JumpStart installation.	Use a text editor to create the following files: <ul style="list-style-type: none"> ■ <code>sysidcfg</code> ■ <code>profile</code> ■ <code>rules.ok</code> ■ <code>begin scripts</code> ■ <code>finish scripts</code> 	“To Create the <code>sysidcfg</code> File” on page 228 “To Create the Profile” on page 229 “To Create the <code>rules</code> File” on page 231 “(Optional) Creating Begin and Finish Scripts” on page 233
Create the system configuration file.	Set the configuration information in the <code>system.conf</code> file.	“To Create the System Configuration File” on page 233

TABLE 13-2 Task Map: Preparing to Perform an Insecure WAN Boot Installation (Continued)

Task	Description	For Instructions
Create the WAN boot configuration file.	Set the configuration information in the <code>wanboot.conf</code> file.	“To Create the <code>wanboot.conf</code> File” on page 235
(Optional) Configure the DHCP server to support a WAN boot installation.	Set Sun vendor options and macros in the DHCP server.	“Preconfiguring System Configuration Information With the DHCP Service (Tasks)” on page 98

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 12-1](#).

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 209](#)
- [“Creating the WAN Boot Miniroot” on page 210](#)
- [“Installing the `wanboot` Program on the WAN Boot Server” on page 214](#)
- [“Creating the `/etc/netboot` Hierarchy on the WAN Boot Server” on page 216](#)
- [“Copying the WAN Boot CGI Program to the WAN Boot Server” on page 218](#)
- [“\(Optional\) Protecting Data by Using HTTPS” on page 220](#)

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 197](#).

For an example of how to set up this directory, see [“Create the Document Root Directory” on page 265](#).

After you create the document root directory, create the WAN boot miniroot. For instructions, see [“Creating the WAN Boot Miniroot” on page 210](#).

Creating the WAN Boot Miniroot

WAN boot uses a special Solaris miniroot that has been modified to perform a WAN boot installation. The WAN boot miniroot contains a subset of the software in the Solaris miniroot. To perform a WAN boot installation, you must copy the miniroot from the Solaris DVD or the Solaris Software - 1 CD to the WAN boot server. Use the `-w` option to the `setup_install_server` command to copy the WAN boot miniroot from the Solaris software media to your system's hard disk.

▼ SPARC: 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 the Volume Manager. If you are not using the Volume Manager, see *System Administration Guide: Devices and File Systems* for information about managing removable media without the Volume Manager.

1 Become superuser on the WAN boot server.

The system must meet the following requirements.

- Include a CD-ROM or DVD-ROM drive
- Be part of the site's network and name service.

If you use a name service, the system must already be in a name service, such as NIS, NIS+, DNS, or LDAP. If you do not use a name service, you must distribute information about this system by following your site's policies.

2 Insert the Solaris Software - 1 CD or the Solaris DVD in the install server's drive.

3 Create a directory for the WAN boot miniroot and Solaris installation image.

```
# mkdir -p wan-dir-path install-dir-path
```

`-p` Instructs the `mkdir` command to create all the necessary parent directories for the directory you want to create.

`wan-dir-path` 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 Mbytes in size.

`install-dir-path` Specifies the directory on the install server where the 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/s0/Solaris_10/Tools
```

In the previous example, `cdrom0` is the path to the drive that contains the Solaris OS media.

5 Copy the WAN boot miniroot and the Solaris software image to the WAN boot server's hard disk.

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

wan-dir-path Specifies the directory where the WAN boot miniroot is to be copied

install-dir-path Specifies the directory where the Solaris software image is to be copied

Note – The `setup_install_server` command indicates whether you have enough disk space available for the Solaris Software disc images. To determine available disk space, use the `df -k1` command.

The `setup_install_server -w` command creates the WAN boot miniroot and a network installation image of the Solaris software.

6 (Optional) Remove the network installation image.

You do not need the Solaris software image to perform a WAN installation with a Solaris Flash archive. You can free up disk space if you do not plan to use the network installation image for other network installations. Type the following command to remove the network installation image.

```
# rm -rf install-dir-path
```

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-directory/miniroot
```

```
# ln -s /wan-dir-path/miniroot .
```

document-root-directory/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-path/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-path/miniroot /document-root-directory/miniroot/miniroot-name
```

wan-dir-path/miniroot Specifies the path to the WAN boot miniroot.

/document-root-directory/miniroot/ Specifies the path to the WAN boot miniroot directory in the WAN boot server's document root directory.

miniroot-name Specifies the name of the WAN boot miniroot. Name the file descriptively, for example `miniroot.s10_sparc`.

Example 13-1 Creating the WAN Boot Miniroot

Use the `setup_install_server(1M)` with the `-w` option to copy the WAN boot miniroot and the Solaris software image to the `/export/install/Solaris_10` directory of `wanserver-1`.

Insert the Solaris Software media in the media drive that is attached to `wanserver-1`. Type the following commands.

```
wanserver-1# mkdir -p /export/install/sol_10_sparc
wanserver-1# cd /cdrom/cdrom0/s0/Solaris_10/Tools
wanserver-1# ./setup_install_server -w /export/install/sol_10_sparc/miniroot \
/export/install/sol_10_sparc
```

Move the WAN boot miniroot to the document root directory (`/opt/apache/htdocs/`) of the WAN boot server. In this example the name the WAN boot miniroot is set to `miniroot.s10_sparc`.

```
wanserver-1# mv /export/install/sol_10_sparc/miniroot/miniroot \
/opt/apache/htdocs/miniroot/miniroot.s10_sparc
```

More Information Continuing the WAN Boot Installation

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 212](#).

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

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 if the client supports WAN boot by checking the client’s OBP configuration variables. Perform the following procedure to check the client for WAN boot support.

▼ To Check the Client OBP for WAN Boot Support

This procedure describes how to determine if the client OBP supports WAN boot.

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 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 previous 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 previous command does not return any output, the OBP does not support WAN boot installations. You must perform one of the following tasks.
 - Update the client OBP. See your system documentation for information about how to update the OBP.
 - After you complete the preparation tasks and are ready to install the client, perform the WAN boot installation from the Solaris Software CD in a local CD-ROM drive.

For instructions about how to boot the client from a local CD-ROM drive, see [“To Perform a WAN Boot Installation With Local CD Media” on page 257](#). To continue preparing for the WAN boot installation, see [“Creating the /etc/netboot Hierarchy on the WAN Boot Server” on page 216](#).

Example 13–2 Verifying OBP Support for WAN Boot on the Client

The following command shows how to check the client OBP for WAN boot support.

```
# eeprom | grep network-boot-arguments
network-boot-arguments: data not available
```

In this example, the output `network-boot-arguments: data not available` indicates that the client OBP supports WAN boot.

More Information

Continuing the WAN Boot Installation

After you verify that 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 214](#).

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 216](#)

See Also For additional information about the `setup_install_server` command, see [Chapter 9](#).

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 check if your client's PROM supports WAN boot, see [“To Check the Client OBP for WAN Boot Support” on page 212](#).
- If your client's PROM does not support WAN boot, you must provide the program to the client on a local CD. If your client's PROM does not support WAN boot, go to [“Creating the /etc/netboot Hierarchy on the WAN Boot Server” on page 216](#) to continue preparing for your installation.

▼ SPARC: To Install the wanboot Program on the WAN Boot Server

This procedure describes how to copy the wanboot program from Solaris media to the WAN boot server.

This procedure assumes that the WAN boot server is running the Volume Manager. If you are not using the Volume Manager, see *System Administration Guide: Devices and File Systems* for information about managing removable media without the Volume Manager.

Before You Begin Verify that your client system supports WAN boot. See [“To Check the Client OBP for WAN Boot Support” on page 212](#) for more information.

- 1 **Become superuser on the install server.**
- 2 **Insert the Solaris Software - 1 CD or the Solaris DVD in the install server's drive.**
- 3 **Change to the sun4u platform directory on the Solaris Software - 1 CD or the Solaris DVD.**

```
# cd /cdrom/cdrom0/s0/Solaris_10/Tools/Boot/platform/sun4u/
```
- 4 **Copy the wanboot program to the install server.**

```
# cp wanboot /document-root-directory/wanboot/wanboot-name
```

document-root-directory 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-directory/wanboot
# ln -s /wan-dir-path/wanboot .
```

document-root-directory/wanboot Specifies the directory in the WAN boot server's document root directory where you want to link to the `wanboot` program

/wan-dir-path/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-path/wanboot /document-root-directory/wanboot/wanboot-name
```

wan-dir-path/wanboot Specifies the path to the `wanboot` program

/document-root-directory/wanboot/ Specifies the path to the `wanboot` program directory in the WAN boot server's document root directory.

wanboot-name Specifies the name of the `wanboot` program. Name the file descriptively, for example `wanboot.s10_sparc`.

Example 13–3 Installing the `wanboot` Program on the WAN Boot Server

To install the `wanboot` program on the WAN boot server, copy the program from the Solaris Software media to the WAN boot server's document root directory.

Insert the Solaris DVD or the Solaris Software - 1 CD in the media drive that is attached to `wanserver-1` and type the following commands.

```
wanserver-1# cd /cdrom/cdrom0/s0/Solaris_10/Tools/Boot/platform/sun4u/
wanserver-1# cp wanboot /opt/apache/htdocs/wanboot/wanboot.s10_sparc
```

In this example, the name of the `wanboot` program is set to `wanboot.s10_sparc`.

More Information

Continuing the WAN Boot Installation

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 216.

See Also For overview information about the `wanboot` program, see [“What Is WAN Boot?”](#) on page 187.

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. 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. Have the subdirectory follow this naming convention.

```
/etc/netboot/net-ip
```

In this example, *net-ip* is the IP address of the client's subnet.

- **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. Have the subdirectory follow this naming convention.

```
/etc/netboot/net-ip/client-ID
```

In this example, *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 detailed planning information about these configurations, see [“Storing Configuration and Security Information in the /etc/netboot Hierarchy” on page 199](#).

The following procedure describes how to create the /etc/netboot hierarchy.

▼ To Create the /etc/netboot Hierarchy on the WAN Boot Server

Follow these steps to create the /etc/netboot hierarchy.

- 1 **Become superuser on the WAN boot server.**
- 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
```

dir-name Specifies the name of a directory in the /etc/netboot hierarchy

Example 13–4 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.

The commands in this example 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.

```
# 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
```

More Information

Continuing the WAN Boot Installation

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 218](#).

See Also

For detailed planning information about how to design the `/etc/netboot` hierarchy, see [“Storing Configuration and Security Information in the `/etc/netboot` Hierarchy” on page 199](#).

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 Solaris 10 6/06 software. To enable the WAN boot server to use this program, copy this program to the `cgi - bin` directory of the WAN boot server.

▼ To Copy the `wanboot - cgi` Program to the WAN Boot Server

- 1 Become superuser on the WAN boot server.
- 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
```

More Information**Continuing the WAN Boot Installation**

After you copy the WAN boot CGI program to the WAN boot server, you can optionally set up a logging server. For instructions, see [“\(Optional\) To Configure the WAN Boot Logging Server” on page 219](#).

If you do not want to set up a separate logging server, see [“\(Optional\) Protecting Data by Using HTTPS” on page 220](#) for instructions about how to set up the security features of a WAN boot installation.

See Also For overview information about the `wanboot -cgi` program, see [“What Is WAN Boot?” on page 187](#).

▼ (Optional) 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.

To configure the logging server, follow these steps.

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 [“To Create the `wanboot.conf` File” on page 235](#).

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 13–5 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
```

More Information

Continuing the WAN Boot Installation

After you set up the logging server, you can optionally set up the WAN boot installation to use digital certificates and security keys. See “(Optional) Protecting Data by Using HTTPS” on page 220 for instructions about how to set up the security features of a WAN boot installation.

(Optional) 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 192, 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 Custom JumpStart Installation Files” on page 226.

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 the following documentation.
 - For information about activating SSL on the SunONE and iPlanet web servers, see the SunONE and iPlanet documentation collections on <http://docs.sun.com>.
 - For information about activating SSL on the Apache web server, see the Apache Documentation Project at <http://httpd.apache.org/docs-project/>.
 - If you are using web server software that is not listed in the previous list, see your web server software documentation.
- Install digital certificates on the WAN boot server.
For information about using digital certificates with WAN boot, see “(Optional) To Use Digital Certificates for Server and Client Authentication” on page 221.
- Provide a trusted certificate to the client.

For instructions about how to create a trusted certificate, see [“\(Optional\) To Use Digital Certificates for Server and Client Authentication”](#) on page 221.

- Create a hashing key and an encryption key.
For instructions about how to create keys, see [“\(Optional\) To Create a Hashing Key and an Encryption Key”](#) on page 223.
- (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.

▼ (Optional) 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 202.

To use a PKCS#12 file in a WAN boot installation, you perform the following tasks.

- Split the PKCS#12 file into separate SSL private key and trusted certificate files.
- Insert the trusted certificate in the client’s `truststore` file in the `/etc/netboot` hierarchy. The trusted certificate instructs the client to trust the server.
- (Optional) Insert the contents of the SSL private key file in the client’s `keystore` file in the `/etc/netboot` hierarchy.

The `wanbootutil` command provides options to perform the tasks in the previous list.

If you do not want to perform a secure WAN boot, skip this procedure. To continue preparing for your less secure installation, see [“Creating the Custom JumpStart Installation Files”](#) on page 226.

Follow these steps to create a trusted certificate and a client private key.

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 199.
- For instructions about how to create the `/etc/netboot` hierarchy, see [“Creating the `/etc/netboot` Hierarchy on the WAN Boot Server”](#) on page 216.

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. Insert 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

Option to wanbootutil command that 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) Decide if you want to require client authentication.

- **If no, go to “(Optional) To Create a Hashing Key and an Encryption Key” on page 223.**

- **If yes, continue with the following steps.**

a. Insert the client certificate in the client's certstore.

```
# wanbootutil p12split -i p12cert -c \  
/etc/netboot/net-ip/client-ID/certstore -k keyfile
```

p12split

Option to wanbootutil command that splits a PKCS#12 file into separate private key and certificate files.

-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.

b. Insert the private key in the client's keystore.

```
# wanbootutil keygmt -i -k keyfile \  
-s /etc/netboot/net-ip/client-ID/keystore -o type=rsa
```

keygmt -i

Inserts an SSL private key in the client's keystore

<code>-k keyfile</code>	Specifies the name of the client's private key file that was created in the previous step
<code>-s /etc/netboot/net-ip/client-ID/keystore</code>	Specifies the path to the client's keystore
<code>-o type=rsa</code>	Specifies the key type as RSA

Example 13-6 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
```

More Information

Continuing the WAN Boot Installation

After you create a digital certificate, create a hashing key and an encryption key. For instructions, see [“\(Optional\) To Create a Hashing Key and an Encryption Key” on page 223](#).

See Also For more information about how to create trusted certificates, see the man page `wanbootutil(1M)`.

▼ (Optional) 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.

By using the `wanbootutil keygen` command, you can generate these keys and store them in the appropriate `/etc/netboot` directory.

If you do not want to perform a secure WAN boot, skip this procedure. To continue preparing for your less secure installation, see [“Creating the Custom JumpStart Installation Files” on page 226](#).

To create a hashing key and an encryption key, follow these steps.

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
```

`keygen -m` Creates the master HMAC SHA1 key for the WAN boot server

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 Decide if you need to 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 are performing a more secure WAN installation over HTTPS with server authentication, continue.
- If you only want to check the integrity of the `wanboot` program, you do not need to create an encryption key. Go to [Step 6](#).

5 Create an encryption key for the client.

```
# 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) <code>net=<i>net-ip</i></code>	Specifies the network IP address for the client. If you do not use the <code>net</code> option, the key is stored in the <code>/etc/netboot/keystore</code> file, and can be used by all WAN boot clients.
(Optional) <code>cid=<i>client-ID</i></code>	Specifies the client ID. The client ID can be a user-defined ID, or the DHCP client ID. The <code>cid</code> option must be preceded by a valid <code>net=</code> value. If you do not specify the <code>cid</code> option with the <code>net</code> option, the key is stored in the <code>/etc/netboot/<i>net-ip</i>/keystore</code> file. This key can be used by all WAN boot clients on the <i>net-ip</i> subnet.
<code>type=<i>key-type</i></code>	Instructs the <code>wanbootutil keygen</code> utility to create an encryption key for the client. <i>key-type</i> can have a value of <code>3des</code> or <code>aes</code> .

6 Install the keys on the client system.

For instructions about how to install keys on the client, see [“Installing Keys on the Client” on page 244](#).

Example 13-7 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
```

More Information

Continuing the WAN Boot Installation

After you create a hashing and an encryption key, you must create the installation files. For instructions, see [“Creating the Custom JumpStart Installation Files” on page 226](#).

See Also For overview information on hashing keys and encryption keys, see [“Protecting Data During a WAN Boot Installation” on page 190](#).

For more information about how to create hashing and encryption keys, see the man page `wanbootutil(1M)`.

Creating the Custom JumpStart Installation Files

WAN boot performs a custom JumpStart installation to install a Solaris Flash archive on the client. The custom 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 custom 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 custom JumpStart installation is completely free of manual intervention.

To prepare the custom JumpStart files for a WAN boot installation, complete the following tasks.

- “To Create the Solaris Flash Archive” on page 226
- “To Create the `sysidcfg` File” on page 228
- “To Create the rules File” on page 231
- “To Create the Profile” on page 229
- “(Optional) Creating Begin and Finish Scripts” on page 233

For detailed information on the custom JumpStart installation method, see Chapter 5, “Custom JumpStart (Overview),” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

▼ To Create the Solaris Flash Archive

The Solaris Flash installation feature enables you to use a single reference installation of the Solaris OS on a system, which is called the master system. You can then create a Solaris Flash archive, which is a replica image of the master system. You can install the Solaris Flash archive on other systems in the network, creating clone systems.

This section describes how to create a Solaris Flash archive.

Before You Begin

- Before you create a Solaris Flash archive, you must first install the master system.
 - For information about installing a master system, see “Installing the Master System” in *Solaris 10 6/06 Installation Guide: Solaris Flash Archives (Creation and Installation)*.
 - For detailed information about Solaris Flash archives, see Chapter 1, “Solaris Flash (Overview),” in *Solaris 10 6/06 Installation Guide: Solaris 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 Solaris Flash archive.

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 To create the archive, use the `flarcreate` command.

```
# flarcreate -n name [optional-parameters] document-root/flash/filename
```

name The name that you give the archive. The *name* you specify is the value of the `content_name` keyword.

optional-parameters You can use several options to the `flarcreate` command to customize your Solaris Flash archive. For detailed descriptions of these options, see Chapter 5, “Solaris Flash (Reference),” in *Solaris 10 6/06 Installation Guide: Solaris Flash Archives (Creation and Installation)*.

document-root/flash The path to the Solaris 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 to 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 man page `flarcreate(1M)`.

- 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 13–8 Creating a Solaris Flash Archive for a WAN Boot Installation

In this example, you create your Solaris 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`. You save the archive 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
```

More Information**Continuing the WAN Boot Installation**

After you create the Solaris Flash archive, preconfigure the client information in the `sysidcfg` file. For instructions, see “[To Create the sysidcfg File](#)” on page 228.

See Also For detailed instructions about how to create a Solaris Flash archive, see Chapter 3, “Creating Solaris Flash Archives (Tasks),” in *Solaris 10 6/06 Installation Guide: Solaris Flash Archives (Creation and Installation)*.

For more information about the `flarcreate` command, see the man page `flarcreate(1M)`.

▼ To Create the `sysidcfg` File

You can specify a set of keywords in the `sysidcfg` file to preconfigure a system.

To create the `sysidcfg` file, follow these steps.

Before You Begin Create the Solaris Flash archive. See “[To Create the Solaris Flash Archive](#)” on page 226 for detailed instructions.

1 Create a file called `sysidcfg` in a text editor on the install server.

2 Type the `sysidcfg` keywords you want.

For detailed information about `sysidcfg` keywords, see “[sysidcfg File Keywords](#)” on page 81.

3 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 13–9 `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 name 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

```

More Information

Continuing the WAN Boot Installation

After you create the `sysidcfg` file, create a custom JumpStart profile for the client. For instructions, see [“To Create the Profile” on page 229](#).

See Also For more detailed information about `sysidcfg` keywords and values, see [“Preconfiguring With the `sysidcfg` File” on page 79](#).

▼ To Create the Profile

A profile is a text file that instructs the custom JumpStart program how to install the 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 *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*](#).

To create the profile, follow these steps.

Before You Begin Create the `sysidcfg` file for the client. See [“To Create the `sysidcfg` File” on page 228](#) for detailed instructions.

1 Create a text file on the install server. Name the file descriptively.

Ensure that the name of the profile reflects how you intend to use the profile to install the Solaris software on a system. For example, you might name the profiles `basic_install`, `eng_profile`, or `user_profile`.

2 Add profile keywords and values to the profile.

For a list of profile keywords and values, see [“Profile Keywords and Values” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*](#).

Profile keywords and their values are case sensitive.

3 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.

- 4 **Ensure that root owns the profile and that the permissions are set to 644.**
- 5 **(Optional) Test the profile.**

“Testing a Profile” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations* contains information about testing profiles.

Example 13–10 Retrieving a Solaris Flash Archive From a Secure HTTP Server

In the following example, the profile indicates that the custom JumpStart program retrieves the Solaris 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
```

The following list describes some of the keywords and values from this example.

install_type	The profile installs a Solaris Flash archive on the clone system. All files are overwritten as in an initial installation.
archive_location	The compressed Solaris 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 Solaris 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.

More Information

Continuing the WAN Boot Installation

After you create a profile, you must create and validate the rules file. For instructions, see [“To Create the rules File” on page 231](#).

See Also

For more information about how to create a profile, see “Creating a Profile” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

For more detailed information about profile keywords and values, see “Profile Keywords and Values” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

▼ To Create the rules File

The rules file is a text file that contains a rule for each group of systems on which you want to install the 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 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 custom JumpStart installations.

For detailed information about how to create a rules file, see “Creating the rules File” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

To create the rules file, follow these steps.

Before You Begin Create the profile for the client. See “To Create the Profile” on page 229 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 *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced 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 Solaris 10 6/06 software image instead of the check script from the system you are using. `path` is the image on a local disk or a mounted Solaris DVD or a 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 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 13–11 Creating and Validating the `rules` File**

The custom JumpStart programs use 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 client 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 custom JumpStart programs should use to install the client.

```
network 192.168.198.0 - wanclient_prof -
```

This `rules` file instructs the custom JumpStart programs to use the `wanclient_prof` to install the Solaris 10 6/06 software on the client.

Name this rule file `wanclient_rule`.

After you create the profile and the `rules` file, you 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.

More Information**Continuing the WAN Boot Installation**

After you create the `rules.ok` file, you can optionally set up begin and finish scripts for your installation. For instructions, see [“\(Optional\) Creating Begin and Finish Scripts” on page 233](#).

If you do not want to set up begin and finish scripts, see [“Creating the Configuration Files” on page 233](#) to continue the WAN boot installation.

See Also

For more information about how to create a `rules` file, see [“Creating the rules File” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*](#).

For more detailed information about rules file keywords and values, see “Rule Keywords and Values” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

(Optional) 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 Solaris software is installed on a system. A finish script performs tasks after the Solaris software is installed on a system, but before the system reboots. You can use these scripts only when using custom JumpStart to install 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 *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.
- For more information about creating finish scripts, see “Creating Finish Scripts” in *Solaris 10 6/06 Installation Guide: Custom JumpStart and Advanced Installations*.

To continue preparing for your WAN boot installation, see “[Creating the Configuration Files](#)” on page 233.

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)
- wanboot.conf file

This section describes how to create and store these two files.

▼ To Create the System Configuration File

In the system configuration file, you can direct the WAN boot installation programs to the following files.

- sysidcfg file
- rules.ok file
- Custom 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

To use a system configuration file to direct the WAN installation programs to the `sysidcfg`, `rules.ok`, and profile files, follow these steps.

Before You Begin Before you create the system configuration file, you must create the installation files for you WAN boot installation. See [“Creating the Custom JumpStart Installation Files”](#) on page 226 for detailed instructions.

- 1 Assume the same user role as the web server user on the WAN boot server.**
- 2 Create a text file. Name the file 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 [“To Create the `sysidcfg` File”](#) on page 228.

For WAN installations that use HTTPS, set the value to a valid HTTPS URL.

SjumpsCF=jumpstart-files-URL

This setting points to the Solaris 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 custom JumpStart files that you created in [“To Create the Profile”](#) on page 229 and [“To Create the `rules` File”](#) on page 231.

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
```

path Specifies the path to the directory that contains the system configuration file.

system-conf-file Specifies the name of the system configuration file.

Example 13-12 System Configuration File for WAN Boot Installation Over HTTPS

In the following example, the WAN boot programs check for the `sysidcfg` and custom 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 custom 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 13-13 System Configuration File for Insecure WAN Boot Installation

In the following example, the WAN boot programs check for the `sysidcfg` and custom 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 custom 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
```

More Information**Continuing the WAN Boot Installation**

After you create the system configuration file, create the `wanboot.conf` file. For instructions, see [“To Create the wanboot.conf File” on page 235](#).

▼ To Create the 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 216](#).

If the WAN boot server is running the Solaris 10 6/06 OS, 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 following information in the `wanboot.conf` file.

Type of Information	Description
WAN boot server information	<ul style="list-style-type: none"> ■ Path to wanboot program on the WAN boot server ■ URL of wanboot - cgi program on WAN boot server
Install server information	<ul style="list-style-type: none"> ■ 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 custom JumpStart files
Security information	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ Additional hosts that might need to be resolved for the client during a WAN boot installation ■ URL to the boot log - cgi script on the logging server

You specify this information by listing parameters with associated values in the following format.

parameter=value

For detailed information about wanboot . conf file parameters and syntax, see [“wanboot . conf File Parameters and Syntax” on page 281](#).

To create the wanboot . conf file, follow these steps.

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 281](#).

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 216](#).

5 Validate the wanboot . conf file.

```
# bootconfchk /etc/netboot/path-to-wanboot.conf/wanboot.conf
```

path-to-wanboot.conf 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-to-wanboot.conf/wanboot.conf
```

Example 13–14 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`

(Optional) Booting and installation log messages are recorded on the WAN boot server by using secure HTTP.

For instructions on how to set up a logging server for your WAN boot installation, see “(Optional) To Configure the WAN Boot Logging Server” on page 219.

`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 13–15 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`

(Optional) Booting and installation log messages are recorded on the WAN boot server.

For instructions on how to set up a logging server for your WAN boot installation, see [“\(Optional\) To Configure the WAN Boot Logging Server” on page 219](#).

`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.

More Information

Continuing the WAN Boot Installation

After you create the `wanboot.conf` file, you can optionally configure a DHCP server to support WAN boot. For instructions, see [“\(Optional\) Providing Configuration Information With a DHCP Server” on page 240](#).

If you do not want to use a DHCP server in your WAN boot installation, see [“To Check the net Device Alias in the Client OBP” on page 242](#) 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 281](#) and the man page `wanboot.conf(4)`.

(Optional) 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 Solaris DHCP server, see [“Preconfiguring System Configuration Information With the DHCP Service \(Tasks\)”](#) on page 98.

For detailed information about setting up a Solaris DHCP server, see Chapter 14, “Configuring the DHCP Service (Tasks),” in *System Administration Guide: IP Services*.

To continue with your WAN boot installation, see [Chapter 14](#).

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 13](#).

This chapter describes the following tasks.

- “Preparing the Client for a WAN Boot Installation” on page 242
- “Installing the Client” on page 249

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 14-1 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 13
Verify that the net device alias is set correctly in the client OBP.	Use the <code>devalias</code> command to verify that the net device alias is set to the primary network interface.	“ To Check the net Device Alias in the Client OBP ” on page 242

TABLE 14–1 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 244
Install the client over a wide area network.	Choose the appropriate method to install your client.	“To Perform a Noninteractive WAN Boot Installation” on page 250 “To Perform an Interactive WAN Boot Installation” on page 252 “To Perform a WAN Boot Installation With a DHCP Server” on page 255 “To Perform a WAN Boot Installation With Local CD Media” on page 257

Preparing the Client for a WAN Boot Installation

Before you install the client system, prepare the client by performing the following tasks.

- [“To Check the net Device Alias in the Client OBP” on page 242](#)
- [“Installing Keys on the Client” on page 244](#)

▼ 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*.

Follow these steps to check the net device alias on the client.

- 1 **Become superuser on the client.**

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 want to use during the installation, you do not need to reset the alias. Go to [“Installing Keys on the Client” on page 244](#) to continue your installation.
- If the net alias is not set to the network device you want to use, you must reset the alias. Continue.

4 Set the net device alias.

Choose one of the following commands to set the net device alias.

- 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 14-1 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
```

**More
Information**

Continuing the WAN Boot Installation

After you check the net device alias, see the appropriate section to 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 244](#).
- If you are performing a less secure installation without keys, see [“Installing the Client” on page 249](#).

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 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 [“To Install Keys in the Client OBP” on page 244](#).
- For instructions about how to install keys during the boot process, see [“To Perform an Interactive WAN Boot Installation” on page 252](#).
- For instructions about how to install keys in the OBP of a running client, see [“To Install a Hashing Key and an Encryption Key on a Running Client” on page 247](#).

▼ 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.

To install keys in the client OBP, follow these steps.

If you want to assign key values to OBP network boot argument variables, follow these steps.

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
```

set-security-key Installs the key on the client

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.

After you install the keys, you are ready to install the client. See [“Installing the Client” on page 249](#) for instructions about how to install the client system.

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 14–2 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 previous 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 wanboot-3des to wanboot-aes to display the encryption key value.

Install the keys on the client system.

```
ok set-security-key wanboot-hmac-sha1 b482aaab82cb8d5631e16d51478c90079cc1d463
ok set-security-key wanboot-3des 9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

The previous 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`.

More Information

Continuing the WAN Boot Installation

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 249](#).

See Also For more information about how to display key values, see the man page `wanbootutil(1M)`.

▼ 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.

If you want to install a hashing key and an encryption key in the OBP of a running client, follow these steps.

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 on the client machine.

5 Install the necessary keys on the running client machine.

```
# /usr/lib/inet/wanboot/ickey -o type=key-type
> key-value
```

key-type Specifies the key type you want to install on the client. Valid key types are `3des`, `aes`, or `sha1`.

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.

After you install the keys, you are ready to install the client. See “[Installing the Client](#)” on page 249 for instructions about how to install the client system.

Example 14-3 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 previous 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.

```
# /usr/lib/inet/wanboot/ickey -o type=sha1 b482aaab82cb8d5631e16d51478c90079cc1d463
# /usr/lib/inet/wanboot/ickey -o type=3des 9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

The previous 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

More Information**Continuing the WAN Boot Installation**

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 249](#).

See Also For more information about how to display key values, see the man page `wanbootutil(1M)`.

For additional information about how to install keys on a running system, see `ickey(1M)`.

Installing the Client

When you finish preparing your network for a WAN boot installation, you can choose from the following ways to install the system.

TABLE 14-2 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.	<ul style="list-style-type: none"> ■ To install keys on the client before the installation, see “Installing Keys on the Client” on page 244. ■ To perform a noninteractive installation, see “To Perform a Noninteractive WAN Boot Installation” on page 250.
Interactive installation	Use this installation method if you want to set the client configuration information during the boot process.	“To Perform an Interactive WAN Boot Installation” on page 252
Installing with a DHCP server	Use this installation method if you configured the network DHCP server to provide client configuration information during the installation.	<ul style="list-style-type: none"> ■ To configure a DHCP server to support a WAN boot installation, see “(Optional) Providing Configuration Information With a DHCP Server” on page 240. ■ To use a DHCP server during your installation, see “To Perform a WAN Boot Installation With a DHCP Server” on page 255.

TABLE 14-2 Methods to Install the Client (Continued)

Method	Description	Instructions
Installing with local CD media	If your client OBP does not support WAN boot, boot the client from a local copy of the Solaris Software CD.	<ul style="list-style-type: none"> ■ To determine if the client OBP supports WAN boot, see “To Check the Client OBP for WAN Boot Support” on page 212. ■ To install the client with a local copy of the Solaris Software CD, see “To Perform a WAN Boot Installation With Local CD Media” on page 257.

▼ 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 244.

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.

setenv network-boot-arguments	Instructs the OBP to set the following boot arguments
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) <code>http-proxy=proxy-ip:port</code>	Specifies the IP address and port of the network's proxy server
<code>file=wanbootCGI-URL</code>	Specifies the URL of the wanboot - cgi program on the web server

3 Boot the client.

```
ok boot net - install
```

`net - install` Instructs the client to use the network boot argument variables to boot from the WAN

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 14-4 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 244](#).

```
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 `set(1)`.

For more information about how to boot a system, see `boot(1M)`.

▼ 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.

<code>setenv network-boot-arguments</code>	Instructs the OBP to set the following boot arguments
<code>host-ip=<i>client-IP</i></code>	Specifies the IP address of the client

<code>router-ip=router-ip</code>	Specifies the IP address of the network router
<code>subnet-mask=mask-value</code>	Specifies the subnet mask value
<code>hostname=client-name</code>	Specifies the host name of the client
(Optional) <code>http-proxy=proxy-ip:port</code>	Specifies the IP address and port of the network's proxy server
<code>bootserver=wanbootCGI-URL</code>	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 the system.

```
ok boot net -o prompt - install
```

```
net -o prompt - install
```

Instructs the client to boot and install from the network. The wanboot program prompts the user to enter client configuration information at the `boot>` prompt.

The `boot>` prompt is displayed.

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 14-5 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 previous 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

```
boot> 3des=9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

```
boot> sha1=b482aaab82cb8d5631e16d51478c90079cc1d463
```

```
boot> go
```

The previous 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

See Also For more information about how to display key values, see `wanbootutil(1M)`.

For more information about how to set network boot arguments, see `set(1)`.

For more information about how to boot a system, see `boot(1M)`.

▼ 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 [“\(Optional\) Providing Configuration Information With a DHCP Server” on page 240](#).

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 244](#).
- 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 98.

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
```

setenv network-boot-arguments Instructs the OBP to set the following boot arguments

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.

```
ok boot net - install
```

net - install Instructs the client to use the network boot argument variables to boot from the WAN

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 14–6 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 `set(1)`.

For more information about how to boot a system, see `boot(1M)`.

For more information about how to configure a DHCP server, see “(Optional) Providing Configuration Information With a DHCP Server” on page 240.

▼ 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 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.

Follow these steps to perform a WAN boot installation from a local CD.

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 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
```

<code>cdrom</code>	Instructs the OBP to boot from the local CD-ROM
<code>-o prompt</code>	Instructs the wanboot program to prompt the user to enter client configuration information
<code>-F wanboot</code>	Instructs the OBP to load the wanboot program from the CD-ROM
<code>- install</code>	Instructs the client to perform a WAN boot installation

The client's OBP loads the wanboot program from the 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 [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 [Step 2](#).

9 Set the network interface variables.

`boot> variable=value[, variable=value*]`

Type the following variable and value pairs at the `boot>` prompt.

<code>host-ip=client-IP</code>	Specifies the IP address of the client.
<code>router-ip=router-ip</code>	Specifies the IP address of the network router.
<code>subnet-mask=mask-value</code>	Specifies the subnet mask value.
<code>hostname=client-name</code>	Specifies the host name of the client.
(Optional) <code>http-proxy=proxy-ip:port</code>	Specifies the IP address and port number of the network's proxy server.
<code>bootserver=wanbootCGI-URL</code>	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 14-7 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 previous 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@0,1 File and args: -o prompt
```

```
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
```

The previous 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/

See Also For more information about how to display key values, see `wanbootutil(1M)`.

For more information about how to set network boot arguments, see `set(1)`.

For more information about how to boot a system, see `boot(1M)`.

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” on page 264
- “Create the Document Root Directory” on page 265
- “Create the WAN Boot Miniroot” on page 265
- “Check the Client OBP for WAN Boot Support” on page 265
- “Install the wanboot Program on the WAN Boot Server” on page 266
- “Create the /etc/netboot Hierarchy” on page 266
- “Copy the wanboot - cgi Program to the WAN Boot Server” on page 267
- “(Optional) Configure the WAN Boot Server as a Logging Server” on page 267
- “Configure the WAN Boot Server to Use HTTPS” on page 267
- “Provide the Trusted Certificate to the Client” on page 267
- “(Optional) Use Private Key and Certificate for Client Authentication” on page 268
- “Create the Keys for the Server and the Client” on page 268
- “Create the Solaris Flash Archive” on page 269
- “Create the sysidcfg File” on page 269
- “Create the Client’s Profile” on page 270
- “Create and Validate the rules File” on page 270
- “Create the System Configuration File” on page 271
- “Create the wanboot . conf File” on page 271
- “Check the net Device Alias in OBP” on page 273
- “Install Keys on the Client” on page 273
- “Install the Client” on page 274

Sample Site Setup

Figure 15-1 shows the site setup for this example.

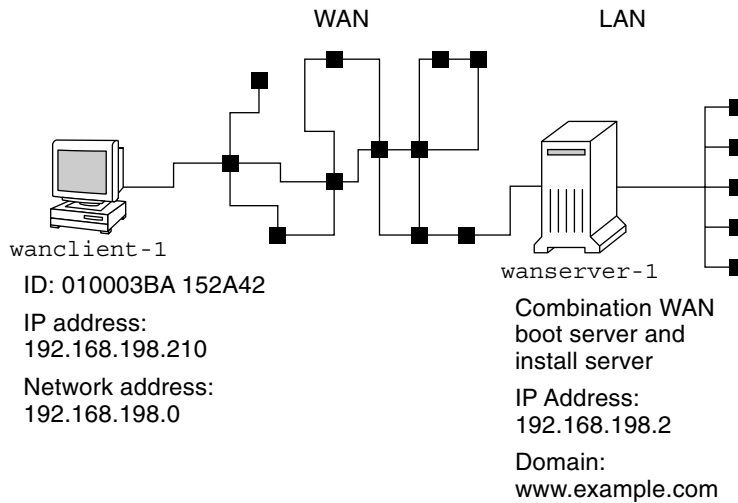


FIGURE 15-1 Sample Site for WAN Boot Installation

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 Solaris 10 6/06 OS.
- `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 `wancient-1`.
- `wancient-1` is an UltraSPARCII system.
- The client ID for `wancient-1` is 010003BA152A42.
- The IP address of `wancient-1` is 192.168.198.210.
- The IP address of the client's subnet is 192.168.198.0.
- The client system `wancient-1` has Internet access, but is not directly connected to the network that includes `wanserver-1`.
- `wancient-1` is a new system that is to be installed with the Solaris 10 6/06 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.

- 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 Solaris software image to the `/export/install/Solaris_10` directory of wanserver-1.

Insert the Solaris Software media in the media drive that is attached to wanserver-1. Type the following commands.

```
wanserver-1# mkdir -p /export/install/sol_10_sparc
wanserver-1# cd /cdrom/cdrom0/s0/Solaris_10/Tools
wanserver-1# ./setup_install_server -w /export/install/sol_10_sparc/miniroot \
/export/install/sol_10_sparc
```

Move the WAN boot miniroot to the document root directory (/opt/apache/htdocs/) of the WAN boot server.

```
wanserver-1# mv /export/install/sol_10_sparc/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 Solaris Software media to the WAN boot server's document root directory.

Insert the Solaris DVD or the Solaris Software - 1 CD in the media drive that is attached to wanserver-1 and type the following commands.

```
wanserver-1# cd /cdrom/cdrom0/s0/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 Solaris 10 6/06 OS, 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. Then, 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, you 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, you 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 Solaris Flash Archive

In this example, you create your Solaris 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. You 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 15-1 sysidcfg File for client-1 System

The following is an example of a sysidcfg file for wanclient-1. The host name, IP address, and netmask of these systems have been preconfigured by editing the name 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
terminal=xterm
timeserver=localhost
name_service=NIS {name_server=matter(192.168.254.254)
                  domain_name=leti.example.com}
```

EXAMPLE 15-1 sysidcfg File for client-1 System (Continued)

```

    }
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 Solaris 10 6/06 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/sol_10_sparc.flar
partitioning           explicit
filesys                c0t1d0s0 4000 /
filesys                c0t1d0s1 512 swap
filesys                c0t1d0s7 free /export/home

```

The following list describes some of the keywords and values from this example.

install_type	The profile installs a Solaris Flash archive on the clone system. All files are overwritten as in an initial installation.
archive_location	The compressed Solaris 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 Solaris 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 custom JumpStart programs use 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 custom JumpStart programs should use to install wanclient-1.

```
network 192.168.198.0 - wanclient_1_prof -
```

This rules file instructs the custom JumpStart programs to use the wanclient_1_prof to install the Solaris 10 6/06 software on wanclient-1.

Name this rule file `wanclient_rule`.

After you create the profile and the rules file, you 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 custom 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 custom 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 custom 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 268, 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 267, 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, type the `devalias` command to verify that the net alias is set to the primary network device `/pci@1f,0/pci@1,1/network@0,1`.

```
ok devalias
screen                /pci@1f,0/pci@1,1/SUNW,m64B@2
net                   /pci@1f,0/pci@1,1/network@0,1
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@0,1` is assigned to the net alias. You do not need to reset the alias.

Install Keys on the Client

In “[Create the Keys for the Server and the Client](#)” on page 268, you 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
```

The previous 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.

```
ok set-security-key wanboot-hmac-sha1 b482aaab82cb8d5631e16d51478c90079cc1d463
ok set-security-key wanboot-3des 9ebc7a57f240e97c9b9401e9d3ae9b292943d3c143d07f04
```

The previous 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`

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.

WAN Boot (Reference)

This chapter briefly describes the commands and files you use to perform a WAN installation.

- “WAN Boot Installation Commands” on page 277
- “OBP Commands” on page 280
- “System Configuration File Settings and Syntax” on page 281
- “wanboot.conf File Parameters and Syntax” on page 281

WAN Boot Installation Commands

The following tables describe the commands you use to perform a WAN boot installation.

- Table 16-1
- Table 16-2

TABLE 16-1 Preparing the WAN Boot Installation and Configuration Files

Task and Description	Command
Copy the Solaris installation image to <i>install-dir-path</i> , and copy the WAN boot miniroot to <i>wan-dir-path</i> on the install server’s local disk.	<code>setup_install_server -w wan-dir-path install-dir-path</code>

TABLE 16-1 Preparing the WAN Boot Installation and Configuration Files (Continued)

Task and Description	Command
<p>Create a Solaris Flash archive that is named <i>name.flar</i>.</p> <ul style="list-style-type: none"> ■ <i>name</i> is the name of the archive ■ <i>optional-parameters</i> are optional parameters you can use to customize the archive ■ <i>document-root</i> is the path to the document root directory on the install server ■ <i>filename</i> is the name of the archive 	<code>flarcreate -n name [optional-parameters] document-root/flash/filename</code>
<p>Check the validity of the custom JumpStart <i>rules</i> file that is named <i>rules</i>.</p>	<code>./check -r rules</code>
<p>Check the validity of the <i>wanboot.conf</i> file.</p> <ul style="list-style-type: none"> ■ <i>net-ip</i> is the IP address of the client's subnet. ■ <i>client-ID</i> can be a user-defined ID or the DHCP client ID. 	<code>bootconfchk /etc/netboot/net-ip/client-ID/wanboot.conf</code>
<p>Check for WAN boot installation support in the client OBP.</p>	<code>eeeprom grep network-boot-arguments</code>

TABLE 16-2 Preparing the WAN Boot Security Files

Task and Description	Command
<p>Create a master HMAC SHA1 key for the WAN boot server.</p>	<code>wanbootutil keygen -m</code>
<p>Create a HMAC SHA1 hashing key for the client.</p> <ul style="list-style-type: none"> ■ <i>net-ip</i> is the IP address of the client's subnet. ■ <i>client-ID</i> can be a user-defined ID or the DHCP client ID. 	<code>wanbootutil keygen -c -o net=net-ip,cid=client-ID,type=sha1</code>
<p>Create an encryption key for the client.</p> <ul style="list-style-type: none"> ■ <i>net-ip</i> is the IP address of the client's subnet. ■ <i>client-ID</i> can be a user-defined ID or the DHCP client ID. ■ <i>key-type</i> is either 3des or aes. 	<code>wanbootutil keygen -c -o net=net-ip,cid=client-ID,type=key-type</code>

TABLE 16-2 Preparing the WAN Boot Security Files (Continued)

Task and Description	Command
Split a PKCS#12 certificate file and insert the certificate in the client's truststore. <ul style="list-style-type: none"> ▪ <i>p12cert</i> is the name of the PKCS#12 certificate file. ▪ <i>net-ip</i> is the IP address of the client's subnet. ▪ <i>client-ID</i> can be a user-defined ID or the DHCP client ID. 	<pre>wanbootutil p12split -i <i>p12cert</i> -t /etc/netboot/<i>net-ip</i>/<i>client-ID</i>/truststore</pre>
Split a PKCS#12 certificate file and insert the client certificate in the client's certstore <ul style="list-style-type: none"> ▪ <i>p12cert</i> is the name of the PKCS#12 certificate file. ▪ <i>net-ip</i> is the IP address of the client's subnet. ▪ <i>client-ID</i> can be a user-defined ID or the DHCP client ID. ▪ <i>keyfile</i> is the name of the client's private key. 	<pre>wanbootutil p12split -i <i>p12cert</i> -c /etc/netboot/<i>net-ip</i>/<i>client-ID</i>/certstore -k <i>keyfile</i></pre>
Insert the client private key from a split PKCS#12 file in the client's keystore. <ul style="list-style-type: none"> ▪ <i>keyfile</i> is the name of the client's private key. ▪ <i>net-ip</i> is the IP address of the client's subnet. ▪ <i>client-ID</i> can be a user-defined ID or a DHCP client ID. 	<pre>wanbootutil keygmt -i -k <i>keyfile</i> -s /etc/netboot/<i>net-ip</i>/<i>client-ID</i>/keystore -o type=rsa</pre>
Display the value of a HMAC SHA1 hashing key. <ul style="list-style-type: none"> ▪ <i>net-ip</i> is the IP address of the client's subnet. ▪ <i>client-ID</i> can be a user-defined ID or the DHCP client ID. 	<pre>wanbootutil keygen -d -c -o net=<i>net-ip</i>,cid=<i>client-ID</i>,type=sha1</pre>
Display the value of an encryption key. <ul style="list-style-type: none"> ▪ <i>net-ip</i> is the IP address of the client's subnet. ▪ <i>client-ID</i> can be a user-defined ID or the DHCP client ID. ▪ <i>key-type</i> is either 3des or aes. 	<pre>wanbootutil keygen -d -c -o net=<i>net-ip</i>,cid=<i>client-ID</i>,type=<i>key-type</i></pre>
Insert a hashing key or an encryption key on a running system. <i>key-type</i> can have a value of sha1, 3des, or aes.	<pre>/usr/lib/inet/wanboot/ickey -o type=<i>key-type</i></pre>

OBP Commands

The following table lists the OBP commands that you type at the client ok prompt to perform a WAN boot installation.

TABLE 16-3 OBP Commands for a WAN Boot Installation

Task and Description	OBP Command
Begin an unattended WAN boot installation.	<code>boot net - install</code>
Begin an interactive WAN boot installation.	<code>boot net -o prompt - install</code>
Begin a WAN boot installation from a local CD.	<code>boot cdrom -F wanboot - install</code>
Install a hashing key before you begin a WAN boot installation. <i>key-value</i> is the hexadecimal value of the hashing key.	<code>set-security-key wanboot-hmac-sha1 <i>key-value</i></code>
Install an encryption key before you begin a WAN boot installation. <ul style="list-style-type: none"> ■ <i>key-type</i> is either <code>wanboot-3des</code> or <code>wanboot-aes</code>. ■ <i>key-value</i> is the hexadecimal value of the encryption key. 	<code>set-security-key <i>key-type key-value</i></code>
Verify that key values are set in OBP.	<code>list-security-keys</code>
Set client configuration variables before you begin your WAN boot installation. <ul style="list-style-type: none"> ■ <i>client-IP</i> is the IP address of the client. ■ <i>router-ip</i> is the IP address of the network router. ■ <i>mask-value</i> is the subnet mask value. ■ <i>client-name</i> is the host name of the client. ■ <i>proxy-ip</i> is the IP address of the network's proxy server. ■ <i>wanbootCGI-path</i> is the path to the wanboot CGI programs on the web server. 	<code>setenv network-boot-arguments host-ip=<i>client-IP</i>, router-ip=<i>router-ip</i>, subnet-mask=<i>mask-value</i>, hostname=<i>client-name</i>, http-proxy=<i>proxy-ip</i>, file=<i>wanbootCGI-path</i></code>
Check the network device alias.	<code>devalias</code>
Set the network device alias, where <i>device-path</i> is the path to the primary network device.	<ul style="list-style-type: none"> ■ To set the alias for the current installation only, type <code>devalias net <i>device-path</i></code>. ■ To permanently set the alias, type <code>nvvalias net <i>device-path</i></code>.

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`
- Custom 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 custom 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 on 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 216](#).

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 man page `wanboot.conf(4)`.

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 custom JumpStart files.

Set the value to the path to the `sysidcfg` and custom JumpStart files on the web server.

`system_conf=sys.conf`

PART IV

Appendixes

This part provides reference information.

Troubleshooting (Tasks)

This chapter contains a list of specific error messages and general problems you might encounter when installing Solaris 10 6/06 software. The chapter also explains how to fix the problems. Start by using this list of sections to determine where in the installation process the problem occurred.

- “Problems With Setting Up Network Installations” on page 287
- “Problems With Booting a System” on page 287
- “Initial Installation of the Solaris OS” on page 293
- “Upgrading the Solaris OS” on page 295

Note – When you see the phrase “bootable media,” this means the Solaris installation program and JumpStart 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 name service.

Description: Add the host *host_name* to the name service and execute the `add_install_client` command again.

Problems With Booting a System

Booting From Media, Error Messages

le0: No carrier - transceiver cable problem

Cause: The system is not connected to the network.

Solution: If this is a nonnetworked system, ignore this message. If this 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 Solaris 10 6/06 software from the network from an install server. The following are examples of checks you can make.

- If you copied the images of the Solaris DVD or the 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 Solaris DVD or 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.

Note – *filename* is a variable for the name of the file affected.

Solution: Follow these instructions:

- Reset the boot - file in the PROM to “ “ (blank).
- Ensure that the 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.
- Solaris DVD or the 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 Solaris 10 6/06 software was installed (either through the Solaris installation program or custom 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.

Booting From Media, General Problems

The system does not boot.

Description: When initially setting up a custom 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. When you use the `-v` option, the boot command displays verbose debugging information about the screen.

Note – If this flag is not given, the messages are still printed, but the output is directed to the system log file. For more information, see `syslogd(1M)`.

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 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 sunsolve.sun.com.

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*)

Solution: You have hardware that is not supported. 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. Such an entry resembles 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 name 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: This error occurs on a system that you are attempting to install from the network. The system 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 167](#).

`prom_panic`: Could not mount file system (*SPARC based systems only*)

Cause: This error occurs when you are installing Solaris from a network, but the boot software cannot locate the following:

- Solaris DVD, either the DVD or a copy of the DVD image on the install server
- Solaris Software - 1 CD image, either the 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 Solaris from the install server’s DVD-ROM or CD-ROM drive, ensure that the Solaris DVD or 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 Solaris DVD image or 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+ name 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 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 custom JumpStart installation, the `add_install_client` command specifies the platform group that uses a specified server as an install server. If the wrong architecture value is used when using the `add_install_client`, this problem occurs. 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 name service. If the system's host name is listed in the NIS or NIS+ name 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. Using this command adds 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.

Booting From the Network, General Problems

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 98.

Initial Installation of the Solaris OS

Initial installation fails

Solution: If the Solaris installation fails, you must restart the installation. To restart the installation, boot the system from the Solaris DVD, the Solaris Software - 1 CD, or from the network.

You cannot uninstall the Solaris software after the software has been partially installed. You must restore your system from a backup or begin the Solaris installation process again.

`/cdrom/Solaris_10/SUNWxxx/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 Solaris Device Configuration Assistant diskette 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 Solaris software to a device that does not require the Solaris Device Configuration Assistant diskette.

x86 only – If you are using the `locale` keyword to test a custom 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 Solaris OS”](#) on page 295.

▼ x86: To Check IDE Disk for Bad Blocks

IDE disk drives do not automatically map out bad blocks like other drives supported by Solaris software. Before installing Solaris on an IDE disk, you might want to perform a surface analysis on the disk. To perform surface analysis on an IDE disk, follow this procedure.

- 1 **Boot to the installation media.**
- 2 **When you are prompted to select an installation type, select option 6, Single user shell.**

3 Start the `format(1M)` program.

```
# format
```

4 Specify the IDE disk drive on which you want to perform a surface analysis.

```
# cxdy
```

```
cx    Is the controller number
```

```
dy    Is the device number
```

5 Determine if you have an `fdisk` partition.

- If a Solaris `fdisk` partition already exists, proceed to [Step 6](#).
- If a Solaris `fdisk` partition does not exist, use the `fdisk` command to create a Solaris partition on the disk.

```
format> fdisk
```

6 To begin the surface analysis, type:

```
format> analyze
```

7 Determine the current settings, type:

```
analyze> config
```

8 (Optional) To change settings, type:

```
analyze> setup
```

9 To find bad blocks, type:

```
analyze> type_of_surface_analysis
```

```
type_of_surface_analysis    Is read, write, or compare
```

If `format` finds bad blocks, it remaps them.

10 To exit the analysis, type:

```
analyze> quit
```

11 Determine if you want to specify blocks to remap.

- If no, go to [Step 12](#).
- If yes, type:

```
format> repair
```

12 To exit the `format` program, type:

```
quit
```

13 Restart the media in multiuser mode by typing the following command.

```
# exit
```

Upgrading the 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: Solaris Live Upgrade fails because of needing a patch cluster.

Solution: A patch is needed to install Solaris Live Upgrade. Ensure that you have the most recently updated patch list by consulting <http://sunsolve.sun.com>. Search for the info doc 72099 on the SunSolve web site.

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 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 Mbytes or use another method of upgrading such as the Solaris installation program from 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 Solaris root (/) file system and is found on the 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. Uncompress the miniroot archive.

```
# /usr/bin/gzcat $MINIROOT_ARCHIVE > $TEMP_FILE_NAME
```

2. Create the miniroot device by using the `lofiadm` command.

```
# LOFI_DEVICE=/usr/sbin/lofiadm -a $TEMP_FILE_NAME
# echo $LOFI_DEVICE
/dev/lofi/1
```

3. Mount the miniroot with the `lofi` command under the Miniroot directory.

```
# /usr/sbin/mount -F ufs $LOFI_DEVICE $MINIROOT_DIR
```

4. Test the profile.

```
# /usr/sbin/install.d/pfinstall -D -c $MEDIA_DIR $path-to-jumpstart_profile
```

5. After the testing is completed, unmount the `lofi` device.

```
# umount $LOFI_DEVICE
```

6. Delete the `lofi` device.

```
# lofiadm -d $TEMP_FILE_NAME
```

Upgrading, General Problems

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

Is the version of Solaris software on the system

Cause: *Reason 3:* SUNWusr is missing from /var/sadm/softinfo.

Solution: *Solution 3:* You need to do an initial installation. The Solaris software is not upgradable.

Couldn't shut down or initialize the md driver

Solution: Follow these instructions:

- If the file system is not a RAID-1 volume, comment out 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 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](#)” on page 40 for the space problem and see if you can fix it 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*.

▼ To Continue Upgrading After a Failed Upgrade

The upgrade fails and the system cannot be soft-booted. The failure is for reasons beyond your control, such as a power failure or a network connection failure.

- 1 **Reboot the system from the Solaris DVD, the Solaris Software - 1 CD, or from the network.**

2 Choose the upgrade option for installation.

The Solaris installation program determines if the system has been partially upgraded and continues the upgrade.

x86: Problems With Solaris Live Upgrade When You Use GRUB

The following errors can occur when you use Solaris 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: The error messages are seen when using the `luupgrade` command to upgrade a new boot environment.

Cause: An older version of Solaris Live Upgrade is being used. The Solaris Live Upgrade packages you have installed on your system are incompatible with the media and the release on that media.

Solution: Always use the Solaris Live Upgrade packages from the release you are upgrading to.

Example: In the following example, the error message indicates that the Solaris 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 Solaris Live Upgrade has not been installed.

Cause: One or more patches required by Solaris Live Upgrade are not installed on your system. Beware that this error message does not catch all missing patches.

Solution: Before using Solaris Live Upgrade, always install all the required patches. Ensure that you have the most recently updated patch list by consulting <http://sunsolve.sun.com>. Search for the info doc 72099 on the SunSolve web site.

ERROR: Device mapping command </sbin/biosdev> failed. Please reboot and try again.

Cause: *Reason 1:* Solaris Live Upgrade is unable to map devices because of previous administrative tasks.

Solution: *Reason 1:* Reboot the system and try Solaris 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: Solaris Live Upgrade imposes the restriction that a boot environment cannot be deleted if the boot environment contains the GRUB menu.

Solution: Use `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. Solaris 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 Solaris 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:

- Contain a mountable file system
- Remain a part of the same Solaris 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 Solaris Live Upgrade Running Veritas VxVm

When you use Solaris 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 Solaris advanced packaging guidelines.

- 1 **Create an inactive boot environment. See “Creating a New Boot Environment” in *Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.**

2 Before upgrading the inactive boot environment, you must 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`, for example:

```
# 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, for example:

```
# sed '/vx\dsk/s/^/#/' < 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.

```
# lumount inactive_boot_environment_name
```

3 Upgrade the inactive boot environment. See Chapter 9, "Upgrading With Solaris Live Upgrade (Tasks)," in *Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.

- 4 **Activate the inactive boot environment. See “Activating a Boot Environment” in *Solaris 10 6/06 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.**
- 5 **Shut down the system.**

```
# init 0
```
- 6 **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.
- 7 **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 VRTSvman VRTSvmdev
```
- 8 **Restore the original `vfstab` and system files:**

```
# cp /etc/vfstab.original /etc/vfstab
# cp /etc/system.original /etc/system
```
- 9 **Reboot the system.**

```
# init 6
```

x86: Service Partition Not Created by Default on Systems With No Existing Service Partition

If you install the Solaris 10 6/06 OS 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 Solaris partition, you must re-create the service partition before you install the Solaris 10 6/06 OS.

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 Solaris 10 6/06 OS.

If you want to include a service partition on the disk that contains the Solaris partition, choose one of the following workarounds.

▼ **To Install Software From a Network Installation Image or From the Solaris DVD**

To install the software from a net installation image or from the 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 To load the default boot disk partition layout, click Default.**
The installation program preserves the service partition and creates the Solaris partition.

▼ **To Install From the Solaris Software - 1 CD or From a Network Installation Image**

To use the Solaris installation program to install from the 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.
- 3 The installation program prompts you to choose a method for creating the Solaris partition.**
- 4 Boot the system.**
- 5 Select the Use rest of disk for Solaris partition option.**
The installation program preserves the service partition and creates the Solaris partition.

6 Complete the installation.

Installing or Upgrading Remotely (Tasks)

This appendix describes how to use the Solaris installation program program to install or upgrade to the 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 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 Solaris Installation Program to Install or Upgrade From a Remote DVD-ROM or CD-ROM

If you want to install the 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: 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* for detailed information about managing removable media without the Volume Manager.

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 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 Solaris DVD or the 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/s0/Solaris_10/Tools
```

- For CD media, type:

```
remote system# cd /cdrom/cdrom0/s0
```

- 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/s0 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 Solaris 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/s0
```

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 Solaris DVD or 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/s0
```

```
remote system# unshare /cdrom/cdrom0/s1
```

11 On the client system that you are installing, continue the Solaris installation by clicking Next.**12 If the Solaris installation program prompts you to insert the Solaris Software - 2 CD, repeat Step 9 through Step 11 to unshare the Solaris Software - 1 CD and to export and install the Solaris Software - 2 CD.****13 If the Solaris installation program prompts you to insert additional Solaris Software CDs, repeat Step 9 through Step 11 to unshare the Solaris Software CDs and to export and install the additional CDs.****14 If the Solaris installation program prompts you to insert the Solaris Languages CD, repeat Step 9 through Step 11 to unshare the Solaris Software CDs and to export and install the Solaris Languages CD.**

When you export the Solaris Languages CD, an installer window appears on the machine where the CD-ROM is mounted. Ignore the installer window while you install the Solaris Languages CD. After you complete the installation of the Solaris Languages CD, close the installer window.

Glossary

<code>/etc</code>	A directory that contains critical system configuration files and maintenance commands.
<code>/etc/netboot</code> 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.
<code>/export</code>	A file system on an OS server that is shared with other systems on a network. For example, the <code>/export</code> file system can contain the root (<code>/</code>) file system and swap space for diskless clients and the home directories for users on the network. Diskless clients rely on the <code>/export</code> file system on an OS server to boot and run.
<code>/opt</code>	A file system that contains the mount points for third-party and unbundled software.
<code>/usr</code>	A file system on a standalone system or server that contains many of the standard UNIX programs. Sharing the large <code>/usr</code> file system with a server rather than maintaining a local copy minimizes the overall disk space that is required to install and run the Solaris software on a system.
<code>/var</code>	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, <code>vi</code> files, mail files, and <code>uucp</code> files.
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	<p>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.</p> <p>An archive could be a differential archive which is a Solaris 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.</p>

arrow keys	One of the four directional keys on the numeric keypad.
begin script	A user-defined Bourne shell script, specified within the <code>rules</code> file, that performs tasks before the Solaris software is installed on the system. You can use begin scripts only with custom JumpStart installations.
boot	To load the system software into memory and start it.
boot archive	<p>x86 only: A boot archive is a collection of critical files that is used to boot the Solaris OS. These files are needed during system startup before the root (<code>/</code>) file system is mounted. Two boot archives are maintained on a system:</p> <ul style="list-style-type: none">▪ The boot archive that is used to boot the 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 (<code>/</code>) 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	<p>A collection of mandatory file systems (disk slices and mount points) that are critical to the operation of the Solaris OS. These disk slices might be on the same disk or distributed across multiple disks.</p> <p>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.</p>
boot loader	<p>x86 only: The boot loader is the first software program that runs after you turn on a system. This program begins the booting process.</p>
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 Solaris software is to be installed.
<code>bootlog.cgi</code>	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.
<code>certstore</code>	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.
checksum	The result of adding a group of data items that are used for checking the group. The data items can be either numerals or other character strings that are treated as numerals during the checksum calculation. The checksum value verifies that communication between two devices is successful.
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.
clone system	A system that you installed by using a Solaris Flash archive. The clone system has the same installation configuration as the master system.
cluster	A logical collection of packages (software modules). The Solaris software is divided into <i>software groups</i> , which are each composed of clusters and <i>packages</i> .
command line	A string of characters that begins with a command, often followed by arguments, including options, file names, and other expressions, and terminated by the end-of-line character.
concatenation	A RAID-0 volume. If slices are concatenated, the data is written to the first available slice until that slice is full. When that slice is full, the data is written to the next slice, serially. A concatenation provides no data redundancy unless it is contained in a mirror. See also RAID-0 volume.
Core Software Group	A software group that contains the minimum software that is required to boot and run the Solaris OS on a system. Core includes some networking software and the drivers that are required to run the Common Desktop Environment (CDE) desktop. Core does not include the CDE software.
critical file systems	File systems that are required by the Solaris OS. When you use Solaris Live Upgrade, these file systems are separate mount points in the <i>vfstab</i> of the active and inactive boot environments. Example file systems are root (<i>/</i>), <i>/usr</i> , <i>/var</i> , and <i>/opt</i> . These file systems are always copied from the source to the inactive boot environment.
custom JumpStart	A type of installation in which the 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. A custom JumpStart installation is a JumpStart installation you create.
custom probes file	A file, which must be located in the same JumpStart directory as the <i>rules</i> file, that is a Bourne shell script that contains two types of functions: probe and comparison. Probe functions gather the information you want or do the actual work and set a corresponding <i>SI_</i> environment variable you define. Probe functions become probe keywords. Comparison functions call a corresponding probe function, compare the output of the probe function, and return 0 if the keyword matches or 1 if the keyword doesn't match. Comparison functions become rule keywords. See also <i>rules file</i> .

decryption	The process of converting coded data to plain text. See also encryption .
derived profile	A profile that is dynamically created by a begin script during a custom JumpStart installation.
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.
Developer Solaris Software Group	A software group that contains the End User Solaris Software Group plus the libraries, include files, man pages, and programming tools for developing software.
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.
differential archive	A Solaris 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 that are specified and is restricted to systems that contain software consistent with the unchanged master image.
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 .
disk configuration file	A file that represents a structure of a disk (for example, bytes/sector, flags, slices). Disk configuration files enable you to use <code>pfinstall</code> from a single system to test profiles on different-size disks.
diskless client	A client on a network that relies on a server for all of its disk storage.
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.
domain	A part of the Internet naming hierarchy. A domain represents a group of systems on a local network that share administrative files.
domain name	The name that is assigned to a group of systems on a local network that share administrative files. The domain name is required for the Network Information Service (NIS) database to work properly. A domain name consists of a sequence of component names that are separated by periods (for example: <code>tundra.mpk.ca.us</code>). As you read a domain name from left to right, the component names identify more general (and usually remote) areas of administrative authority.

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 .
End User Solaris Software Group	A software group that contains the Core Software Group plus the recommended software for an end user, including the Common Desktop Environment (CDE) and DeskSet software.
Entire Solaris Software Group	A software group that contains the entire Solaris 10 6/06 release.
Entire Solaris Software Group Plus OEM Support	A software group that contains the entire Solaris 10 6/06 release, plus additional hardware support for OEMs. This software group is recommended when installing Solaris software on SPARC based servers.
failsafe boot archive	x86 only: A boot archive that is used for recovery when the primary boot archive is damaged. This boot archive brings the system up without mounting the root (/) file system. This boot archive is called failsafe on the GRUB menu. The archive's essential purpose is to regenerate the primary boot archive, which is usually used to boot the system. See <i>boot archive</i> .
fallback	A reversion to the environment that ran previously. Use fallback when you are activating an environment and the boot environment that is designated for booting fails or shows some undesirable behavior.
fdisk partition	A logical partition of a disk drive that is dedicated to a particular operating system on x86 based systems. To install the Solaris software, you must set up at least one Solaris <code>fdisk</code> partition on an x86 based system. x86 based systems allow up to four different <code>fdisk</code> partitions on a disk. These partitions can be used to hold individual operating systems. Each operating system must be located on a unique <code>fdisk</code> partition. A system can only have one Solaris <code>fdisk</code> partition per disk.
file server	A server that provides the software and file storage for systems on a network.
file system	In the SunOS™ 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 <code>rules</code> file, that performs tasks after the Solaris software is installed on the system, but before the system reboots. You use finish scripts with custom JumpStart installations.
format	To put data into a structure or divide a disk into sectors for receiving data.
function key	One of the 10 or more keyboard keys that are labeled F1, F2, F3, and so on that are mapped to particular tasks.
global zone	In Solaris Zones, the global zone is both the default zone for the system and the zone used for system-wide administrative control. The global zone is the only zone from which a non-global zone can be configured, installed, managed, or uninstalled. Administration of the system infrastructure, such as physical devices, routing, or dynamic reconfiguration (DR), is only possible in the global

zone. Appropriately privileged processes running in the global zone can access objects associated with other zones. See also Solaris Zones and non-global zone.

- 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 Solaris OS, Linux, or Microsoft Windows.
- 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.
- hard link** A directory entry that references a file on disk. More than one such directory entry can reference the same physical file.
- hash** A number that is produced by taking some input and generating a number that is significantly shorter than the input. The same output value is always generated for identical inputs. Hash functions can be used in table search algorithms, in error detection, and in tamper detection. When used for tamper detection, hash functions are chosen such that it is difficult to find two inputs that yield the same hash result. MD5 and SHA-1 are examples of one-way hash functions. For example, a message digest takes a variable-length input such as a disk file and reduces it to a small value.
- 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 Solaris OS overwrites the system's disk or disks with the new version of the Solaris OS. If your system is not running the Solaris OS, you must perform an initial installation.

If your system is running an upgradable version of the Solaris OS, an initial installation overwrites the disk and does not preserve the OS or local modifications.

- install server** A server that provides the Solaris DVD or CD images from which other systems on a network can install Solaris (also known as a *media server*). You can create an install server by copying the Solaris DVD or CD images to the server's hard disk.
- IP address** (Internet protocol address) In TCP/IP, a unique 32-bit number that identifies each host in a network. An IP address consists of four numbers that are separated by periods (192.168.0.0, for example). Most often, each part of the IP address is a number between 0 and 255. However, the first number must be less than 224 and the last number cannot be 0.
- IP addresses are logically divided into two parts: the network (similar to a telephone area code), and the local system on the network (similar to a phone number). The numbers in a Class A IP address, for example, represent “network.local.local.local” and the numbers in a Class C IP address represent “network.network.network.local.”
- | Class | Range (xxx is a number 0 to 255) | Number of Available IP Addresses |
|---------|----------------------------------|----------------------------------|
| Class A | 1.xxx.xxx.xxx - 126.xxx.xxx.xxx | Over 16 million |
| Class B | 128.0.xxx.xxx - 191.255.xxx.xxx | Over 65,000 |
| Class C | 192.0.0.xxx - 223.255.255.xxx | 256 |
- IPv6** IPv6 is a version (version 6) of Internet Protocol (IP) that is designed to be an evolutionary step from the current version, IPv4 (version 4). Deploying IPv6, by using defined transition mechanisms, does not disrupt current operations. In addition, IPv6 provides a platform for new Internet functionality.
- IPv6 is described in more detail in Part I, “Introducing System Administration: IP Services,” in *System Administration Guide: IP Services*.
- job** A user-defined task to be completed by a computer system.
- JumpStart directory** When you use a profile diskette for custom JumpStart installations, the JumpStart directory is the root directory on the diskette that contains all the essential custom JumpStart files. When you use a profile server for custom JumpStart installations, the JumpStart directory is a directory on the server that contains all the essential custom JumpStart files.
- JumpStart installation** A type of installation in which the Solaris software is automatically installed on a system by using the factory-installed JumpStart software.
- Kerberos** A network authentication protocol that uses strong, secret-key cryptography to enable a client and server to identify themselves to each other over an insecure network connection.

key	The code for encrypting or decrypting data. See also encryption .
keystore	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.
LAN	(local area network) A group of computer systems in close proximity that can communicate by way of some connecting hardware and software.
LDAP	(Lightweight Directory Access Protocol) A standard, extensible directory access protocol that is used by LDAP naming service clients and servers to communicate with each other.
locale	A geographic or political region or community that shares the same language, customs, or cultural conventions (English for the U.S. is <code>en_US</code> , and English for the U.K. is <code>en_UK</code>).
logical device	A group of physical slices on one or more disks that appear to the system as a single device. A logical device is called a volume in Solaris Volume Manager. A volume is functionally identical to a physical disk in the view of an application or file system.
manifest section	A section of a Solaris Flash archive that is used to validate a clone system. The manifest section lists the files on a system to be retained, added to, or deleted from the clone system. This section is informational only. The section lists the files in an internal format and cannot be used for scripting.
master system	A system that you use to create a Solaris Flash archive. The system configuration is saved in the archive.
MD5	(Message Digest 5) An iterative cryptographic hash function that is used for message authentication, including digital signatures. The function was developed in 1991 by Rivest.
media server	See <i>install server</i> .
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.
metadevice	See <i>volume</i> .
miniroot	A minimal, bootable root (<code>/</code>) file system that is included in Solaris installation media. A miniroot consists of the 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 <i>failsafe boot archive</i> .
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, <i>/usr</i>).
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 name service to systems on a network.
name 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 name service, the system information can be maintained, managed, and accessed on a network-wide basis. Without a name service, each system has to maintain its own copy of the system information in the local <i>/etc</i> files. Sun supports the following name 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 <i>name server</i> and an <i>install server</i> .
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.
non-global zone	A virtualized operating system environment created within a single instance of the Solaris Operating System. One or more applications can run in a non-global zone without interacting with the rest of the system. Non-global zones are also called zones. See also Solaris Zones and global zone.
nonnetworked systems	Systems that are not connected to a network or do not rely on other systems.
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 (<i>/</i>) file system and swap space (<i>/export/root</i> , <i>/export/swap</i>).
package	A collection of software that is grouped into a single entity for modular installation. The Solaris software is divided into <i>software groups</i> , which are each composed of <i>clusters</i> and packages.
panel	A container for organizing the contents of a window, a dialog box, or applet. The panel might collect and confirm user input. Panels might be used by wizards and follow an ordered sequence to fulfill a designated task.

patch analyzer	A script that you can run manually or as part of the Solaris installation program. The patch analyzer performs an analysis on your system to determine which (if any) patches will be removed by upgrading to a Solaris update.
platform group	A vendor-defined grouping of hardware platforms for the purpose of distributing specific software. Examples of valid platform groups are <code>i86pc</code> and <code>sun4u</code> .
platform name	The output of the <code>uname -i</code> command. For example, the platform name for the Ultra 60 is <code>SUNW,Ultra-60</code> .
Power Management	<p>Software that automatically saves the state of a system and turns it off after it is idle for 30 minutes. When you install the Solaris software on a system that complies with Version 2 of the U.S. Environmental Protection Agency's Energy Star guidelines—a <code>sun4u</code> SPARC system, for example—the Power Management software is installed by default. After a subsequent reboot, you are prompted to enable or disable the Power Management software.</p> <p>Energy Star guidelines require that systems or monitors automatically enter a “sleep state” (consume 30 watts or less) after the system or monitor becomes inactive.</p>
primary boot archive	A boot archive that is used to boot the Solaris OS on a system. This boot archive is sometimes called the primary boot archive. See <i>boot archive</i> .
private key	The decryption key used in public-key encryption.
probe keyword	A syntactical element that extracts attribute information about a system when using the custom JumpStart method to install. A probe keyword does not require you to set up a matching condition and run a profile as required for a rule. See also <i>rule</i> .
profile	A text file that defines how to install the Solaris software when using the custom 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 <i>rules file</i> .
profile diskette	A diskette that contains all the essential custom JumpStart files in its root directory (JumpStart directory).
profile server	A server that contains all the essential custom 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.
Reduced Network Support Software Group	A software group that contains the minimum code that is required to boot and run a Solaris system with limited network service support. The Reduced Networking Software Group provides a multiuser text-based console and system administration utilities. This software group also enables the system to recognize network interfaces, but does not activate network services.
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 dismounted. 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 custom 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 <code>rules</code> file links each group to a profile, which is a text file that defines how the Solaris software is to be installed on each system in the group. A rules file is used in a custom JumpStart installation. See also <i>profile</i> .
rules.ok file	A generated version of the <code>rules</code> file. The <code>rules.ok</code> file is required by the custom JumpStart installation software to match a system to a profile. You <i>must</i> use the check script to create the <code>rules.ok</code> file.
Secure Sockets Layer	(SSL) A software library establishing a secure connection between two parties (client and server) used to implement HTTPS, the secure version of HTTP.
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 <code>/export/home</code> and <code>/swap</code> . These file systems are shared between the active and inactive boot environment when you use Solaris Live Upgrade. Shareable file systems contain the same mount point in the <code>vfstab</code> 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.
software group	A logical grouping of the Solaris software (clusters and packages). During a Solaris installation, you can install one of the following software groups: Core, End User Solaris Software, Developer Solaris Software, or Entire Solaris Software, and for SPARC systems only, Entire Solaris Software Group Plus OEM Support.
Solaris DVD or CD images	The Solaris software that is installed on a system, which you can access on the Solaris DVDs or CDs or an install server's hard disk to which you have copied the Solaris DVD or CD images.
Solaris Flash	A Solaris installation feature that enables you to create an archive of the files on a system, known as 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 <i>archive</i> .
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 Solaris software and third-party software.
Solaris 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.
Solaris Zones	A software partitioning technology used to virtualize operating system services and provide an isolated and secure environment for running applications. When you create a non-global zone, you produce an application execution environment in which processes are isolated from the all other zones. This isolation prevents processes that are running in a zone from monitoring or affecting processes that are running in any other zones. See also <i>global zone</i> and <i>non-global zone</i> .
standalone	A computer that does not require support from any other machine.
state database	A database that stores information about disk about the state of your Solaris Volume Manager configuration. The state database is a collection of multiple, replicated database copies. Each copy is referred to as a state database replica. The state database tracks the location and status of all known state database replicas.
state database replica	A copy of a state database. The replica ensures that the data in the database is valid.
submirror	See RAID-0 volume.
subnet	A working scheme that divides a single logical network into smaller physical networks to simplify routing.
subnet mask	A bit mask that is used to select bits from an Internet address for subnet addressing. The mask is 32 bits long and selects the network portion of the Internet address and 1 or more bits of the local portion.

superuser	A special user who has privileges to perform all administrative tasks on the system. The superuser has the ability to read and write to any file, run all programs, and send kill signals to any process.
swap space	A slice or file that temporarily holds the contents of a memory area till it can be loaded back into memory. Also called the /swap or swap file system.
sysidcfg file	A file in which you specify a set of special system configuration keywords that preconfigure a system.
system configuration file	(<i>system.conf</i>) A text file in which you specify the locations of the <i>sysidcfg</i> file and the custom JumpStart files you want to use in a WAN boot installation.
time zone	Any of the 24 longitudinal divisions of the earth's surface for which a standard time is kept.
truststore	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 <i>truststore</i> 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 saves modifications where possible. An upgrade of the Solaris OS merges the new version of the 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 Solaris OS.
upgrade option	An option that is presented by the Solaris installation program. The upgrade procedure merges the new version of Solaris with existing files on your disk or disks. An upgrade also saves as many local modifications as possible since the last time Solaris was installed.
URL	(Uniform Resource Locator) The addressing system used by the server and the client to request documents. A URL is often called a location. The format of a URL is <i>protocol://machine:port/document</i> . A sample URL is <code>http://www.example.com/index.html</code> .
utility	A standard program, usually furnished at no charge with the purchase of a computer, that does the computer's housekeeping.
volume	A group of physical slices or other volumes that appear to the system as a single logical device. A volume is functionally identical to a physical disk in the view of an application or file system.

In some command-line utilities, a volume is called a metadvice. Volume is also called pseudo device or virtual device in standard UNIX terms.

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 Solaris Flash archive over a public network and perform a custom 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 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 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.
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.
zone	See non-global zone

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