Tru64 UNIX

Installation Guide

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Product Version: Tru64 UNIX Version 5.0 or higher

This guide describes how to install Version 5.0 or higher of the Compaq Tru64 UNIX (formerly DIGITAL UNIX) operating system on all supported processors.

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About This Guide

This guide describes how to install the Tru64™ UNIX® (formerly DIGITAL UNIX) Version 5.0 operating system on all supported processors.

This guide describes how to prepare your system for an installation, boot the system from the distribution media, and perform the Full, Update, or Cloned Installation procedures.

Installation information is located in two books. This book covers the basic Full Installation and Update Installation procedures and is designed to get most systems from zero to operational quickly. The *Installation Guide – Advanced Topics* describes advanced installation topics such as Installation Cloning, Configuration Cloning, invoking user supplied files, and planning disk space.

Section 1.5, Using This Book, provides a navigation path to help you find the information relevant to the type of installation you want to perform.

Audience

The *Installation Guide* is intended for anyone installing or updating the base operating system software or Worldwide Language Support (WLS) software. Before starting any installation, you must:

- Read the documentation supplied with the hardware
- Read the current version of the *Release Notes*, particularly all information related to installation
- Understand how to load and unload the installation media and know which disks are needed during the installation
- Have a basic understanding of UNIX file systems and commands

New and Changed Features

The following list describes new and changed installation features:

- Your system must have a minimum of 64 MB of memory to install and run this version of the operating system.
- If you plan to install all file systems and swap space on a single disk, the disk must be 1 GB or larger.

- To better support clustering capability, a new device naming scheme has been introduced. Refer to Appendix A for a description of the new device naming conventions.
- Changes to the Update Installation process include:
  - Your system must be running Version 4.0D or 4.0F of the operating system in order to update to Version 5.0. Table 2–1 shows the successive update paths to reach Version 5.0 if your system is running a version of the operating system other than Version 4.0D or 4.0F.
  - A graphical user interface has been added to the Update Installation process. In previous releases, the Update Installation only provided a text-based interface. New Update Installation features are documented in Chapter 2.
  - Updating Worldwide Language Support (WLS) software is performed automatically during an Update Installation of the base operating system. It is no longer necessary to remove WLS software before the operating system is updated or update WLS software as a separate task.
  - The Update Installation can be invoked with the optional `-u` flag to run the Update Installation in **unattended** mode. Unattended means that barring any problems with the update, there is no user interaction required. The only exception to this is the switching of CD-ROMs if WLS software is being updated. The `-u` flag builds a kernel with all kernel components and does not provide the chance to archive obsolete files.
  - An **analysis phase** has been added to the beginning of the Update Installation process. Your system is analyzed for layered products that prevent the Update from continuing, layered products that should be reinstalled after the Update, fatal and non-fatal file system type conflicts, and available disk space. If layered product or non-fatal file type conflicts are discovered, you can resolve them directly from the Update user interface; there is no need to exit the Update, resolve the conflict, and restart the Update. If your system does not have enough available disk space for new software and room for Update processing, disk space recovery options are available directly from the Update Installation as well.
- Usability enhancements to the Full Installation process are documented in Chapter 4. Major changes to the Full Installation include:
  - Both the text-based and graphical user interfaces have a task oriented design, which steps you through each installation task and lets you go backward and forward at any time to change your answers.

  - Partition a of the disk you choose to hold the root file system must be at least 128 MB in size.
  - The new recommended partition table creates the g partition at 745 MB and the b partition for swap space at 128 MB.
  - The Advanced File System (AdvFS) is now the default file system type. You still have the option to use the UNIX File System (UFS).
  - The Logical Storage Manager (LSM) can be installed and configured during a Full Installation, eliminating the need to install and configure LSM as a separate task.
  - Worldwide Language Support (WLS) software can be installed during a Full Installation, eliminating the need to install WLS software as a separate task.
- Chapter 7 describes new SysMan tools and applications, such as Quick Setup, System Setup, and the SysMan Menu, that are used to configure your system after a Full Installation. Also described are new system monitoring tools such as the Event Manager, Insight Manager, and SysMan Station.
- The online documentation set is available in both HTML and PDF versions. Chapter 8 describes how to mount the documentation CD-ROM, how to use Netscape Navigator to view the HTML files, how to install Acrobat Reader to view PDF files, and how to copy the online documentation set files to your system. This CD-ROM is in ISO–9660 format, so it is viewable from a personal or laptop computer.

Organization

This guide is organized as follows:

Chapter 1	Provides an overview of the operating system features and a summary of the Full, Update, and Cloned Installation processes. Use this information to decide which type of installation is best suited for you.
Chapter 2	Provides an introduction to the Update Installation process, which now includes automatic update of Worldwide Language Support (WLS) software.
Chapter 3	Describes how to perform an Update Installation.
Chapter 4	Provides an introduction to the Full Installation process.

Chapter 5	Describes the tasks you must complete before beginning a Full Installation.
Chapter 6	Describes how to perform a Full Installation of the base operating system and WLS software.
Chapter 7	Describes how to set up the system for general use after installing the operating system software.
Chapter 8	Describes how to access, use, and copy the books on the Documentation CD-ROM.
Chapter 9	Provides information on installing and removing optional software at any time after the initial installation.
Appendix A	Describes the new device naming conventions introduced in Version 5.0.
Appendix B	Describes how to load a CD-ROM into a caddy and a drive, how to mount and unmount a CD-ROM, and how to remove a CD-ROM from a drive and a caddy.
Appendix C	Provides descriptions of the base operating system and WLS software subsets.
Appendix D	Provides descriptions of the Associated Products that can be installed in addition to the base operating system.
Appendix E	Describes how the Update Installation process merges user customizations from protected system files into the new versions of the files.
Appendix F	Describes the log files that are created after a Full or Update Installation. You should review these log files after any installation to ensure that no errors occurred.

Appendix G	Lists error messages and provides corrective action for errors encountered during Full and Update Installations.

Related Documents

The printed version of the Tru64 UNIX documentation uses letter icons on the spines of the books to help specific audiences quickly find the books that meet their needs. (You can order the printed documentation from Compaq.) The following list describes this convention:

G	Books for general users
S	Books for system and network administrators
P	Books for programmers
D	Books for device driver writers
R	Books for reference page users

Some books in the documentation help meet the needs of several audiences. For example, the information in some system books is also used by programmers. Keep this in mind when searching for information on specific topics.

The *Documentation Overview* provides information on all of the books in the Tru64 UNIX documentation set.

The following documents may be useful references when you are installing the operating system and later when you are configuring the operating system for general use:

- The documentation for your hardware shows how to set up the processor and its additional devices and supplies valuable troubleshooting guidelines.
- Read the relevant sections in the *Release Notes*, especially those that pertain to installations.
- Refer to the *Installation Guide – Advanced Topics* for information regarding the use of advanced installation features, such as: user-supplied files, Installation Cloning, Configuration Cloning, installing Worldwide Language Support (WLS) on a running system, and disk space planning.
- Refer to *Sharing Software on a Local Area Network* for information about Remote Installation Services (RIS) and Dataless Management Services (DMS). RIS lets you install software products over a network from a central server. DMS lets you set up an environment where the /

and /usr file systems are exported from a central server onto a client system.

- Refer to *System Administration* for information about configuring, administering, and maintaining your system after it has been installed.
- Refer to *AdvFS Administration* for information about administering the Advanced File System (AdvFS).
- Refer to *Network Administration* for information about network configuration and administration.
- Refer to *Software License Management* for information about registering and loading Product Authorization Keys (PAKs), software licenses.

Reader's Comments

Compaq welcomes any comments and suggestions you have on this and other Tru64 UNIX manuals.

You can send your comments in the following ways:

- Fax: 603-884-0120 Attn: UBPG Publications, ZKO3-3/Y32
- Internet electronic mail: `readers_comment@zk3.dec.com`

  A Reader's Comment form is located on your system in the following location:

  `/usr/doc/readers_comment.txt`

- Mail:

  Compaq Computer Corporation
  UBPG Publications Manager
  ZKO3-3/Y32
  110 Spit Brook Road
  Nashua, NH 03062-9987

  A Reader's Comment form is located in the back of each printed manual. The form is postage paid if you mail it in the United States.

Please include the following information along with your comments:

- The full title of the book and the order number. (The order number is printed on the title page of this book and on its back cover.)
- The section numbers and page numbers of the information on which you are commenting.
- The version of Tru64 UNIX that you are using.
- If known, the type of processor that is running the Tru64 UNIX software.

The Tru64 UNIX Publications group cannot respond to system problems or technical support inquiries. Please address technical questions to your local system vendor or to the appropriate Compaq technical support office. Information provided with the software media explains how to send problem reports to Compaq.

Conventions

`%` `$`	A percent sign represents the C shell system prompt. A dollar sign represents the system prompt for the Bourne, Korn, and POSIX shells.
`#`	A number sign represents the superuser prompt.
`% cat`	Boldface type in interactive examples indicates typed user input.
`>>>`	The console subsystem prompt is three right angle brackets.
`file`	Italic (slanted) type indicates variable values, placeholders, and function argument names.
`cat`(1)	A cross-reference to a reference page includes the appropriate section number in parentheses. For example, `cat`(1) indicates that you can find information on the `cat` command in Section 1 of the reference pages.
Ctrl/*x*	This symbol indicates that you hold down the first named key while pressing the key or mouse button that follows the slash. In examples, this key combination is enclosed in a box (for example, Ctrl/C).

1

Operating System and Installation Technology Overview

This chapter contains the following information:

- A high level overview of the operating system features
- A situation analysis to help you determine what kind of installation to perform
- A description of the two types of distribution media: CD-ROM or network server
- A description of the two installation user interfaces: graphical and text-based
- How to use this book to find the information you need

1.1 Overview of the Operating System

The operating system is a multiuser, multitasking, 64-bit advanced kernel architecture based on Carnegie Mellon University's Mach Version 2.5 kernel design with components from Berkeley Software Distribution (BSD) Versions 4.3 and 4.4, UNIX System Laboratories System V Release 4.0, other software sources, and the public domain.

A suite of comprehensive management solutions is built into the operating system, enhancing productivity and efficiency at every level from installing new software and monitoring performance to tuning the system dynamically for maximum availability. This version of the operating system provides more advanced management features, including simplified installations, system configuration and management, faster and easier problem diagnosis, and web-based management.

The operating system incorporates several performance enhancements either developed or extended by Compaq, including the wired memory, virtual memory, and unified buffer cache; cached writes over NFS; IP multicasting, path MTU discovery, and optimized TCP/IP; and quick started shared libraries.

The operating system supports loadable drivers and other kernel subsystems including loadable boot-path support for third-party disks and

graphics cards and provides support for dynamic system configuration and dynamic system recognition of disks and tapes.

The Common Desktop Environment (CDE) is the desktop user interface. CDE provides a uniformed graphical user interface - portable across multiple platforms - to facilitate common end-user and system administration tasks. The CDE uniformed graphical interface makes the operating system appear more like a personal computer, a feature that makes it more accessible to the many end-users familiar with those systems.

Tru64 UNIX provides realtime support and symmetrical multiprocessing (SMP), dataless servers and clients, and numerous features intended to assist application programmers in developing applications that use shared libraries, threads, and memory mapped files. It is fully compliant to the Single UNIX Specification, to the X/Open UNIX brand, to POSIX 1003.1B (Realtime) and to POSIX 1003.1C (with DECthreads).

1.2 What Kind of Installation Should You Perform?

There are three ways you can install the operating system:

- **Update Installation** — An Update Installation updates a system running Version 4.0D or 4.0F to Version 5.0. An Update Installation preserves disk partitions, file systems, file customizations, network and print environment, user accounts, user created files, and any other system setup you may have done on the system.
- **Full Installation** — A Full Installation installs a brand new operating system, in this case Version 5.0. A Full Installation creates new file systems and swap space and overwrites existing system and user-created files on the disk partitions where the file systems and swap spaces are to be installed. After the installation, the system must be configured for general use.
- **Cloned Installation** — Installation cloning is a variation of a Full Installation that lets you replicate the full installation from a model system that is already installed with Version 5.0 onto one or more systems with the same or similar hardware configuration. Installation cloning is ideal for environments in which there are many systems of the same type to be installed. Cloning produces identical system installations and eliminates the need to go through the Full Installation tasks at each system.

Use Table 1–1 as a guideline to decide which type of installation to perform.

The primary difference between an Update Installation and a Full Installation is that an Update Installation updates your system to the next

version of the operating system with little or no disruption to your existing system configuration. When you perform a Full Installation, however, you lose all existing configuration data, layered products, and third party software. If user data exists in one of the standard UNIX file systems (for example, in `/usr/users`), that data must be backed up so it can be restored after the Full Installation is complete.

Table 1–1 describes different installation scenarios and lists the appropriate installation type to perform.

Table 1–1: Situation Analysis - Which Installation Type is Best?

Situation	Installation Type Best Suited For Your Needs	Start Here for Information...
Want to install Version 5.0 onto a system currently running Version 4.0D or 4.0F but want to retain disk partitions, file system layout, and system configuration	Update	Chapter 2
Want to install Version 5.0 onto a system currently running a version other than Version 4.0D or 4.0F but want to retain disk partitions, file system layout, and system configuration	Successive Updates to reach Version 5.0	Chapter 2
Want to install Version 5.0 onto a system currently running Version 4.0D or 4.0F but need to change disk partitions sizes, file system layout, file system type, add more software, or add hardware	Full	Chapter 4
Want to install Version 5.0 on a brand new system.	Full	Chapter 4
Want to install Version 5.0 on several similar systems	Full on one system, then Cloned	*Installation Guide – Advanced Topics*; then Chapter 5 in this book
Want to duplicate the installation from one system to another similar system	Cloned	*Installation Guide – Advanced Topics*; then Chapter 5 in this book
Want to customize the installation process by running a script or executable	All	*Installation Guide – Advanced Topics*; then Chapter 5 in this book

Table 1–1: Situation Analysis - Which Installation Type is Best? (cont.)

Situation	Installation Type Best Suited For Your Needs	Start Here for Information...
Want to install additional optional software to a system already installed with Version 5.0.	`setld` command	Chapter 9
Want to set up a remote installations server (RIS) to serve Version 5.0 over the network	All	*Sharing Software on a Local Area Network*
Want to use the network as the distribution media rather than CD-ROM	All	*Installation Guide – Advanced Topics* (for network boot instructions); then Chapter 5 in this book

1.3 Installation Media: CD-ROM or Network Server

There are two types of distribution media you can use to install the operating system:

- The Version 5.0 operating system CD-ROM. The software subsets contained on this CD-ROM are described in Appendix C. CD-ROM is the most commonly used installation media and the boot instructions in this book are based on that.
- Over a network connection to a **Remote Installation Services** (**RIS**) server that is serving Version 5.0 of the operating system. Although the installation procedures are documented in this book, the network boot commands are described in the *Installation Guide – Advanced Topics* because the network is less commonly used.

Choosing which distribution media to use for the installation depends on the following:

- If you have a copy of the Version 5.0 operating system CD-ROM in your possession and your system has a CD-ROM drive, you can perform the installation from CD-ROM.
- If your site has a RIS server that is serving Version 5.0 of the operating system, ask the RIS server administrator if you should perform a RIS installation. The RIS server administrator performs the tasks necessary to register your system as a client of the RIS server.

  If you are the RIS server administrator and want to enable installations over the network, follow the instructions in *Sharing Software on a Local Area Network* to set up a RIS server and register client systems.

1.4 Installation User Interfaces: Graphical and Text-Based

Full and Update Installations have a graphical user interface and a text-based, menu–driven user interface.

The type of user interface presented during a Full or Update Installation is determined based on the hardware configuration. Systems equipped with graphics consoles present a graphical interface to the installation. Systems with consoles that do not have graphics capabilities present a text-based interface.

Both interfaces are task oriented in design, which means that each user decision is presented to you one at a time. You can go back and change your entries at any time.

Both installation interfaces have an online help system. The online help for the graphical interface was modeled after the CDE online help system and provides enough information for you to make intelligent decisions. Online help is available in the text-based interface by entering `help` at any prompt.

1.5 Using This Book

After you have decided which type of installation to perform, follow these paths to the right information:

Update Installation:	Chapter 2 ⇒ Chapter 3 *Suggested reading*: Appendix F and Appendix E
Full Installation:	Chapter 4 ⇒ Chapter 5 ⇒ Chapter 6 ⇒ Chapter 7 *Suggested reading*: Chapter 8 and Appendix F
Cloned Installation:	*Installation Guide – Advanced Topics* ⇒ then Chapter 6 in this book *Suggested reading*: Appendix F

2

Update Installation Overview

This chapter includes the following information:

- A description of how the current operating system is updated to the new version
- Supported update paths if your system is running a version of the operating system other than Version 4.0D or 4.0F
- A summary of the Update Installation features that you control and the features that are built into the process
- The theory of operation behind an Update Installation

If you are not interested in reading about the features or the theory of operation behind an Update Installation; go directly to Chapter 3 which gives step-by-step instructions for performing the Update.

2.1 Description of an Update Installation

An Update Installation updates the operating system from Version 4.0D or 4.0F to Version 5.0. An Update Installation preserves disk partitions, file systems, file customizations, the network, print, and mail environments, user accounts, user created files, and any other system setup you may have done. For details about the affects an Update Installation has on existing files, see Appendix E.

If software patches have been applied to your current operating system, it is not necessary to remove the patches before you begin the Update process. The Update process is designed to update and reinstall any software fixes or features that were supplied in officially released patches.

The software subsets that comprise the operating system are known as **base software subsets**. During an Update Installation, the base software subsets that are already installed on the current version of the operating system are updated to Version 5.0. In addition, any mandatory base software subsets that were introduced in Version 5.0 are installed automatically. Base software subset names start with the prefix `OSF` and can be viewed by using the following command:

```
# /usr/sbin/setld -i | grep -E ^OSF
```

Worldwide Language Support (WLS) software subsets that are already installed on the current version of the operating system are updated to Version 5.0. In addition, any mandatory WLS software subsets that are introduced in Version 5.0 are installed automatically. WLS software subset names start with the prefix `IOS` and can be viewed by using the following command:

```
# /usr/sbin/setld -i | grep -E ^IOS
```

You cannot install additional optional software subsets during an Update Installation. Additional optional software subsets can be installed by using the `setld` command when the Update Installation is complete. Refer to Chapter 9 for more information about using the `setld` command to install base operating system software, and refer to *Installation Guide – Advanced Topics* for information about installing WLS software.

Layered products are not updated by the Update Installation process. To update layered products, it may be necessary to delete the existing version and reinstall the new version that is designed to operate with Version 5.0. The Update Installation notifies you accordingly.

Do not perform an Update Installation if you want to change the type, location, or size of file systems or if you want to install additional optional software because those features are not offered during an Update Installation.

2.2 What Versions of the Operating System Can Be Updated to Version 5.0?

The Update Installation process updates your operating system from Version 4.0D or 4.0F to Version 5.0. If your system is installed with a version other than Version 4.0D or 4.0F, you must perform successive updates to reach Version 5.0. The only other option to performing successive updates is to perform a Full Installation. Table 2–1 shows the successive update paths to reach Version 5.0. The `installupdate` command invokes the Update Installation process. Certain update paths require the use of the `setld -l` command.

To update a system from the current release to the next release in the update path, you must have the distribution media associated with the version you want to update to. The `installupdate` command invokes the Update Installation procedure.

Table 2–1: Successive Update Installation Paths

If the system is installed with...	Update the operating system to..
Version 3.2, 3.2A, or 3.2B	Version 3.2C by using the `installupdate` command
Version 3.2C, 3.2D-1, or 3.2D-2	Version 4.0 by using the `installupdate` command
Version 3.2E-1, 3.2E-2, or 3.2F	Version 3.2G by using the `setld -l` command
Version 3.2G	Version 4.0A by using the `installupdate` command
Version 4.0 or 4.0A	Version 4.0B by using the `installupdate` command
Version 4.0B or 4.0C	Version 4.0D by using the `installupdate` command
Version 4.0E	Version 4.0F by using the `installupdate` command
Version 4.0D or 4.0F	Version 5.0 by using the `installupdate` command

If you do not have the version of the operating system distribution you need, contact your support representative.

2.3 Update Installation Features

An Update Installation can be invoked in either a graphical or text-based interface. When you invoke the Update Installation and your system has graphics capabilities, a graphical interface is presented. If your system does not have graphics capabilities, the text-based interface is presented. If your system has graphics capabilities, but you want to use the text-based interface, you can force the text-based interface by using the `-nogui` flag. However, the reverse is not true. See Section 3.3 for instructions about forcing the text-based interface.

The Update Installation features are classified into two types: the features you control and the features that are built into the Update process:

- The features that you control when you begin an Update Installation are shown in Table 2–2.
- The features that are built into the Update Installation process are shown in Table 2–3.

Table 2–2 shows the Update Installation features that you can turn on or off.

Table 2–2: User-Controlled Features of the Update Process

User Options	Description	Detailed Information Located in
Unattended Update Installation	If you do not need to select optional kernel components or archive obsolete files, you can invoke the Update Installation with the `-u` flag to run the Update without any user intervention.	Section 3.3
Kernel Component Options	You have the option to build either mandatory only or all kernel components into the kernel or you have the option to interactively select optional kernel components.	Section 3.5.3
Archive Obsolete Files	You have the option to archive obsolete files before they automatically are removed by the Update Installation.	Section 3.5.5

Table 2–3 describes the features that are built into the Update process.

Table 2–3: Built-In Features of the Update Process

Built-In Feature	Description	Detailed Information Located in
Notification of conflicting layered products	Notifies you when an installed layered product may not be compatible with the new version of the operating system; this layered product may need to be reinstalled later.	Section 3.5.1
Removes layered products that prevent the Update from continuing	Upon your confirmation, removes layered products that prevent the Update from continuing.	Section 3.5.1.1
Updates base operating system and WLS software to new version	Updates existing installed subsets and installs new mandatory subsets introduced in the new version.	Section 3.5.2
Checks for changed file types	Checks for file types that have been changed. The Update might not be able to proceed if certain conflicts are found.	Section 3.5.4

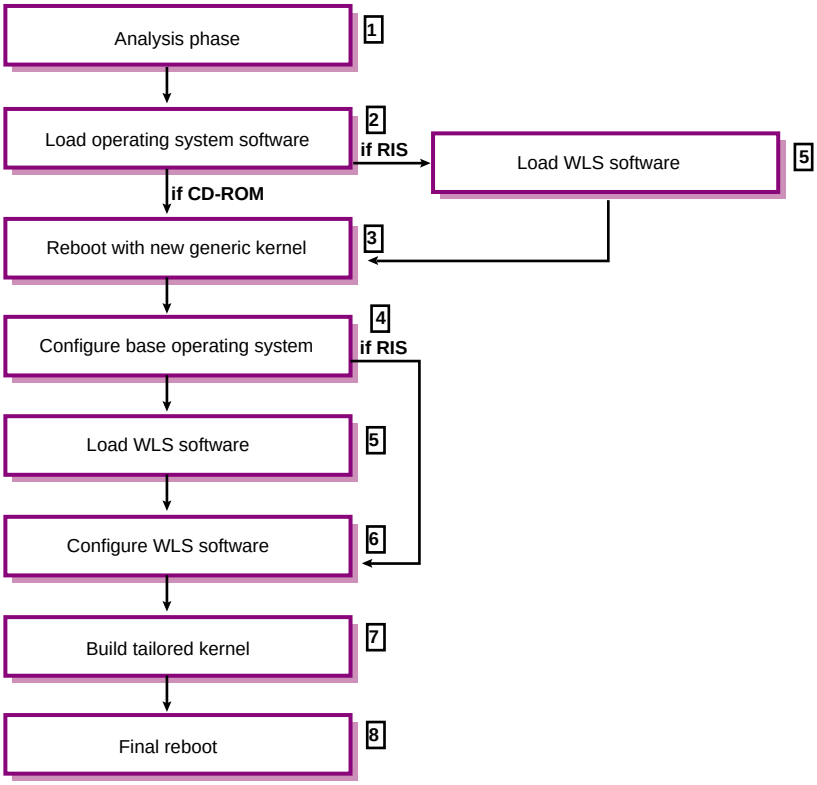
Table 2–3: Built-In Features of the Update Process (cont.)

Built-In Feature	Description	Detailed Information Located in
Disk space recovery	Provides the option to remove unnecessary software subsets and `.PreUPD`, `core` and extra kernel files to recover disk space if there is not enough file space to complete the Update.	Section 3.5.6
Executes instructions provided in user-supplied files	You can customize an Update Installation by creating and moving user-supplied scripts, programs, or executables to the right location. If the Update process finds files with the correct names in the right locations, the files are executed.	*Installation Guide – Advanced Topics*

2.4 Theory of Operation

Figure 2–1 shows the operational flow of an Update Installation.

Figure 2–1: Update Installation Theory of Operation



1 Analysis Phase - During the analysis phase, the Update Installation analyzes the system for the following items:

- Conflicting layered products
- Installed software
- Conflicting file types
- Obsolete files
- Disk space required for new software and update processing

During the analysis phase, there may be a situation where one or more actions may be taken to correct the situation. You make the decision as to which action is correct. If the Update process discovers any problems during the analysis phase, you can correct them or exit the Update without making any changes to the current system.

An Update Installation changes the current system in real time. For example, if conflicting software is detected and you choose to remove that software, when the analysis step is complete, the conflicting

software has been removed, and it is no longer available in the current system even if the Update is canceled.

2 Load base operating system software - An Update Installation installs the new version of software subsets that match the software subsets already installed on your system. Additionally, all new mandatory software subsets that were introduced in the new version of the operating system are installed automatically. Optional software subsets are loaded only if they were installed previously. When all software subsets are installed successfully and verified, customized protected system files (files with a `.new..` prefix) from the previous version of the operating system are merged automatically with the files provided by the new version of the operating system.

3 Reboot with new generic kernel - The system reboots using a copy of the generic kernel (`/genvmunix`) that is shipped with the new version of the operating system.

4 Configure operating system software - The new version of the operating system that was loaded in Step 2 is configured.

5 Load WLS - If the previous version of the operating system was installed with WLS software, the new versions of WLS subsets are loaded here.

6 Configure WLS software - If new versions of the WLS software subsets were loaded, they are configured here.

7 Build tailored kernel - A machine-specific kernel is built at this time. If you selected optional kernel components during the Analysis Phase, they are also built into this kernel.

8 Final system reboot - The system reboots with the newly-built tailored kernel. The Update Installation is complete, and you can log in to the updated system.

2.5 Update Installation Completion Time

Update Installations typically complete in 45 to 120 minutes. Actual time depends on your processor type, the number of software subsets to be updated, the type of media used to perform the Update (CD–ROM or remote server), the speed of your CD-ROM drive if you are using CD-ROM, and the volume of network traffic if you are using a remote server.

3

Update Installation Procedures

The information in this chapter assumes that you are performing the Update Installation from CD-ROM. To invoke an Update Installation from a RIS server, refer to the *Installation Guide – Advanced Topics* for network boot instructions; then come back to this book for the actual procedure.

Summary of Update Installation Procedures:

1. Complete prerequisite tasks to prepare the system for an Update Installation.
2. Shut down the system to single-user mode to begin the Update.
3. Start the Update Installation from CD–ROM.
4. Choose Update Installation options.
5. Monitor the analysis phase of the Update.
6. Confirm the start of the Update process.
7. Log in as the user `root` when the Update is complete.
8. Review installation log files after the Update is complete.
9. Manually merge file customizations if necessary.
10. Optionally run the Update Installation Cleanup utility to remove files left on the system as a result of the Update.

3.1 Step 1: Prepare for the Update Installation

Perform the following tasks before you begin an Update Installation:

1. Back up the current operating system.

   It is recommended that you back up the current operating system before beginning an Update Installation. If there are any interruptions when the Update process is loading software subsets, it is unlikely that the Update will complete successfully, which will leave your system in an indeterminate state. Should this happen, you must restore the original version of the operating system before you can attempt another Update Installation. Refer to *System Administration* for information about backing up your current operating system.

2. Read the current version of the *Release Notes*, particularly any information about Update Installations.

   It is recommended that you read the *Release Notes* because it may contain changes to software, firmware, or hardware that are not documented in this book. The *Release Notes* also contain a summary of the software enhancements made in the new version of the operating system.

3. Update firmware.

   Firmware updates are located on the *Alpha Systems Firmware CD-ROM* that is included in the Software Distribution Kit you received. The firmware update process requires you to insert the firmware CD-ROM into the drive and boot from it. The firmware update utility automatically identifies your system type and model and determines the correct firmware revision required for your system. There is an automatic display of the `READ-ME-FIRST` file, which describes the firmware changes included in the update so you can quickly decide if you want to proceed.

   The contents of the firmware CD-ROM are also available at the corporate Internet site through anonymous file transfer protocol (FTP):

   `ftp://ftp.digital.com/pub/Digital/Alpha/firmware/readme.html`

   Firmware updates are also available through anonymous file FTP from the `ftp.europe.digital.com` worldwide web server.

   Note

   The EB64+ single-board computer uses a socketed firmware ROM chip. The EB66+, AlphaPC64, AlphaPC164, and EB164 single-board computers use an EPROM that can be updated with new firmware. Refer to your hardware owner's documentation for details on how to update the console firmware on these systems.

   To determine your system's current firmware revision, enter the following command as the user `root`:

```
# uerf | grep -i "Firmware revision:" | tail -1
Firmware revision: 6.3
```

4. If you do not already know it, determine the CD-ROM device name while the system is still in multiuser mode.

If you do not know the name of the CD-ROM device you will use to perform the Update Installation, enter the following command:

```
# file /dev/rrz*c | grep RRD
/dev/rrz4c:
character special (8/4098) SCSI #0 RRD45 disk #32 \
(SCSI ID #4) (SCSI LUN #0) offline
```

The result of this command shows that the CD-ROM device name is `rz4c`. If the previous command returns no output, use the following command with a more generic name to determine the CD-ROM device name:

```
# file /dev/rrz*c | grep CD
/dev/rrz4c:
character special (8/2) EIDE #0 CD-ROM X disk #0 \
(SCSI ID #0) (SCSI LUN #0) offline
```

Standard device names begin with `rz` for the block special file and `rrz` for the raw (character) special file. The result of the `file` command displays the *raw* device name, but you must specify the block special file when mounting the CD-ROM device.

Beginning with Version 5.0 of the operating system, new device names have been introduced. In a special circumstance where you are updating a system already installed with Version 5.0, you can determine the CD-ROM device name by entering the following command:

```
$ ls /dev/disk/cdrom*c
/dev/disk/cdrom0c
```

5. If you have AdvFS file systems on your system, perform the following procedure to protect the data on AdvFS file domains:

   a. Log in as `root` or use the `su` command to gain superuser privileges.

   b. Use the `shutdown` command to put your system into single-user mode.

   c. Use the `umount -A` command to unmount all local file systems.

   d. Run the `verify` utility on each domain (remember to use the `-r` flag if you are checking the root domain). If you find any problems, correct them before continuing. Refer to the `verify`(8) reference page for more information.

   e. Use the `mount` command to mount all of the verified local file systems.

   f. Use the `quotacheck` command to fix the quotas on the mounted local file systems. If you have problems running the `quotacheck`

command, you may have to edit your /etc/fstab file and try again. Refer to the quotacheck(8) reference page for more information.

For more information about administering AdvFS file systems, refer to *AdvFS Administration*.

3.2 Step 2: Shut Down the System to Single–User Mode

An Update Installation is performed from single-user mode. You can either log in as root or use the su command to gain superuser privileges. The following example shows how to become superuser and then shut down the system to single-user mode:

```
# su -
password:
# shutdown +10 Please log out-ready to update system
```

In the previous example, +10 shuts down the system in ten minutes and sends the message Please log out-ready to update system to all logged in users.

Caution

If your system is already at the console mode prompt (>>>), you must boot to multiuser mode and then shut down to single-user mode. It is important that you do not boot the system to single-user mode.

You will see the following messages when the system is in single-user mode:

```
.
.
.
Halting processes ...

INIT: SINGLE-USER MODE
#
```

3.3 Step 3: Start the Update Installation

Before beginning the Update Installation, be aware that the process takes from 45 to 120 minutes to complete. Actual time depends on your processor type, the speed of your CD-ROM drive, and the number of software subsets to be updated. If you want the Update to run without any further intervention from you, invoke the Update with the -u flag.

Caution

Do not use the `setld –l` command to update from Version 4.0D or 4.0F to Version 5.0. The only method to update your system to Version 5.0 is to use the `/sbin/installupdate` program that is described in this chapter.

1. If you are using the Logical Storage Manager (LSM), enter the following command to activate LSM:

   # **/sbin/lsmbstartup**

2. Mount the local file systems:

   # **/sbin/bcheckrc**

   The `bcheckrc` command invokes the `mount -a` command, which mounts all file systems in the `/etc/fstab` file, not just the standard UNIX file systems (`/`, `usr`, and `var`). The `bcheckrc` command also runs `fsck` on UNIX file systems (UFS). If `fsck` finds a problem with the / (root) partition, the system shuts down and reboots to correct the problem.

3. Ensure that the base operating system CD–ROM is loaded in the drive.

4. Mount the CD-ROM. This example assumes the CD-ROM drive is device `rz4c`:

   # **/sbin/mount /dev/rz4c**

5. Use the `/sbin/installupdate` command with the following syntax to start the Update Installation:

   /sbin/installupdate [-u] [-nogui] {*location*}

   The optional `-u` flag runs the Update Installation in **unattended** mode. Unattended means that barring any problems with the Update, there is no user interaction required. The only exception to this is the switching of CD-ROMs if WLS software is being updated as well. The `-u` flag builds a kernel with all kernel components and does not provide the chance to archive obsolete files.

   If your system has graphics capability, the optional `-nogui` flag runs the text-based interface.

   The required *`location`* argument specifies the source of the software. The *`location`* can be:

   - A local device - a disk or CD-ROM that contains the operating system (for example, `/dev/rz4c`)
   - A mount point - a local directory where the operating system media is already mounted (for example, `/mnt`)

- A RIS server - the name of the RIS server (appended with a colon) that is serving the current version of the operating system (for example, `server1:`)

The following sample commands can be used to start an Update Installation. Use the command that best suits your situation:

- To start an unattended Update from CD-ROM device `rz4`:

  ```
  # /sbin/installupdate -u /dev/rz4c
  ```

- To start the Update from a CD-ROM device that is already mounted:

  ```
  # /sbin/installupdate /cdrom
  ```

  In the previous example, `/cdrom` is the mount point.

- To start the Update from CD-ROM using the text-based rather than the graphical interface:

  ```
  # /sbin/installupdate -nogui /dev/rz4c
  ```

- To start the Update from a RIS server named `server1`:

  ```
  # /sbin/installupdate server1:
  ```

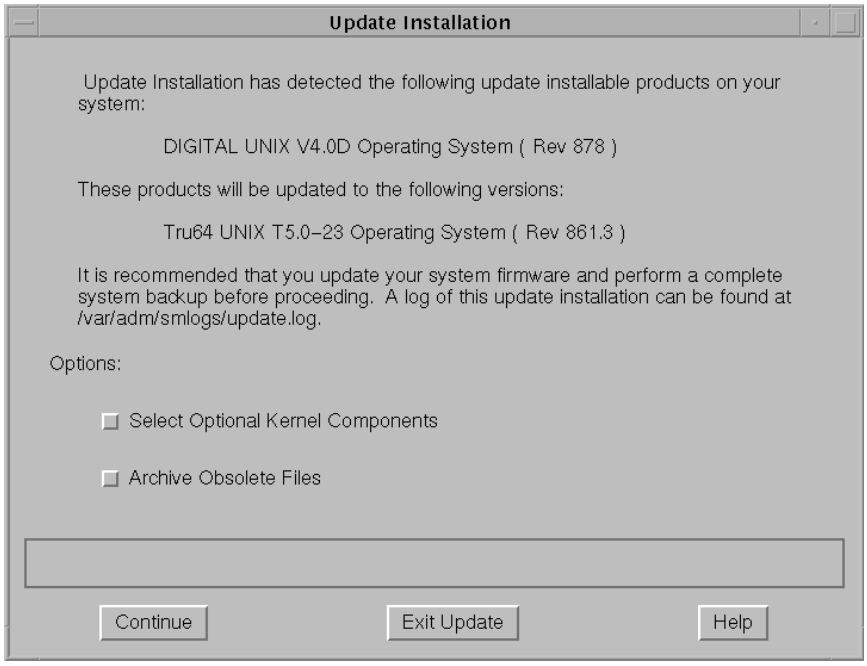
The Update Installation continues as described in Section 3.4.

3.4 Step 4: Choose Update Installation Options

What you see after you start the Update process depends upon whether or not your system is capable of graphical displays:

- If your system has graphical display capabilities, the Update Installation dialog box shown in Figure 3–1 is displayed after you enter the `installupdate` command. The graphical interface contains online help, which describes each dialog box and field in the Update Installation application.

Figure 3–1: Update Installation Main Window



- If your system does not have graphical capabilities or you used the `-nogui` flag on the command line, a screen similar to this is displayed:

```
Update Installation has detected the following update
installable products on your system:

        Digital UNIX 4.0D Operating System ( Rev 758 )

These products will be updated to the following versions:

Tru64 UNIX Version 5.0 Operating System (Rev nnn)

It is recommended that you update your system firmware
and perform a complete system backup before proceeding.
A log of this update installation can be found at
/var/adm/smlogs/update.log.

Do you want to continue the Update Installation?  (y/n) []: y

Do you want to select optional kernel components?  (y/n) [n]:

Do you want to archive obsolete files?  (y/n) [n]:
```

Table 3–1 describes the decisions you have to make when you first invoke the Update. You can choose one option, both options, or neither option.

Table 3–1: Update Installation Options

Option	Description
Select Optional Kernel Components	Select this option if your current system is running a customized kernel that has been built with optional kernel components or if you want to customize the new kernel. If you select this option, later on in the analysis phase of the Update Installation you will have the opportunity to select which optional kernel components you want to build into the kernel (if any). If you do not select this option, the new kernel will be built with only the mandatory kernel components required to run the installed software.
Archive Obsolete Files	Choose this option to archive obsolete files before they are removed automatically by the Update Installation. Obsolete files are files that were shipped in Version 4.0D or 4.0F but are no longer required by Version 5.0. If you select this option, later in the analysis phase of the Update Installation the list of obsolete files is presented, and you can select one or more files to archive and the file name you want to use for the archive. You can always delete the archive at a later date. If you do not select this option, you will not have the opportunity to archive obsolete files before they are removed from the system.

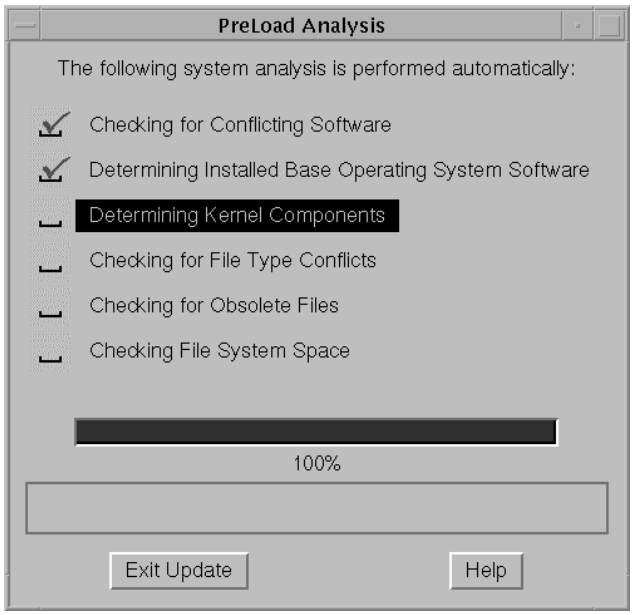
Note

The remainder of this chapter applies to the graphical and text-based user interfaces. Rather than showing examples from both interfaces, the screens from the graphical interface were used instead of the text-based interface to show the Update process and user actions. The same steps in the same order occur for the text-based interface.

3.5 Step 5: Monitor the Analysis Phase

After you have selected the Update Installation options, the Update process begins to analyze the current system. If your system has graphics capabilities, the dialog box shown in Figure 3–2 is displayed.

Figure 3–2: Update Installation Preload Analysis Dialog Box



A check mark indicates when an analysis step is complete. The progress indicator at the bottom of the dialog box applies to the currently highlighted analysis step.

The following sections describe each analysis step in detail and the required user interaction if one or more of the conditions require your attention:

- Section 3.5.1 — checks for conflicting layered software
- Section 3.5.2 — determines installed software
- Section 3.5.3 — determines kernel components and optional selection process
- Section 3.5.4 — checks for file type conflicts
- Section 3.5.5 — checks for obsolete files and opportunity to archive them
- Section 3.5.6 — checks for sufficient file system space

3.5.1 Check for Conflicting Software

There are two types of layered software products that affect the Update Installation: software products that allow the Update Installation to proceed but which may require reinstallation later and software products that must be deleted before the Update can continue.

3.5.1.1 Conflicting Software Found: Update Installation Cannot Proceed

The dialog box shown in Figure 3–3 is displayed if the Update Installation detects a conflicting layered software product that halts the Update. You can instruct the Update Installation to delete the software and continue or you can exit the Update. You cannot update your system to the new version of the operating system until you remove this conflicting software. If you choose to exit the Update Installation at this point, no changes are made to your system. If the conflicting software is not supported under the new version of the operating system, and the software is critical to your system, it is recommended that you do not continue with the Update Installation.

Note

Delete operations take effect immediately. Any software you remove cannot be recovered even if the Update is canceled later.

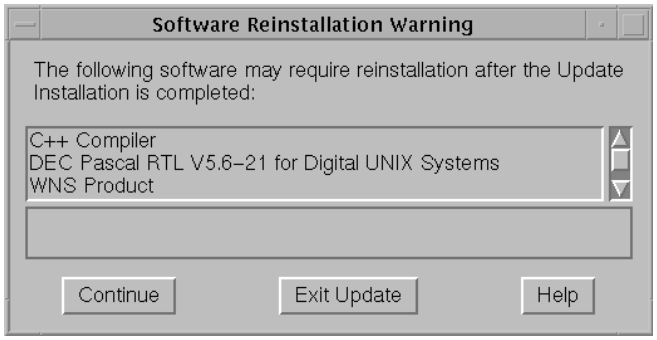
Figure 3–3: Conflicting Software Found Dialog Box

3.5.1.2 Software Reinstallation Warning

The dialog box shown in Figure 3–4 is displayed if the Update Installation detects a layered software product that may require reinstallation after updating to the new version of the operating system. You can choose to exit the Update Installation and manually remove this software or you can continue the Update.

If you decide to continue without removing the layered software product or products, test the software when the Update is finished. It is recommended that you reinstall any layered software products that are critical to the use of the operating system with a version that is compatible with and is supported on the new version of the operating system.

Figure 3–4: Software Reinstallation Warning Dialog Box



3.5.2 Determine Installed Software

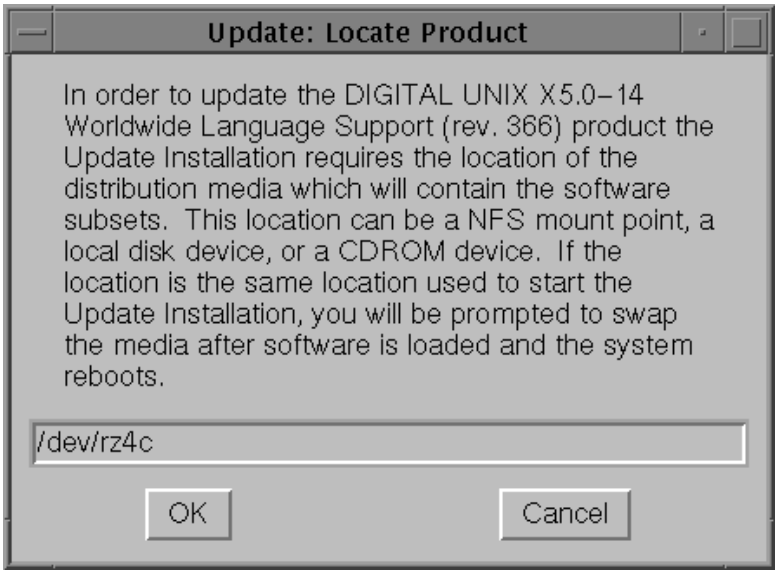
During this part of the analysis, the Update Installation process determines what software is already installed so that it knows what has to be updated.

If you have installed Worldwide Language Support (WLS) software, an additional analysis step, `Determining Installed Worldwide Language Support Software`, is displayed as part of the Preload Analysis dialog box shown in Figure 3–2.

If the system has WLS software, the dialog box shown in Figure 3–5 is displayed, and you need to identify the source of the Version 5.0 WLS software subsets. As noted, you might need to change media after the system reboots.

For example, if you are installing the operating system from CD-ROM and the WLS software is also on CD-ROM (*Associated Products Volume 1*), enter the location of the CD-ROM drive as shown. The Update Installation knows when to prompt you to insert the WLS media after the system reboots.

Figure 3–5: Locate Product Dialog Box

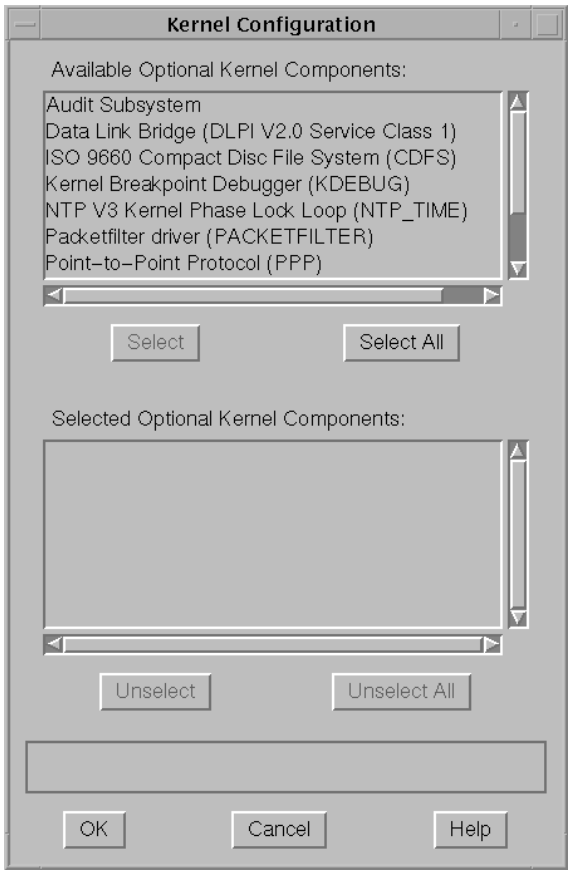


3.5.3 Select Kernel Components

If you chose the option to include optional kernel components in the kernel (as described in Section 3.4, use the `Kernel Configuration` dialog box shown in Figure 3–6 to select the optional kernel components to build into the kernel. If you had previously built optional kernel components into the kernel, you have to select them again here. The Update Installation process has no knowledge of the contents of the current kernel. To select kernel components, click on the components you want and click on `Select`. After you have made all selections, click on `OK`.

If you cancel kernel component selection at this time, the Update Installation builds a kernel with only the mandatory kernel components that are associated with the installed software subsets.

Figure 3–6: Kernel Configuration Dialog Box



3.5.3.1 Manually Add Special Configuration Options to the Kernel if Necessary

The Update Installation provides a basic kernel configuration file that includes support for all mandatory components plus any optional components you have just selected. The Update Installation does not propagate any special or custom configuration options that you may have added into the kernel configuration file.

If your kernel configuration file has been edited manually or edited as the result of layered product installations to include non-standard kernel options, psuedodevices, controllers, or other changes, you will need to include those options, psuedodevices, controllers, or other changes into your new kernel configuration file (`/sys/conf/`*`host_name`*).

If you are using the text-based interface, you will be given the option to edit the kernel configuration file during the Update Installation. Otherwise,

you can edit the file after the Update Installation is complete, and then rebuild the kernel using the `doconfig`(8) command.

3.5.4 Check for File Type Conflicts

Files that are shipped with the operating system, also known as system files, are classified into one of five different file types. A file can be classified as a `file`, `directory`, `hard link`, `symbolic link`, `block device`, or `pipe`. The Update Installation procedure expects to find system file types the same as when they were shipped with the previous version of the base operating system. When a file type has changed, it is known as a **file type conflict**. There are two types of file type conflicts: those that are serious enough to stop the Update and those that allow the Update to continue.

An Update Installation checks for file types that will be incompatible with the updated version of the operating system. Some file conflicts cause the Update Installation to exit, and you must resolve the conflict before you can restart the Update. Other file conflicts are not as serious, and you have the option to continue the Update Installation without resolving the conflict. This feature is intended to preserve the integrity of the software product about to be installed. In each case, the Update Installation identifies the conflict and informs you of the action required to resolve the conflict.

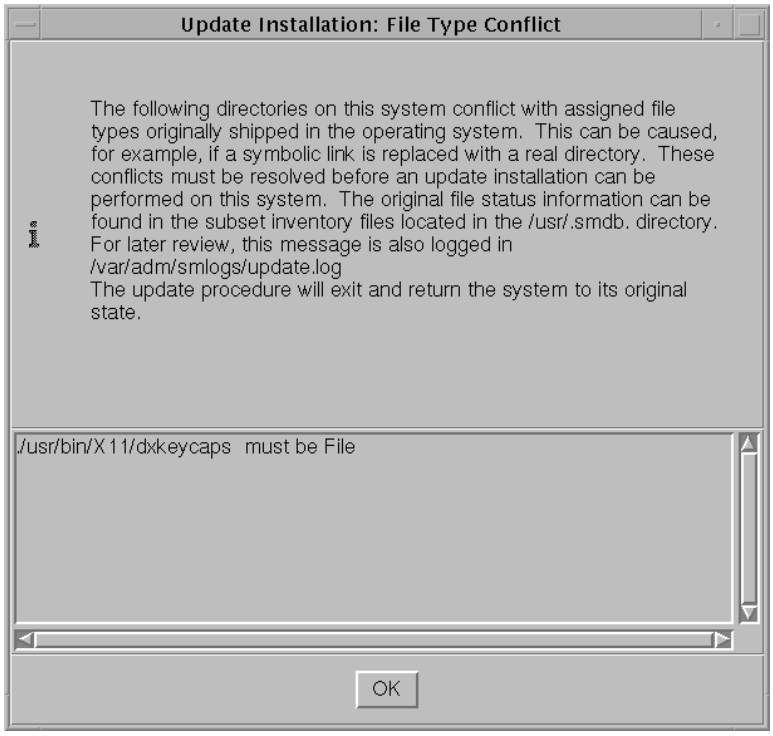
3.5.4.1 File Type Conflicts That Halt the Update

A serious file type conflict may require the Update Installation to exit without updating the system. If the Update were to continue, it would result in a corrupt system. When a conflict of this severity is encountered, you manually must resolve it before restarting the Update Installation. The following types of file type conflicts prevent the Update from continuing:

- Files shipped originally as type `directory` are changed to type `file`
- Files shipped originally as type `file` are changed to type `symbolic link`
- Files shipped originally as type `symbolic link` are changed to type `directory`

For example, if a file is shipped as a directory in Version 4.0D or 4.0F and you later change it to be a symbolic link, when the same file ships as a directory in Version 5.0, the Update Installation detects the difference and the dialog box shown in Figure 3–7 is displayed.

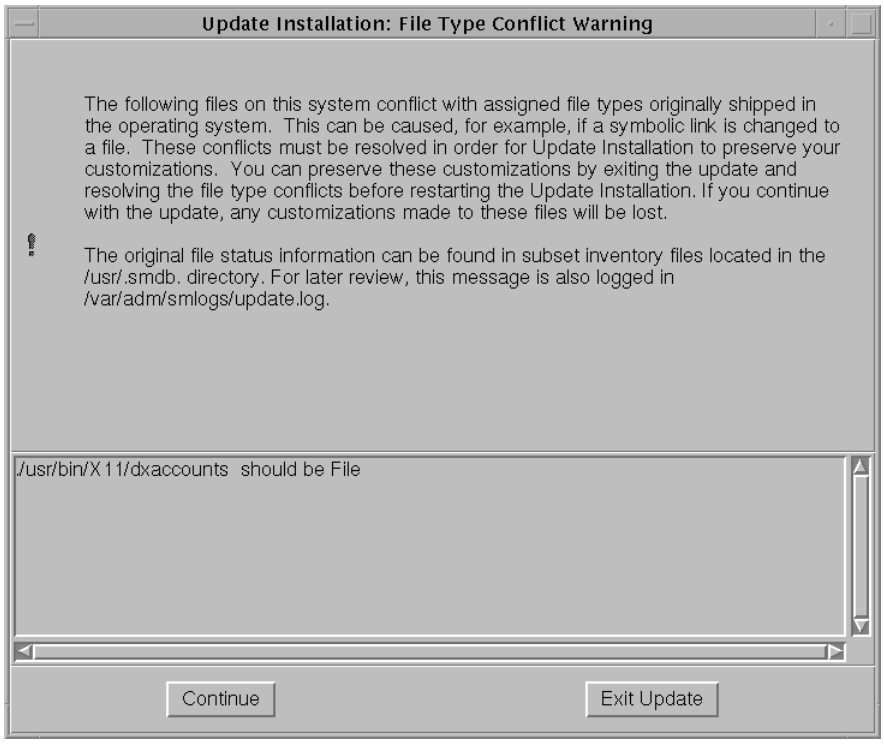
Figure 3–7: File Type Conflict Dialog Box



3.5.4.2 Less Serious File Type Conflicts

A less serious file type conflict is any file type conflict other than the ones shown in Section 3.5.4.1. The Update Installation automatically resolves these conflicts by saving a copy of the modified file type to a file with a `.PreUPD` extension, for example `/etc/hosts.PreUPD`. When the new version of the operating system is loaded, the original file (for example, `/etc/hosts`) is replaced by the new version that is shipped with the operating system. This means that the file will change type to the file type that is shipped with the new version of the operating system. Any customizations that were in the modified file type must be manually merged from the `.PreUPD` version into the new version of the file after the Update is complete. Figure 3–8 shows the dialog box that is displayed when a less serious file type conflict is detected.

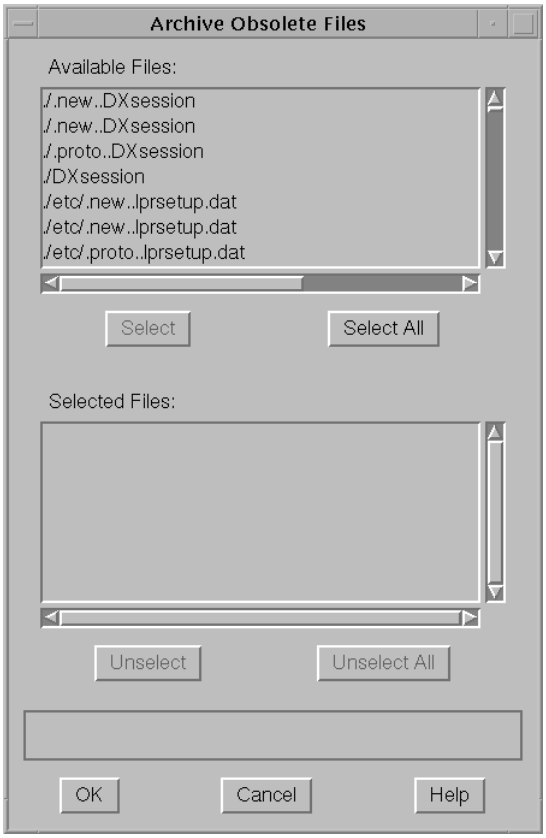
Figure 3–8: File Type Conflict Warning Dialog Box



3.5.5 Check for Obsolete Files

Obsolete files are files that were shipped in Version 4.0D or 4.0F of the operating system but are no longer part of Version 5.0. The Update Installation automatically searches for and removes obsolete files. If you chose the option to archive obsolete files as described in Section 3.4, you can save obsolete files to a `.tar` file and have the option to compress the `tar` file with the `gzip` utility. The default file name is `/var/adm/update/backup.tar`. Whether you archive the files or not, the Update Installation deletes obsolete files after the analysis phase is complete. The dialog box that you use to select and archive obsolete files is shown in Figure 3–9.

Figure 3–9: Archive Obsolete Files Dialog Box

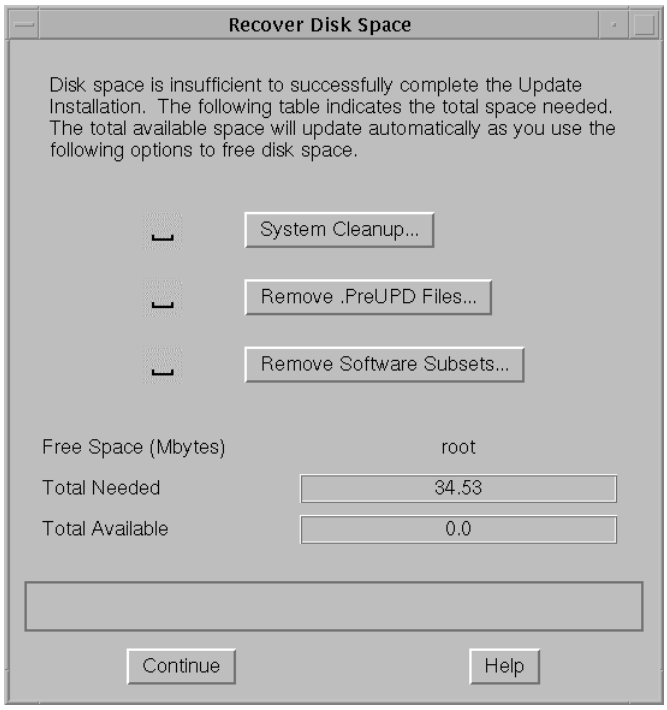


3.5.6 Check System File Space

Version 5.0 of the operating system requires more disk space than Version 4.0D or 4.0F. The Update Installation performs file system size checks to make sure there is enough space for the new version of the software and that there is enough temporary space for processing.

If the Update Installation determines that there is not enough disk space, disk space status and options for recovering disk space are presented. The dialog box that you use to recover disk space is shown in Figure 3–10.

Figure 3–10: Recover Disk Space Dialog Box



It is recommended that you pursue disk space recovery in this order:

1. Perform **system cleanup** by removing `core` files and extra kernel files.

   Whenever an application or the system crashes, a `core` file is created. These files tend to be large, and if not removed after each crash, can occupy considerable disk space. If you are not in the habit of cleaning up after system or application crashes, you may be able to recover the disk space from this operation.

   The Update Installation procedure looks for extra kernel files (files named `vmunix.*`) in the `/sys/`*`HOST_NAME`* and `/var/adm/crash` directories and looks for `core` files in the `/`, `/usr`, and `/var` file systems.

2. **Remove .PreUPD files**

   The Update Installation looks for customized system files and protects them by copying them into files with the suffix `.PreUPD`. If removing `core` and extra `vmunix` files do not recover enough disk space, remove the `.PreUPD` files as necessary. Clicking on `Remove .PreUPD Files` displays a dialog box where you can select the files to remove.

Note

If you remove `.PreUPD` files here, they will be unavailable when it comes time to manually merge changes. These `.PreUPD` files are the only backup copies of unprotected system files that have been modified.

3. **Remove software subsets**

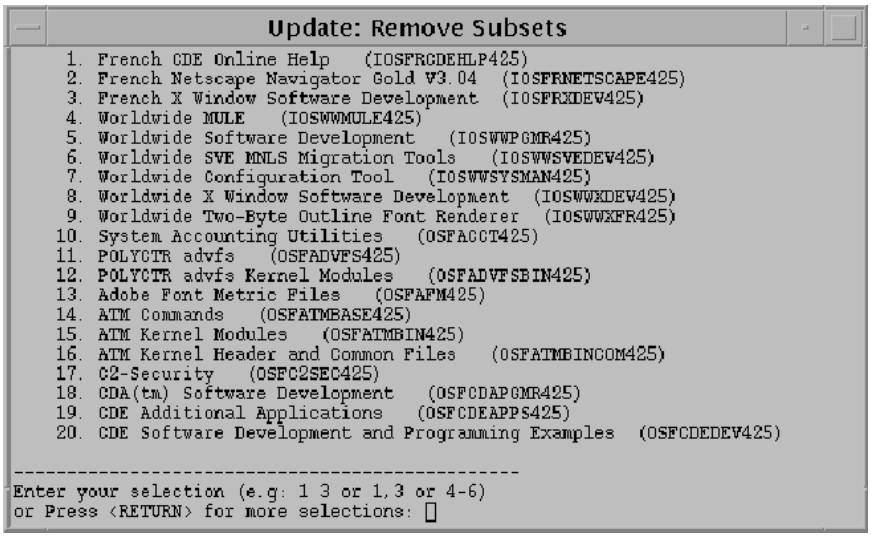
   If there are software subsets that are not being used, remove them. Software subsets removed at this point are not available for update. Clicking on `Remove Software Subsets` displays the dialog box shown in Figure 3–11.

Note

Deleting individual files that are part of the installed base operating system or WLS software by using a command other than the `setld` command will not produce the additional free space needed because the Update Installation has already taken into account that these old files will be replaced by new versions.

Use the various options until the disk space available in each file system is greater than the disk space needed. If these options do not produce the necessary free space, you may need to change the file system layout or use disk partitions large enough to accommodate the installed software by performing a Full Installation using the disk partition sizes recommended by the Full Installation procedure.

Figure 3–11: Remove Subsets Dialog Box

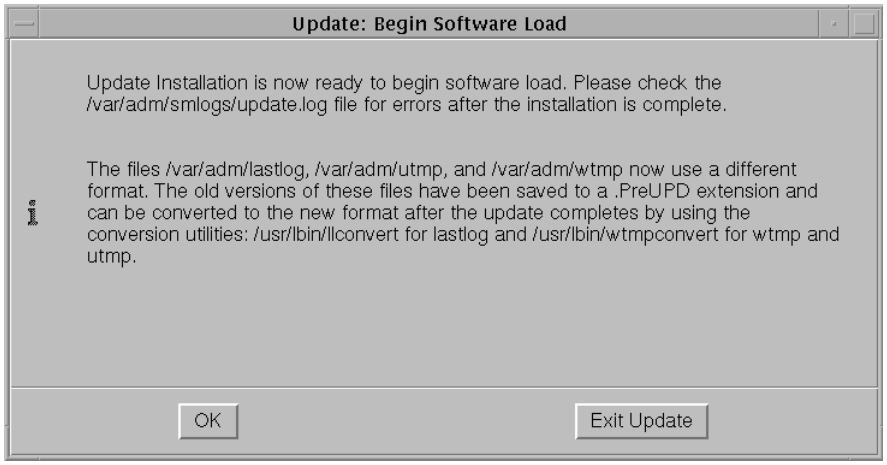


3.6 Step 6: Confirm the Start of the Update Installation Process

When the Analysis Phase completes, use the dialog box shown in Figure 3–12 to confirm the start of the Update Installation. If you are satisfied with all your selections and choices, click on OK to save your choices and begin the Update. If you do not want to proceed with the Update, click on Exit Update.

Update Installations typically complete in 45 to 120 minutes. Actual time depends on your processor type, the number of software subsets to be updated, the type of media used to perform the Update (CD–ROM or remote server), the speed of your CD-ROM drive if you are using CD-ROM, and the volume of network traffic if you are using a remote server.

Figure 3–12: Ready to Begin Update Dialog Box



3.7 Step 7: Log in to the System

After the Update Installation is complete, log in to the system as the user `root` to perform the postinstallation tasks shown in Section 3.8 and Section 3.9, which can be done only by the user `root`.

What happens when you log in for the first time depends upon whether you have a graphics workstation or a terminal without graphics capabilities:

- If you have a graphics workstation, a Common Desktop Environment (CDE) login window displays.
- If you do not have a workstation with graphics capabilities, log in as the user `root` at the `login` prompt and enter the `root` password at the `password` prompt.

Note

Starting with Version 5.0 of the operating system, naming conventions for device special file names for disks and tapes are different from previous versions of the operating system. The unit numbers may be reordered as a result of the Update process. If you want to review a mapping of old-to-new device names for your system, review the `/etc/dfsl.dat` file.

For a description of device naming conventions and how the Update process operates with them, see Section A.5.

3.8 Step 8: Review Update Installation Log Files

Information about the Update Installation is stored in log files for you to review. Installation and configuration data is appended to any log files left over from previous Updates. It is recommended that you examine the log files when the Update is complete to ensure that there were no errors during the Update and that all files merged successfully. Log files are located in the following locations:

- The Update Installation log is located in: `/var/adm/smlogs/update.log`
- Information about the system configuration is located in: `/var/adm/smlogs/it.log`
- The list of customized files is located in: `/var/adm/smlogs/upd_custom_files`
- The list of failed merges is located in: `/var/adm/smlogs/upd_mergefail_files`

Appendix F describes the contents of all logs files that are created as part of an Update Installation. If no customized or failed merge files are detected during the Update Installation, the relevant log files do not contain any data.

3.9 Step 9: Manually Merge Customizations if Necessary

An Update Installation may not be able to merge certain customizations automatically and may require that file customizations be added to the new files manually. Manual merging involves editing the new versions of system files with a text editor to include your own customizations. The following information is saved so that you can merge your customizations into the new versions:

- Unprotected system files

  When the Update is complete, check for any saved file names in: `/var/adm/smlogs/upd_custom_files`. Edit the new version of each logged file to include your customizations. Previous versions of each file are saved as *`filename`*`.PreUPD`.

- Kernel configuration file

  Edit the kernel configuration file at `/sys/conf/`*`host_name`* if you customized this file in the previous version of the operating system. The saved version is located in `/sys/conf/`*`host_name`*`.bck`. You then will need to rebuild a tailored kernel in order for the newly-made changes to

take effect. Refer to the doconfig(8) reference page for more information about building tailored kernels.

- Failed merges

  If any files failed to merge during the Update, an error message is displayed on your screen. A list of failed merge files is located in: /var/adm/smlogs/upd_mergefail_files. Check the update.log and the it.log to identify any merge errors and manually edit any files that failed to merge by adding your customizations. Your customized, preupdate version of these files is always preserved for your reference as *filename*.PreMRG.

When all manual merges are complete, your system is ready to use. At this time you can install additional optional software subsets provided on the Version 5.0 distribution media. Refer to Chapter 9 for information about installing optional software subsets.

3.10 Optional Step 10: Run the Update Installation Cleanup Utility

Use the Update Installation Cleanup utility to remove or archive the .PreMRG and .PreUPD backup files created by an Update Installation. If there were failed file merges during the Update process, you use these files as a reference to merge your customizations into the new versions of the files. When all manual merges are complete, the .PreMRG and .PreUPD files are no longer needed.

Running the Update Installation Cleanup utility is an optional step after performing an Update Installation, but it is recommended if you want to recover disk space being consumed by these files. If you decide to archive the files, the archive destination can be any archive destination supported by the tar command (that is file, tape device, or disk).

The Update Installation Cleanup utility is invoked from the **SysMan Menu** (/usr/sbin/sysman) by selecting the following items:

1. **Software** branch
2. **Installation** branch
3. **Cleanup after an OS update (updadmin)** task

The utility is also available from the CDE front panel by selecting Software Management from the SysMan Applications icon. Use the online help provided with the graphical user interface if you need more information.

From the command line, the Update Installation Cleanup utility is invoked by entering /usr/sbin/updadmin. Refer to the updadmin(8) reference page for more information.

3.11 Error Recovery

There are certain types of error conditions that cause the Update Installation process to stop and require user intervention. These errors may occur at the following points in the Update:

- Analysis phase
- Subset load
- Kernel build

3.11.1 Analysis Phase Failure

You can recover if the Update Installation fails any time during the preload analysis phase. You can bring your system back to multiuser mode by issuing the following command:

```
# init 3
```

Fix the errors reported by the error messages and restart the Update Installation process.

3.11.2 Software Subset Load Failure

Individual software subsets can fail to load if a network interrupt, hardware problem, or file verification error occurs during the load process:

- If an optional software subset fails to load, you can install it later by using the setld command after the Update Installation is complete.
- If a mandatory software subset fails to load, the Update Installation procedure exits. Your system may be rendered unusable and you may have to restore the backed up version of the operating system before attempting another Update Installation. If the OSFBASE500 mandatory software subset was installed successfully, you may be able to retry the Update Installation without first restoring the backed up version of the operating system.

Caution

Pressing Ctrl/c, or in any other way stopping the Update Installation while software subsets are loading can cause serious operating system corruption that can render the operating system unusable. You may have to restore the backed-up version

of the operating system before you can attempt another Update Installation.

3.11.3 Kernel Build Failure

The tailored kernel build can fail at the end of the Update Installation because of an incompatibility of a kernel layered product with the new version of the operating system.

In this case, the system will rebuild a kernel without layered product support. The Update Installation log file located in `/var/adm/smlogs/it.log` contains the reasons for the kernel build failure. After examining the log, use the `setld` command to remove the layered product that caused the failure and then use the `setld` command to reinstall the most recent version of the layered product. You should then be able to build a new customized kernel with support for the layered product by using the `/usr/sbin/doconfig` command.

4

Full Installation Overview

This chapter contains an overview of Full Installation features and options.

If you are not interested in reading about the features of a Full Installation, go directly to Chapter 5, which describes the preinstallation tasks to perform before beginning a Full Installation.

4.1 Summary of Full Installation Features

The Full Installation can be invoked with a graphical or text-based interface. Both interfaces enable you to quickly and easily complete a Full Installation of the operating system. Both interfaces have a task oriented design, which steps you through each task of the setup process and lets you go backward and forward at any time. Section 6.6 summarizes the information you are required to supply and the decisions you have to make during the Full Installation.

A Full Installation creates new file systems and swap space on the disks and partitions you decide to use for the installation. Existing system and user-created files are overwritten on the disk partitions where the file systems and swap spaces are to be installed. You have the option to use default values for the disk layout and swap space allocation or to completely customize the locations of file systems and swap space.

Note

If your system is currently installed with a version of the operating system and was using the Advanced File System (AdvFS) as a file system type, you must run the `advscan` utility to reconstruct the `/etc/fdmns` directory after the Full Installation is complete. Refer to Section 7.6 for more information.

Features of the Full Installation interface include the ability to:

- Dynamically partition disks
- Install the base operating system and Worldwide Language Support software at the same time

- Install and configure Logical Storage Manager (LSM)
- Identify physical disks by blinking the input/output light
- Resolve software dependencies during optional software selection
- Invoke user-supplied files at predefined invocation points to further customize the installation process
- Clone the installation characteristics of one system to other similar systems
- Clone the configuration (network, internet, mail, print) of one system to other similar systems
- Access to a UNIX shell to perform file system and disk management tasks

4.1.1 Dynamic Disk Partitioning

By default, the Full Installation process determines the file system layout based on your software selections. You do not need to calculate in advance the size of the file systems, nor do you need to repartition your disks in advance of the installation process to ensure a successful installation.

Unless you specify otherwise, the Full Installation process defaults to the following file system layout:

- Installs the operating system on a single disk (`dsk0`) with the following layout:
  - The / (root) file system is on the `a` partition.
  - The `/usr` file system is on the `g` partition.
  - The `var` area is a directory in the `/usr` file system.
  - If WLS is installed, the `i18n` (internationalization) area is a directory on the `g` partition in the `/usr` file system.
  - A single swap area is on the `b` partition.
- All file systems are the Advanced File System (AdvFS) type.

The size of each disk partition depends on the size of the disk chosen for the installation and the number of subsets you chose to install. The option to customize your disk layout and partitions is always available during a Full Installation.

4.1.2 Installing Worldwide Language Support (WLS) Software

Tru64 UNIX is an internationalized operating system. The WLS software subsets provide support for various native languages and countries.

Installing the WLS software subsets lets users work in their native language, and enables software developers to develop internationalized software. WLS software subsets are located on the *Associated Products Volume 1* CD-ROM.

United States English is mandatory and is installed during every Full Installation. You have the option to install support for one or more additional languages. It is recommended to install WLS during a Full Installation to ensure that enough disk space is available. When you select one or more additional countries:

- The mandatory software subsets for the language of every country you select are installed automatically.
- Optional subsets for every country you choose can be installed with the `wwinstall`script or `setld` command after the Full Installation completes.
- If you install all base operating system subsets, your system is installed with all subsets for every country you select.
- All WLS base subsets (that is, those prefixed with `IOSWW`) that map to selected base operating system subsets are installed for every country you select.

WLS software is installed in the `/usr/i18n` (internationalization) directory, which can be a separate file system. By default it is part of the `/usr` file system.

WLS software subsets can also be installed after a Full Installation by using the `wwinstall` command or the `setld -l` command. See the *Installation Guide – Advanced Topics* for instructions.

4.1.3 Configuring the Logical Storage Manager (LSM)

You can install and configure the Logical Storage Manager (LSM) during the Full Installation process. LSM is a software product for host-based disk storage management that provides a powerful set of disk management tools and features for configuring and monitoring disk storage subsystems and for enhancing their availability and performance. These tools give system administrators the flexibility to manage storage space according to the needs of applications, databases, and users, without the limitations of standard UNIX partitions and physical devices. The following list summarizes the main features of LSM:

- Online storage management — Provides the ability to manage a system's disks as a pool of storage space for creating LSM logical volumes.

- Concatenation (disk spanning) — Enables the combination of multiple physical disks into a single, larger virtual disk (called a volume) for use by large file systems or databases.
- Striping (RAID 0) — Improves a system's disk I/O performance by interleaving the data within a volume across several physical disks.
- Mirroring (RAID 1) — Protects against data loss due to hardware malfunction by creating a mirror (duplicate) image of the data on another disk.
- Root and swap mirroring — Enables mirroring of critical system disk partitions used for booting and running the system to ensure that no single disk failure leaves the system unusable.
- Dirty region logging — Tracks regions on a mirrored volume that have changed due to I/O writes. Provides fast resynchronization of a mirrored volume after a system failure.
- Encapsulation — Enables migration of existing data on disk partitions to LSM volumes.

Some of the advanced LSM features such as mirroring and striping require a separate software license. For more information on the benefits and configuration and management of LSM, see the *Logical Storage Manager* guide.

4.1.4 Disk Identification

To help you associate a disk device name with a physical disk, both installation interfaces provide a way to determine which physical disk has a particular device name by repeatedly blinking the input/output light on the disk. The blinking light can be used to identify the majority of disks. However, due to hardware limitations, not all disks can be identified in this manner.

4.1.5 Automatic Detection and Installation of Software Dependencies

If you decide to install optional software during a Full Installation, software dependencies automatically are checked. Dependency checking ensures that software required for the proper operation of the optional software also is installed. If such a relationship is detected, the dependent software is installed automatically and you are notified accordingly.

4.1.6 Invoking User-Supplied Files to Perform Customizations

User supplied files can be invoked during a Full Installation to further customize the system beyond what is possible during a regular Full

Installation. User-supplied files can contain scripts, executables, or programs.

At three different process points, the Full Installation process looks for the files:

- Before the installation interface is displayed
- After software is installed
- After the system reboots, but before the tailored kernel build and configuration phase

When a user-defined file is found, it is executed. With these hooks in the installation process, you have the potential to fully automate the Full Installation process, perform customizations on the system, and handle special installation situations. If you want to take advantage of this feature, see the *Installation Guide – Advanced Topics* for file naming conventions, example scripts, and instructions for preparing and moving the files to the right locations.

4.1.7 Installation Cloning

Installation cloning lets you duplicate the installation characteristics from a model system onto one or more systems with the same or similar hardware configuration.

When you install the operating system, the Full Installation process automatically generates a configuration description file (CDF) named `install.cdf` that contains installation setup data you specified. The CDF is located in the `/var/adm/smlogs` directory. The `install.cdf` file contains all the installation information required to duplicate the Full Installation on another system.

Note

Installation cloning is not supported between different releases of the operating system. CDFs created by earlier versions of the operating system are not compatible with the current version.

Refer to *Installation Guide – Advanced Topics* for information about acceptable differences between hardware configurations and for instructions about preparing and moving the `install.cdf` file to the right location so that it can be invoked during a Full Installation.

4.1.8 Configuration Cloning

Configuration Cloning lets you duplicate the network, printer, and mail configuration (among other configuration items) from an already configured system onto one or more systems. A practical use of configuration cloning is when multiple systems in a group must be configured similarly. To achieve a fully automated installation and configuration of another system, Configuration Cloning can be combined with Installation Cloning to completely eliminate the need to manually perform these tasks after the system is installed.

When a system that is designated to be a model system has been configured the way you want it, the `sysman -clone -save` command saves a snapshot of the system configuration data in a CDF called `config.cdf`. The CDF is saved by default in the `/var/adm/smlogs` directory.

Note

Configuration Cloning is not supported between different releases of the operating system. Configuration CDFs created from older versions of the operating system are not supported for use on the current and future releases.

Refer to *Installation Guide – Advanced Topics* for information about creating, editing, and moving the `config.cdf` file to the right location so that it can be invoked during a Full Installation.

4.1.9 UNIX Shell Option for Experienced Administrators

Both Full Installation interfaces provide access to a UNIX shell in single-user mode with superuser privileges. The UNIX shell provides a way to recover from serious problems such as / (root) file system corruption and enables you to perform general file system and disk maintenance tasks during the installation. It is recommended that only experienced users choose the UNIX shell option.

When you start the Full Installation process using the text-based interface, the UNIX shell is presented as an option from the first menu. Choosing the UNIX shell option exits the installation procedure. Be aware that if you already have navigated through the text-based interface and then invoke the UNIX shell, any selections you have made are lost and you have to start again.

If you are using the graphical interface, you access the UNIX shell from the `File` menu. The graphical installation procedure remains available and you can go back and forth between the Full Installation procedure and the UNIX shell as necessary. Any installation selections you have made up to this point are retained.

The distribution media contains file systems that are laid out just as the software would be installed on the system and contains directly accessible /, `/usr`, and `/var` areas. This format makes many commands and utilities available in the UNIX shell even if your operating system is not yet fully functional. In effect, the mounted distribution media is a functional file system.

Caution

Any changes you make to the system from the UNIX shell affect the live system and the subsequent installation. For instance, if you have already assigned file systems to certain disks and partitions and then use the UNIX shell to edit a disk label, you may adversely affect your choices.

Refer to the *Installation Guide – Advanced Topics* for more information about the various maintenance procedures that can be performed from the UNIX shell environment.

4.2 Full Installation: Defaults and User Options

Table 4–1 shows the installation process defaults in relation to options you can choose.

Table 4–1: Custom Option Selections

Item	User Options	Installation Default Settings
Base operating system software subsets	Install mandatory software subsets only, mandatory plus your choice of optional software subsets, or all software subsets.	Installs mandatory base operating system software subsets only.
Worldwide Language Support subsets	Install support for one or more languages in addition to United States English.	Installs support for United States English only.
Disk selection	The /, `/usr`, and `/var` file systems and up to two swap areas can be distributed on a single disk or across multiple disks as you choose.	The / and `/usr` file systems and one swap area are on the same disk; `var` and `i18n` (if needed) are directories under `/usr`[a].

Table 4–1: Custom Option Selections (cont.)

Item	User Options	Installation Default Settings
Partition table	Create custom partition table (for one or more disks).	Creates a recommended partition table for a single disk based on software subset selection and disk size.
File system locations	The / file system is always on the a partition. All other file systems and swap areas can be located on any disk partition on any disk.	The / file system is on the a partition; /usr is on the g partition, and swap space is on the b partition.
File system types	Choose between UFS or AdvFS as the file system type for /, /usr, /var and i18n.	Installs one file system type for all file systems. AdvFS is the default file system type. There is no default in the text based interface.
Swap space	Allocate up to two swap areas on any disk or partition.	Allocates one swap area on the b partition.
Logical Storage Manager	Choose (and possibly create) a partition for LSM private region.	The LSM private region is created automatically if you decide to install LSM.
Kernel Component Options	Build mandatory only, mandatory plus some optional, or all kernel components into the kernel.	Builds mandatory kernel components into the kernel.

[a]Only disks 1GB or larger are supported for single disk installations.

5

Full Installation Prerequisite Tasks

This chapter describes the preinstallation tasks to be performed before starting a Full Installation.

Summary of Prerequisite Tasks:

1. Check the hardware to make sure you have all the hardware required for a Full Installation.
2. Check the Software Distribution Kit to make sure you have the right CD-ROMs and documents.
3. Read the *Release Notes* for last minute software, firmware, or hardware changes that are not documented in this book.
4. Optionally prepare CDFs or user-supplied files to invoke during the Full Installation or to clone the installation or configuration from another system.
5. Optionally run hardware configuration utilities depending upon the type of hardware you have.
6. Optionally connect peripheral devices if you intend to add new devices to your system.
7. Back up the current operating system as a safety precaution.
8. Shut down or power up the system to the console mode to prepare to boot from the distribution media.
9. Update the firmware to the version that is compatible with the new version of the operating system.

5.1 Task 1: Check Hardware

Ensure that you have the hardware needed for an installation. You must know the location and function of the controls and indicators on your hardware. Verify that all cables and connectors are hooked up and that the system is plugged in. Refer to your hardware owner's documentation for more information.

Table 5–1 lists the minimum hardware requirements to install the operating system software.

Table 5–1: Hardware Required for an Installation

Item	Description
CD-ROM disk drive	Most Full Installations are invoked from CD-ROM. If your system does not have a CD-ROM drive, contact your sites network administrator to determine if your system can be installed from a server using Remote Installation Services (RIS).
Disk for the / (root) file system	You need at least one supported disk to contain the / and `/usr` file systems and `swap` space. You will use this disk to boot your system after the installation. If you intend to install the operating system onto a single disk, be sure that the disk you choose is at least 1GB in size. The *Software Product Description* provides a list of disks 1GB or larger that can support a single-disk installation.
Console terminal	The console terminal communicates with your system during the installation. The console terminal may be a graphics or text only terminal. The type of terminal you have determines the installation interface presented.

In addition to these required items, you may want an additional disk or disks for data storage that is separate from the disk on which file systems will reside. This arrangement lets you add additional storage space without changing the system disk configuration.

5.2 Task 2: Check the Software Distribution Kit

You should have received a Software Distribution Kit that contains, among other things, the operating system CD-ROMs. A *Part Listing* is included in the box and lists the contents of the Software Distribution Kit.

At a minimum, you need the *Operating System Volume 1* CD to install the operating system. The Software Distribution Kit also contains the following CD-ROMs and documents:

CD-ROMs:

- *Associated Products Volume 1* — contains layered products and WLS software
- *Associated Products Volume 2* — contains additional layered products
- *Documentation Volume 1* — contains the online documentation set
- *Alpha Systems Firmware CD-ROM* — contains firmware revision levels for all systems

Documents:

- A `READ ME FIRST` letter
- This guide, the *Installation Guide*
- The *Installation Guide – Advanced Topics*
- The *Update Installation Quick Reference Card*
- The *Release Notes*
- The *Technical Overview*
- The *Alpha AXP Systems Firmware Update Release Notes Overview*

If you are missing any one of these items, contact your support representative.

5.3 Task 3: Read the *Release Notes*

It is recommended that you read the *Release Notes* before beginning any software installation procedure. The *Release Notes* describe important changes to the software, firmware, and hardware that are not covered in standard documentation. This information might be required for a successful installation.

The *Release Notes* also provide descriptions of features that are new to Version 5.0 of the operating system or have changed significantly from previous releases.

A printed version of the *Release Notes* is included in the Software Distribution Kit you received.

5.4 Optional Task 4: Prepare CDFs or User-Supplied Files

If you want to perform an Installation Cloning or Configuration Cloning on the system you are about to install, read the chapters about Installation and Configuration Cloning in the *Installation Guide – Advanced Topics*. Prepare the configuration description files (CDFs) as described and move them to the right locations so they are found by the Full Installation process.

If you want to have the Full Installation automatically execute user-supplied scripts, programs, or executables, review the chapter about user-defined files in the *Installation Guide – Advanced Topics*. Prepare `preinstall`, `postload`, or `postreboot` files as instructed and move them to the right location so the Full Installation process can find them.

5.5 Optional Task 5: Configure Hardware

This section describes optional preinstallation tasks you may have to perform depending upon the type of hardware you have. In all cases, check your hardware documentation for more information.

The following hardware-dependent tasks are described in this section:

- Setting the network adapter mode if your network adapter is not configured to operate on twisted-pair networks
- Configuring Integrated System Architecture (ISA) Devices
- Installing ATM adapters before the Full Installation
- Configuring the RAID subsystem
- Running the EISA Configuration Utility (ECU)

5.5.1 Setting the Network Adapter Mode

If you plan to connect your system to a network, you may need to change the value of a console variable to enable your network interface. Failure to do so will prevent you from executing remote installations, configuring network services, or running any network-aware software, such as the Common Desktop Environment (CDE).

By default, your network adapter is configured to operate on twisted-pair (10BaseT) networks. If this is compatible with your network, you do not need to do anything. Otherwise, you need to take one or more of the following actions:

- If you are using a DE500–AA or DE500–BA network adapter and if the switch or repeater to which you are connecting supports IEEE® 802.3u autonegotiation, set the `ewa0_mode` console variable with the following command:

  ```
  >>> set ewa0_mode autonegotiate
  ```

- If you are using an EISA DE425 adapter, run the EISA Configuration Utility (ECU) to select the media that you want. Refer to Section 5.5.5 for information about running the ECU.
- For all other adapters, upgrade your Alpha System Reference Manual (SRM) Console firmware to the most recent version available for your system. Then set the `EW*0_MODE` or `ETHERNET` console variable, depending on your machine type, for each interface. For example:

– Enter the following command at the console prompt to enable thinwire support if you are connecting the system to a thinwire (10Base2) network:

```
>>> set EW{a-n}0_MODE BNC
```

In the previous command, the value *{a-n}* represents the network adapter you are configuring, for example `set ewa0_mode bnc`.

– Enter the following command at the console prompt to enable thickwire support if you are connecting an older machine to a thickwire (10Base5) network:

```
>>> set ETHERNET THICK
```

See your hardware documentation for more information about these console variables.

- Optionally, for all adapters (including the EISA DE425), you can use the `lan_config` command to select the mode of operation that you want. This command overrides whatever you select through the ECU or console (`EW*0_MODE` or `ETHERNET` variables). After the system is installed, use the `/etc/inet.local` configuration file to preserve the `lan_config` settings for subsequent reboots.

Refer to the `tu`(7), `inet.local`(8), and `lan_config`(8) reference pages for more information.

5.5.2 Configure Integrated System Architecture (ISA) Devices

To connect ISA devices to your system (for example, floppy controllers, graphics cards), use the `isacfg` console command to supply the correct configuration information.

The `isacfg` console command is available on systems that have an ISA bus. There is information about the command in the hardware documentation for each of the systems that support ISA bus devices. If you need to know more about the format of the command, enter:

```
>>> help isacfg
```

The System Reference Manual (SRM) console firmware provides information about the ISA bus devices that come configured with systems as well as the device handles that are set up. Use the following console firmware command to view this information:

```
>>> isacfg -all
```

When you specify a device with the `isacfg` command, you must use a handle as the name of the device. Table 5–2 lists the handles for optional ISA devices that you can configure for your system.

Table 5–2: Optional ISA Device Handles

Device	Handle
Ethernet LeMAC (DE203, DE204, DE205)	DE200-LE
Sound board	PCXBJ
ATI Mach64 SVGA graphics[a]	MACH64
Generic VGA graphics	ISA--VGA[b]
Any other kernel device driver kit	Handle defined by vendor[c]

[a]An address conflict occurs between ISA serial devices configured as COM4 and ATI Mach64 graphics controllers. Both ISA GX and PCI ATI Mach64 CX/GX/CT products use the address range of 2EC-2EF. This is the same address range assigned to COM4 devices. Consult the hardware documentation for more information.
[b]If you configure generic VGA graphics, you must reset the graphics device handle (via isacfg) as defined by the vendor, when the system halts after loading the subsets. This allows the X server to recognize the device. Section 6.16.2 provides the instructions to do so where applicable in the installation procedure.
[c]A kernel device driver kit is any graphics kit that is not supplied by the Tru64 UNIX base operating kit. If you are performing a RIS installation from a RIS area that has the required graphics kit already installed, the handle for `isacfg` should be set to the handle specified by the vendor. Section 6.16.2 provides the instructions to do so where applicable in the installation procedure.

Use the `-handle handle-name` flag to specify the device handle. The following example sets the parameters for configuring the DE205 Ethernet controller. When you issue such a command, let the input line wrap; do not press the Return key in the middle of the line:

```
>>> isacfg -slot 1 -dev 0 -mk -handle DE200-LE -irq0 5
   -iobase0 300 -membase0 d0000 -memlen0 10000
   -etyp 1 -enadev 1
```

See your hardware documentation for more information about ISA configuration.

5.5.3 Install Asynchronous Transfer Mode (ATM) Adapters

Install the DGLTA ATM adapter before installing the operating system so that the installation procedure properly detects the presence of the ATM adapter and automatically installs the ATM software subsets. If you install the ATM adapter after installing the operating system, you must boot the system using the generic kernel `/genvmunix`, install the ATM software subsets from the CD-ROM or RIS server, and then run the `doconfig` command to rebuild your system kernel to enable the added ATM support.

Use the following command if you need to boot the system with the generic kernel after the installation:

```
>>> boot -fi "/genvmunix"
```

5.5.4 Configure RAID Subsystem

If your system has a redundant array of independent disks (RAID) subsystem, refer to your hardware owner's guide for configuration instructions before you attempt to install software.

5.5.5 Run the EISA Configuration Utility (ECU)

To install on a system with an Extended System Integrated Architecture (EISA) bus, you must run the EISA Configuration Utility (ECU). Follow the instructions in your hardware owner's guide. If your system has an EISA bus, you will receive a diskette that contains the ECU.

5.6 Optional Task 6: Connect Peripheral Devices

If you have any new peripheral devices you want to connect, do so before you start the installation:

1. Power off your system. Then, connect the peripheral devices while your system is powered off.

   Note

   Depending upon the device or devices you add, you may need to run hardware configuration utilities such as the EISA Configuration Utility (ECU) and RAID Configuration Utility (RCU), as well. Refer to your hardware documentation for more information.

2. Restore power to the console terminal and all additional peripheral devices.

   If you connect additional peripherals or controllers after the installation, refer to the *System Administration* guide for instructions about how to reconfigure your system.

3. Restore power to the system. When the system is powered on, the peripheral devices automatically are recognized by the system.

5.7 Task 7: Back Up the System

If your system is already installed with the operating system, it is recommended that you perform a full backup of the operating system

before you begin any software installation procedure. Refer to the *System Administration* guide for information about backing up your system.

There are particular backup considerations if your system is currently installed with Prestoserve.

5.7.1 Back Up Prestoserve

If your system is currently installed with and running **Prestoserve**, do the following to back up important files:

1. Create a backup copy of the `/etc/prestotab` file. The backup copy should be created on a separate file system that is not located in either the / (root), `/usr`, or `/var` file systems because a Full Installation destroys (overwrites) those three file systems. In the following example, `/backup` is a separate file system:

   ```
   # mkdir /backup/presto
   # cp /etc/prestotab /backup/presto/prestotab
   ```

2. Perform the Full Installation of the operating system as described in this book.

3. After the Full Installation is complete, restore the copy of `/etc/prestotab` from the backup as shown in this example:

   ```
   # cp /backup/presto/prestotab /etc/prestotab
   ```

To configure the Prestoserve software, refer to the `prestosetup`(8) or `setup`(8) reference pages for more information.

5.8 Task 8: Shut Down or Power Up the Processor

To prepare to boot the system from the distribution media, do one of the following depending upon the current state of the system:

- If the system is turned off, power on the processor. The console subsystem prints various start up and diagnostic messages and ends with the console mode prompt (`>>>`).
- If your system is up and already running a version of the operating system, shut down and halt the processor using a command similar to the following :

  ```
  # shutdown -h +5 Please log out
  ```

  In the previous example, the system is shut down and halted in 5 minutes and sends the message `Please log out` to all logged in users. Consult the *System Administration* guide or the `shutdown`(8) reference page if you need more information about shutting down a system.

5.9 Task 9: Update Firmware

Firmware is the software stored within the system (for example, ROM or EPROM) on a system's CPU board. Firmware is the first software that runs when a system is turned on, and it directly controls the hardware. Each hardware platform uses a different set of firmware. The firmware on a platform is the same regardless of the operating system installed on the platform. Thus, firmware is platform dependent, but is operating system independent.

Your system might require a firmware update to run the new version of the operating system. Console firmware is backward compatible with respect to hardware and operating system revision. Therefore, to assure that your system has the latest in terms of PAL code, boot device support, and bug fixes, upgrading firmware to the latest revision is recommended. The firmware *Release Notes* for your system model will note any exceptions to this general recommendation.

Firmware updates are located on the *Alpha Systems Firmware CD-ROM* that is included in the Software Distribution Kit you received. The firmware update process requires you to insert the firmware CD-ROM into the drive and then boot from it. The firmware update utility automatically identifies your system type and model and determines the correct firmware revision required for your system. There is an automatic display of the `READ-ME-FIRST` file, which describes the firmware changes included in the update so you can quickly decide if you want to proceed.

The contents of the firmware CD-ROM are also available at the corporate Internet site through anonymous file transfer protocol (FTP):

`ftp://ftp.digital.com/pub/Digital/Alpha/firmware`

Firmware updates are also available through anonymous FTP from the `ftp.europe.digital.com` worldwide web server.

Note

The EB64+ single-board computer uses a socketed firmware ROM chip. The EB66+, AlphaPC64, AlphaPC164, and EB164 single-board computers use an EPROM that can be updated with new firmware. Refer to your hardware owner's documentation for details on how to update the console firmware on these systems.

5.10 You Are Ready to Begin

When all preinstallation tasks have been completed, proceed to Chapter 6; you are ready to begin a Full Installation of the operating system.

6

Full Installation Procedures

This chapter includes step by step instructions for invoking the Full Installation and supplying all information required by the Full Installation setup process.

Summary of Full Installation Procedures:

Make sure you have performed all prerequiste tasks and are ready to begin before beginning this procedure:

1. Set console environment variables for certain processors.
2. Set console environment variables for all processors.
3. Boot the system from the distribution media.
4. Provide the information requested by the Full Installation interface.
5. Check your selections to make sure they are what you want; go back and change your responses if necessary.
6. Give your final confirmation to start the Full Installation.
7. Optionally select kernel components to build into the kernel.
8. Log in to the newly installed system.
9. Review installation log files.
10. Go to Chapter 7 to set up and configure the system for general use, the Full Installation is complete.

6.1 Are You Ready to Begin?

Before beginning the Full Installation, perform all prerequisite tasks described in Chapter 5. The last prerequisite task is to update the system firmware, so your system should now be in console mode (at the `>>>` prompt). If your system is not in console mode, use the `shutdown -h now` command.

Caution

A Full Installation does not preserve user or data files on disks that you are installing onto, so make sure your current operating

system has been backed up before you begin. If errors occur that prevent a successful installation of the operating system, you may need to restore the previous version of the operating system.

6.2 Step 1: Set Console Environment Variables for Certain Processors

Certain processors require one or more console environment variables to be set in addition to the standard console variables that are set for all processors (as shown in Section 6.3). Look for the corporate logo on the front panel of your hardware to determine what kind of processor you have; then, find the processor in Table 6–1 and execute the commands shown for that processor.

Note

If your processor does not appear in Table 6–1, do not execute any of the commands shown and go to Section 6.3.

Table 6–1: Processor-Specific Console Variables

Processor	Command(s) to Set Console Variable

• AlphaServer 800
• AlphaServer 1000, 1000A
• AlphaServer 1200
• AlphaServer 2000
• AlphaServer 2100/2100A
• AlphaServer 4000/4100A
• AlphaServer 4100A
• Alpha VME 2100
• DS40 and ES40 Servers
	>>> **show bus_probe_algorithm**
	bus_probe_algorithm old
	>>> **set bus_probe_algorithm new**
	>>> **init**

AXPpci Single Board Computers with ATI Mach64 graphics controllers	>>> **set pci_parity off** >>> **init**

Table 6–1: Processor-Specific Console Variables (cont.)

Processor	Command(s) to Set Console Variable
• AlphaServer 1000, 1000A • AlphaStation 500 • AlphaStation 600/600A • AXPvme • AXPpci • Alpha VME • AlphaPC64, 164 • EB64+, EB66+, EB164 Single Board Computers • PICMG Alpha CPUs • Personal Workstation XP1000	>>> **set boot_file**
• Personal Workstation 433au, 500au, 600au • Ultimate Workstation 533–au2	>>> **set os_type unix** >>> **init**

• AlphaServer 8200
• AlphaServer 8400
• GS160 Server
• GS140 Server
	>>> **set boot_reset on**
	>>> **set os_type unix**
	>>> **set console serial**

DEC 10000	>>> **set boot_reset on**
DEC 7000	>>> **set boot_reset on** >>> **set keyboard *type*** [a]
DEC 3000	>>> **set scsi_reset 4** >>> **set boot_reset on**
DEC 2000	>>> **set keyboard *type*** [a]

[a] Sets the keyboard variable to match the keyboard type on the system. Use the `help set` command to list available keyboard types.

6.3 Step 2: Set Console Environment Variables for All Processors

Set the following console environment variables for all processors:

1. Clear and reset the `boot_osflags` variable by entering the following command:

   >>> **set boot_osflags ""**

2. Enter the following command to ensure that your system returns to the console prompt (>>>) after a system crash or power failure during installation:

```
>>> set auto_action halt
```
[1]

Note

Most processors will reboot automatically after the software subsets are loaded. If you are installing the operating system on behalf of another user or customer, you may want to disable this feature. Disabling automatic reboot lets you run the installation interface, load the software, then hand the system to the eventual user thus allowing the user to boot it and enter host and site specific information.

Enter the following command to disable automatic reboot:

```
>>> set boot_osflags h
```

Processors that do not support auto-reboot include the DEC 2000, 3000, and 7000 series, the AlphaStation 255, and the AlphaServer 8400.

6.4 Step 3: Boot the System

The procedure in this section applies to all supported systems and describes how to boot from CD-ROM. If you are performing the installation over the network from a remote installation services (RIS) server, refer to the *Installation Guide – Advanced Topics* for network boot instructions. If you have problems booting your system, refer to the hardware documentation for your particular processor. If the problem is not hardware related, refer to the *System Administration* guide. The *System Administration* guide provides information about booting a generic kernel (`genvmunix`) or booting an alternate custom kernel.

Note

If you are booting a DEC 3000 series processor from a SCSI TURBOchannel option card, see Section 6.4.1.

[1] Once installation is complete, you may want to reset `auto_action` to `restart` to allow your system to reboot automatically after a power or processor failure. See Section 7.8 for instructions.

Use this procedure to boot your system from the operating system CD-ROM:

1. Insert the CD–ROM labeled *Operating System Volume 1* into the disk drive.
2. If you have not already done so, enter the **init** command for AlphaServer 300, 400, 1000/1000a, 2000, 2100, 2100A, 4000/4100, VME 2100, AlphaStation 200, 250, 255, 400, 600, 800 and DEC 4000 and 7000 series processors:

   ```
   >>> init
   ```

3. Determine the console device identifier of your CD-ROM drive by entering the following command:

   ```
   >>> show device
   ```

   Depending upon your system type, a device information table similar to the following is displayed:

```
dka0.0.0.0.0              DKA0                        RZ28
dkb0.0.0.1.0              DKB0                        RZ28
dkc0.0.0.2.0              DKC0                        RZ26
dkc100.1.0.2.0            DKC100                      RZ26
dkc200.2.0.2.0            DKC200                      RZ26
dkc300.3.0.2.0            DKC300                      RZ26
dke100.1.0.4.0            DKE100                      RRD43   ⇐
mka500.0.0.0.0            MKA500                      TLZ04
mke0.0.0.4.0              MKE0                        TZ85
ewa0.0.0.6.0              EWA0             08-00-2B-2C-CE-DE
p_d0.7.0.3.0                                    Bus ID 7
pka0.7.0.0.0              PKA0               SCSI Bus ID 7
pkb0.7.0.1.0              PKB0               SCSI Bus ID 7
pkc0.7.0.2.0              PKC0               SCSI Bus ID 7
pke0.7.0.4.0              PKE0               SCSI Bus ID 7
```

   In the third column to the right, look for the line with the characters RRD or CD-ROM. These characters denote a CD-ROM device. The second column in the table shows the identifiers assigned to each device on your system.

   In this example, the RRD43 CD-ROM device identifier is DKE100. You will enter this device identifier with the boot command in the next step.

Note

The show device command output for DEC *nnnn* series (example, DEC 3000) processors is different. In this case, look in the DEVNAM column for the characters RRD. The device name is in the BOOTDEV column.

4. Enter the boot command with the following syntax:

   boot *cdrom_device_identifier*

   The *cdrom_device_identifier* is the information associated with the CD-ROM device from Step 3. In this example, you would enter the following command:

   ```
   >>> boot dke100
   ```

   Output similar to the following is displayed:

   ```
   (boot dke100.1.0.4.0)
   block 0 of dke100.1.0.4.0 is a valid boot block
   reading 16 blocks from dke100.1.0.4.0
   bootstrap code read in
   base = 1ee000, image_start = 0, image_bytes = 2000
   initializing HWRPB at 2000
   initializing page table at 1e0000
   initializing machine state
   setting affinity to the primary CPU
   jumping to bootstrap code

   Tru64 UNIX boot - Fri Dec 17 15:49:49 EDT 1999
   .
   .
   Starting installation from CD-ROM.  Please wait.
   ```

   Note

   The boot process can take several minutes. Several hardware-specific messages will be displayed. The more complex the system (several peripheral devices, and so on), the longer the boot process takes.

This completes system boot; go to Section 6.5.

6.4.1 DEC 3000 Series Processor: Booting from a SCSI TURBOchannel Option Card

Follow these steps to boot a DEC 3000 processor from a SCSI TURBOchannel option card:

To boot from the dual SCSI TURBOchannel option card (PMAZB or PMAZC), complete the following steps:

1. Determine which controllers and devices are configured on your system by entering the following command at the console prompt:

   ```
   >>> show conf
   ```

   Your system displays output similar to the following (the output differs depending on your system configuration):

```
DEC 3000 - M500
VPP PAL X5.37-82000101/OSF PAL X1.28-82000201 -
Built on 17-MAR-1998 13:39:58.02

TCINFO    DEVNAM   DEVSTAT
------    -------- --------
    CPU    OK KN15-AA -V2.0-S1F4-I039-sV1.0-DECchip 21064
P3.0
    ASIC   OK
    MEM    OK
8
    CXT    OK
7
    NVR    OK
    SCC    OK
     NI    OK
    ISDN   OK
6
    SCSI   OK
3-PMAF-AA   TC3
2-PMAZ-AA   TC2
1-PMAZB-AA  TC1
0-PMTNV-AA  TC0
```

The numbers under the TCINFO column (and the entries in the DEVNAM column) represent the unit number assigned to the PMAZB or PMAZC option card.

2. Determine the number of your boot device by entering a command with the following syntax:

   t tc *slot_number* cnfg

   For example, to determine the device number of a disk on a PMAZB option card, enter the following command:

   ```
   >> t tc1 cnfg
   ```

   A table similar to the following is displayed:

```
DEC       PMAZB-AA  V1.0        (Dual SCSI [53C96])
BOOTDEV     ADDR   DEVTYPE NUMBYTES  RM/FX WP  DEVNAM  REV
-------     ----   ------- --------  ----- --  ------  ---
DKA200      A/2/0  DISK       426MB  FX        RZ25    0700
(rz200A)
DKA400      A/4/0  RODISK     409MB  RM    WP  RRD42   4.3d
(rz400A)
..HostID..  A/7    INITR

..HostID..  B/7    INITR
```

To boot from the PMAZB (or PMAZC) option card, enter the `boot` command with the following syntax:

boot *"slot_number/device_number"*

For example, to boot from disk number 4 on the PMAZB option card located in slot 1, enter the following command:

```
>>> boot "1/dka400"
```

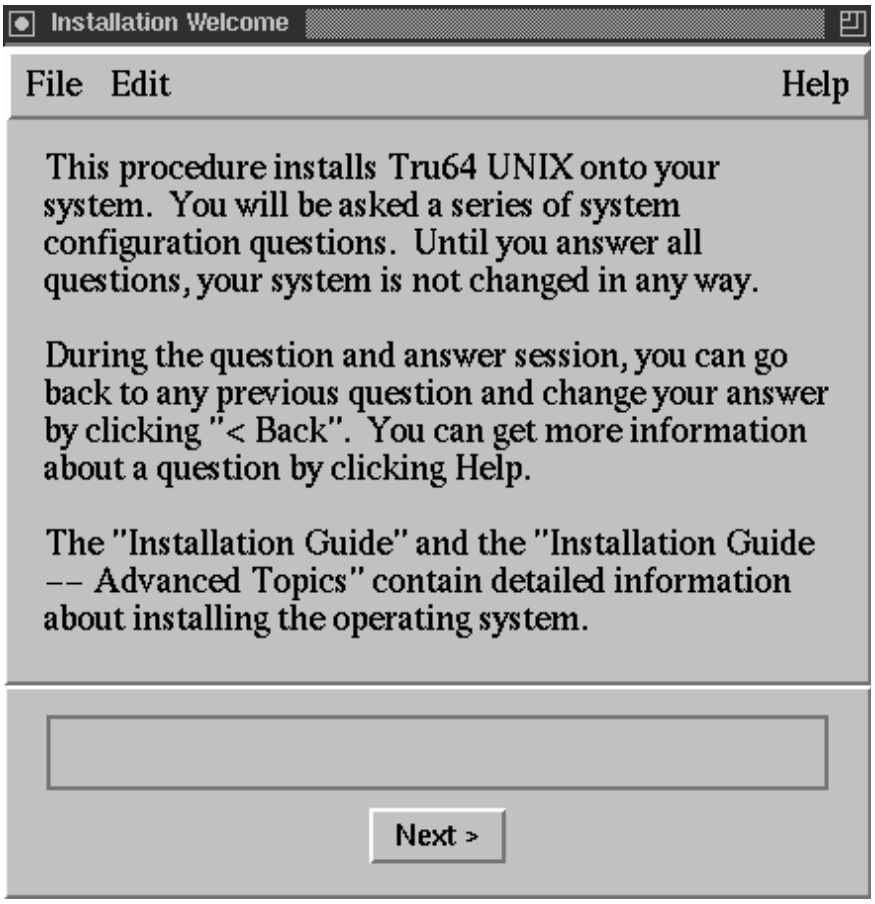
This completes system boot; go to Section 6.5.

6.5 Successful System Boot — What Happens Now?

What you see after booting from the distribution media depends upon the type of console terminal you have:

- On systems capable of graphical display, a successful system boot displays the `Installation Welcome` dialog box shown in Figure 6–1. The graphical user interface steps you through each phase of the installation setup process. The user interface has a task-like design and lets you go backward and forward at any time. Except for setting the system date and time immediately when you enter it, your system is not changed in any way (unless you repartition a disk or disks) until the last dialog box where you confirm the start of the installation. Online help is available from the `Help` menu.

Figure 6–1: Installation Welcome Dialog Box



If your system presents the graphical interface, but you would prefer to use the text-based interface, select the `Quit` option from the `File` menu to exit from the installation user interface. Then, enter the following command:

```
# restart nogui
```

- On systems without graphics capabilities, the following is displayed:

```
          Welcome to the Tru64 UNIX Installation Procedure

This procedure installs Tru64 UNIX onto your system.  You will be
asked a series of system configuration questions.  Until you answer all
questions, your system is not changed in any way.

During the question and answer session, you can go back to any
previous question and change your answer by entering:  "history"
You can get more information about a question by entering:  "help"

Refer to the "Installation Guide" and "Installation Guide -- Advanced
```

```
Topics" for more detailed information about installing Tru64 UNIX.

** This system is currently running firmware revision: n.n
   See the "Tru64 UNIX Release Notes" for information regarding the
   required firmware revision.

The following options are available:

o  The "U.S. English Installation" installs only the Tru64 UNIX base
   software onto your system.

o  The "Installation with Worldwide Language Support" (WLS) allows you
   to internationalize your system.  This option will allow you to install
   the Tru64 UNIX base software as well as WLS software.  The additional
   software subsets provide support for various countries and their native
   languages.

o  The "Exit Installation" option stops the installation, and puts your
   system in single-user mode with superuser privileges.  This option
   is intended for experienced UNIX system administrators who want to
   perform file system or disk maintenance tasks prior to the
   installation.  This option may also be used for disaster recovery
   on a previously installed system.

Remember, you can always get extra information by typing help.

1) U.S. English Installation
2) Installation with Worldwide Language Support
3) Exit Installation

Enter your choice:
```

Online help is available by entering **help** at any prompt.

You can change or review your selections by entering **history** at any time at any prompt, and a list of your previous selections similar to the following is displayed:

```
Enter your choice: history


Select the question you want to revisit.

1) Installation type  ( 1 )
2) Set root password  ( LSWNUMtIomZVg )
3) Confirm root password  ( LSWNUMtIomZVg )
4) Software selection type  ( custom )
5) Select software subsets  ( 34 items: OSFADVFSBIN500 OSFBASE500
   OSFBIN500 OSFBINCOM500 OSFCDEDT500 OSFCDEMAIL500...)
6) Confirm chosen subsets  ( 1 )
7) Select locales  (  )
8) DISMISS history menu

Enter your choice:
```

- If the Full Installation process finds an `install.cdf` file, which indicates that this system is to be installed using the installation cloning technology, the following screen is displayed (regardless of the user interface):

```
Found file install.cdf on <location>

A Configuration Description File was specified for use during the
installation of this system.

The Configuration Description File can be used by the installation to
provide the information related to file system layout and software
selection.

If you choose to use the Configuration Description File, the installation
will proceed and you will not have to answer any questions.  If you decide
not to use the Configuration Description File, the installation will
continue interactively.

Would you like to use the Configuration Description File? (y/n) [y]:  y

In a few moments, the installation will begin.  However, the Configuration
Description File will first be validated for use on this system.  Once the
validation completes, you no longer need to be present.
```

If CDF validation is successful, the installation procedure continues as shown in Section 6.16.1. File systems and swap space are created as specified in the CDF, and the software subsets defined in the CDF begin loading after file system creation. Site-specific information such as host name, location and area, and date and time is obtained from the RIS server if a RIS installation is performed. If a CD-ROM installation is performed, the host name, location, and area are all provided by fields in the CDF. If the CDF variable `timeset` is blank or is set to `no`, the system requests the date and time. If `timeset` is set to `yes`, the system time is set when the first user logs in and sets it using the `date` command.

Later in the installation process, you will be required to boot from the newly installed disks, as shown in Section 6.16.2 and to enter a root password as shown in Section 6.10 (if a password is not already contained in the CDF).

If you need more information about Installation Cloning, especially if you encounter CDF validation errors, refer to the *Installation Guide – Advanced Topics*.

6.6 Step 4: Supplying the Setup Information Required for a Full Installation

Table 6–2 describes the information you have to supply to the Full Installation process.

The information you supply is the same regardless of the user interface, but the order in which it is requested may be different. For instance, the graphical interface begins by asking you to supply host-specific information; the text-based interface begins by asking you if you intend to install Worldwide Language Support software.

Table 6–2: Information You Supply For a Full Installation

Information Requested by Full Installation	User Activity
Host Information	When installing the operating system from a RIS server, the host and site information is obtained automatically. If installing from a CD-ROM, you supply the following information: • Host Name • Current Date • Current Time • Area • Location If you do not enter this information during the installation setup, you will be prompted for it later in the configuration phase. Section 6.7, Section 6.8, and Section 6.9 provide guidelines for entering host– and site-specific information.
Root Password	Create a password for the `root` user. If you do not enter a password during installation setup, you will be asked to create and confirm a password before system configuration (after reboot). Guidelines for choosing an effective password are shown in Section 6.10.
Software Selection	Select the type of software subsets you want to install. The default is to install only mandatory software subsets. But, you also have the option to the optional software you want, or all mandatory and all optional software subsets. Section 6.11 describes the subset selection options.
Worldwide Language Support	Specify whether or not you want to install support for additional languages. The text-based interface asks you to make this decision at the onset of the process; the graphical user interface asks you to specify the countries to support during the software selection step.

Table 6–2: Information You Supply For a Full Installation (cont.)

Information Requested by Full Installation	User Activity
File System Layout	You decide to use the default file system layout or to customize the file system layout for the /, /usr, /var, and i18n file systems and swap areas. You can accept the defaults if you are installing the operating system on a single disk and want to use the recommended file layout. Section 6.13 describes your file system layout options. Section 6.13.4 describes the option to install into Logical Storage Manager (LSM) volumes on each disk you use for the installation.
Kernel Component Options	Select the type of kernel components to build into the kernel. You can choose the option to include mandatory components only, mandatory plus your choice of optional components, or all mandatory and all optional components. Section 6.17 describes these kernel options. If you select the option to customize kernel component selection, you perform that task later after the first system reboot.

The Full Installation procedures start in Section 6.7 and end in Section 6.15. These sections more closely follow the sequence of the graphical interface, however, you should use the same guidelines for the text-based interface. Any difference in how you supply information is noted.

Note

If you are installing the operating system on behalf of another user or customer, you may not want to supply any host or site-specific information. You can accomplish this by doing the following:

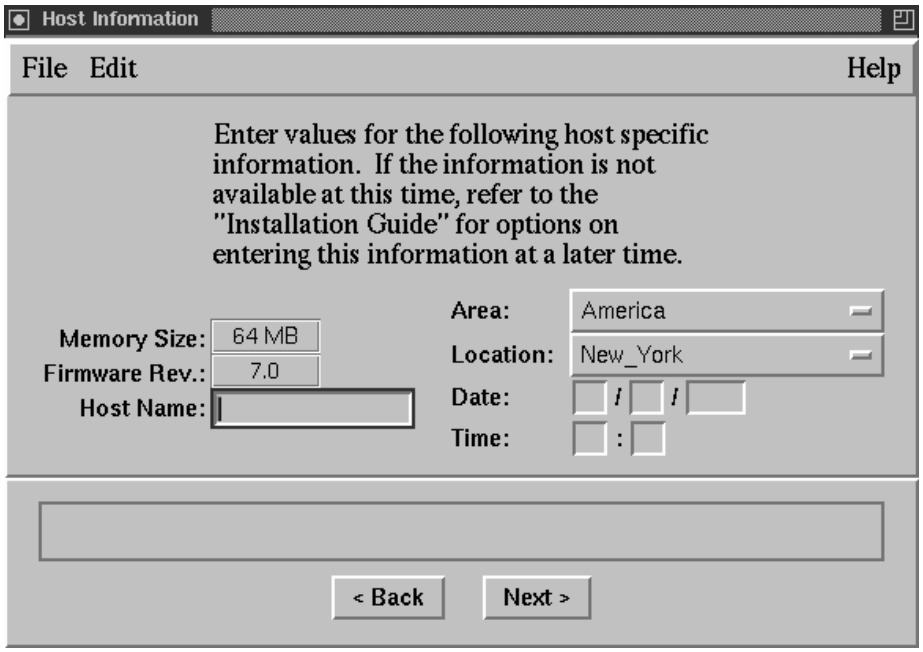
1. Set the console environment variable boot_osflags to halt (see Section 6.3).
2. Do not enter a host name, the date or time, location or area, or a root password; the Full Installation will halt after the software subsets load to request this information. This allows the eventual user of the system to boot the system and specify their own host- and site-specific information.

6.7 Entering a Host Name

The host name is used to identify your system on the network.

For the graphical interface, a variety of host and site-specific information is supplied on the `Host Information` dialog box shown in Figure 6–2. Refer to Section 6.8 and Section 6.9 for information about supplying information for the remaining fields on this dialog box.

Figure 6–2: Host Information Dialog Box



6.7.1 Guidelines for Choosing a Host Name

The following are guidelines for choosing a host name:

- Host names may contain from 2 to 63 alphanumeric upper or lower case characters (`a-z, A-Z, 0-9`). Fully qualified host names (for example, `mysystem.boston.bigcorp.com`) can contain a maximum of 254 characters. Each component of the domain name can contain up to 63 characters and must be separated by a period.
- Host names must begin with a letter.
- Hyphens (`-`) and periods (`.`) are permitted in host names.

- Before deciding upon a host name, consult with the site administrator to make sure you choose a unique name and to determine if site-specific restrictions (such as maximum length) or naming conventions have been defined.
- If your system is running a previous version of the operating system and is already connected to a network, you should keep the same host name because changing it would impact how your system is recognized on the network.

Table 6–3 shows examples of correct and incorrect host names:

Table 6–3: Samples of Correct and Incorrect Host Names

Correct Host Names	Incorrect Host Names
mysystem	generic or binary[a]
y2k-system.com	2000-system.com
system-one	1.system
xyz-college.edu	xyz_college.edu

[a]Do not use the words generic or binary for your host name because they have been reserved for use by the operating system.

If you do not supply a host name, the Full Installation stops after the system reboots but before building the tailored kernel to prompt you for a host name.

6.8 Setting the System Date and Time

Enter today's date in the following order:

mm - the current month
dd - the current day
[cc]yy - the current year in two (yy) or four (ccyy) digits. For example, 00 and 2000 are correct entries

Digits entered in the format and order 07 06 2000 and 07 06 00 both represent July 6, 2000. The text-based interface requires that a hyphen (-) separate each set of digits, for example, 07-06-00.

Enter the time in two sets of two digits (using the 24-hour clock format) in the following order:

hh - the current hour in two digits
mm - the current minutes in two digits

For example, 14 entered in the hh field represents 2 o'clock in the afternoon, and 06 entered in the mm field represents the sixth minute of the hour.

If you enter either a date or a time, you must enter the other. As soon as you enter a date and time, the system date and clock is set immediately.

If you do not supply a date and time, and did not set up your system to halt before system reboot, the Full Installation stops after the system reboots but before building the tailored kernel to prompt you for the current date and time.

6.9 Specifying the Location and Area (Formerly Time Zones)

The location and area is used to set the time zone. You should select the location and area that best describes your geographic location. The default location is `America/New York`. You have the option to set the Location and Area to `none` if you are installing this system on behalf of another user.

Starting with Version 5.0, the naming convention for time zone directories is the `Area/Location` format (for example, `Asia/Tokyo` or `Pacific/Honolulu`) where `Area` is the name of a continent or ocean, and `Location` is the name of a major city or locale within that area. Earlier versions of the operating system used the `Country/Zone` style (for example, `US/Eastern`). All `/etc/zoneinfo` directories and time zone files are still available for compatibility, however many of the files are now hard links to their renamed counterparts. Time zone to location/area mappings are provided in Table 6–4.

Table 6–4: Mapping of Time Zones to Location/Area Style

Obsolete Time Zone	New Location/Area
Australia/ACT	Australia/Sydney
Australia/LHI	Australia/Lord_Howe
Australia/NSW	Australia/Sydney
Australia/North	Australia/Darwin
Australia/Queensland	Australia/Brisbane
Australia/South	Australia/Adelaide
Australia/Tasmania	Australia/Hobart
Australia/Victoria	Australia/Melbourne
Australia/West	Australia/Perth
Australia/Yancowinna	Australia/Broken_Hill
Belfast	Europe/Belfast

Table 6–4: Mapping of Time Zones to Location/Area Style (cont.)

Obsolete Time Zone	New Location/Area
Brazil/Acre	America/Porto_Acre
Brazil/DeNoronha	America/Noronha
Brazil/East	America/Sao_Paulo
Brazil/West	America/Manaus
Canada/Atlantic	America/Halifax
Canada/Central	America/Winnipeg
Canada/East-Saskatchewan	America/Regina
Canada/Eastern	America/Montreal
Canada/Mountain	America/Edmonton
Canada/Newfoundland	America/St_Johns
Canada/Pacific	America/Vancouver
Canada/Saskatchewan	America/Regina
Canada/Yukon	America/Whitehorse
Chile/Continental	America/Santiago
Chile/EasterIsland	Pacific/Easter
Cuba	America/Havana
Dublin	Europe/Dublin
Egypt	Africa/Cairo
GB-Eire	Europe/London
GMT	Etc/GMT
GMT+0	Etc/GMT+0
GMT+1	Etc/GMT+1
GMT+10	Etc/GMT+10
GMT+11	Etc/GMT+11
GMT+12	Etc/GMT+12
GMT+13	Etc/GMT+13
GMT+2	Etc/GMT+2
GMT+3	Etc/GMT+3
GMT+4	Etc/GMT+4
GMT+5	Etc/GMT+5

Table 6–4: Mapping of Time Zones to Location/Area Style (cont.)

Obsolete Time Zone	New Location/Area
GMT+6	Etc/GMT+6
GMT+7	Etc/GMT+7
GMT+8	Etc/GMT+8
GMT+9	Etc/GMT+9
GMT-0	Etc/GMT-0
GMT-1	Etc/GMT-1
GMT-10	Etc/GMT-10
GMT-11	Etc/GMT-11
GMT-12	Etc/GMT-12
GMT-2	Etc/GMT-2
GMT-3	Etc/GMT-3
GMT-4	Etc/GMT-4
GMT-5	Etc/GMT-5
GMT-6	Etc/GMT-6
GMT-7	Etc/GMT-7
GMT-8	Etc/GMT-8
GMT-9	Etc/GMT-9
GMT0	Etc/GMT0
GMT1	Etc/GMT+1
GMT10	Etc/GMT+10
GMT11	Etc/GMT+11
GMT12	Etc/GMT+12
GMT13	Etc/GMT+13
GMT2	Etc/GMT+2
GMT3	Etc/GMT+3
GMT4	Etc/GMT+4
GMT5	Etc/GMT+5
GMT6	Etc/GMT+6
GMT7	Etc/GMT+7
GMT8	Etc/GMT+8

Table 6–4: Mapping of Time Zones to Location/Area Style (cont.)

Obsolete Time Zone	New Location/Area
GMT9	Etc/GMT+9
Greenwich	Etc/Greenwich
Hongkong	Asia/Hong_Kong
Iceland	Atlantic/Reykjavik
Iran	Asia/Tehran
Israel	Asia/Jerusalem
Jamaica	America/Jamaica
Japan	Asia/Tokyo
Libya	Africa/Tripoli
London	Europe/London
Mexico/BajaNorte	America/Tijuana
Mexico/BajaSur	America/Mazatlan
Mexico/General	America/Mexico_City
NZ	Pacific/Auckland
NZ-CHAT	Pacific/Chatham
Navajo	America/Denver
PRC	Asia/Shanghai
Poland	Europe/Warsaw
ROC	Asia/Taipei
ROK	Asia/Seoul
Singapore	Asia/Singapore
Turkey	Europe/Istanbul
UCT	Etc/UCT
US/Alaska	America/Anchorage
US/Aleutian	America/Adak
US/Arizona	America/Phoenix
US/Central	America/Chicago
US/East-Indiana	America/Indianapolis
US/Eastern	America/New_York
US/Hawaii	Pacific/Honolulu

Table 6–4: Mapping of Time Zones to Location/Area Style (cont.)

Obsolete Time Zone	New Location/Area
US/Indiana-Starke	America/Indiana/Knox
US/Michigan	America/Detroit
US/Mountain	America/Denver
US/Pacific	America/Los_Angeles
US/Samoa	Pacific/Pago_Pago
UTC	Etc/UTC
Universal	Etc/Universal
W-SU	Europe/Moscow
Zulu	Etc/Zulu

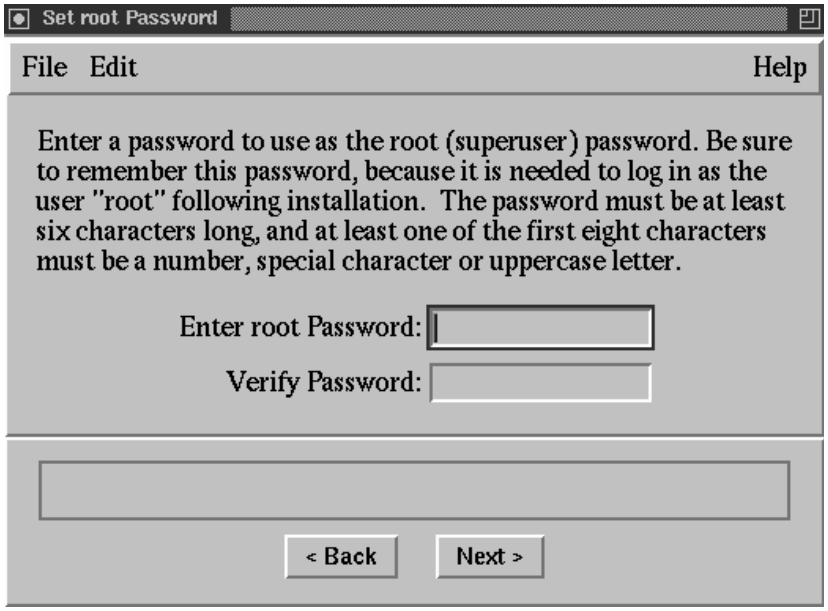
If you do not supply a location and area, and did not set up your system to halt before system reboot (see Section 6.5), the Full Installation stops after system reboot and prompts you for location and area information.

6.10 Entering a Root Password

A UNIX operating system permits a superuser to have permissions that supersede those of ordinary users. This superuser is often referred to as the `root` user. The superuser is usually the system administrator. This user has access to all files and all devices and is not restricted from changing anything on the operating system. For this reason, the `root` user (or `root` account), needs a special password. Section 6.10.1 contains guidelines for choosing effective root passwords.

Figure 6–3 shows the `Set root Password` dialog box.

Figure 6–3: Set Root Password Dialog Box



Choose a password that conforms to the following rules:

- Passwords must contain a minimum of six to a maximum of 16 characters.
- The password should contain a combination of upper and lower case letters.
- At least one of the first six characters must be a number, a special character, or an upper case letter.
- It is recommended, but not mandatory, to use numbers and special characters such as the dollar sign (`$`), the percent sign (`%`), the number sign (`#`), the period (`.`), the hyphen (`-`), the underscore (`_`), or the at sign (`@`) in your password. If you do not use a special character or number in the password, at least one of the first six characters must be an upper case letter.

When you enter the password, it is not displayed on your screen for security reasons. You must enter the new password again for verification. Remember this password because you will need it to log in as the `root` user the first time you log in to the system after the installation. You can change the `root` password at any time (using the `passwd` command) after the system is installed.

If you do not supply a root password, and did not set up your system to halt before system reboot, the Full Installation stops after the system reboots but before building the tailored kernel to prompt you for a root password.

6.10.1 Hints for Choosing an Effective Password

When choosing a root password, you should *not* use:

- Words found in any dictionary (in any language)
- Personal information about you or your family such as first and last names, addresses, birth dates, telephone numbers, names of pets, and so on
- Any combination of words in the dictionary and personal information

Do not choose a password that can be guessed by someone who knows you. Because the `root` user has absolute power over the operating system, the `root` password should be carefully protected. The basic guideline is to make the password something that you can remember but difficult for someone else to guess.

Table 6–5 shows examples of passwords adhere to suggested guidelines and some that do not:

Table 6–5: Sample Root Passwords

Correct Root Passwords	Passwords That Are Not Recommended	Why Password Violates Guidelines
`OhU8one2to`	`johnsmith`	Uses a proper name with all letters lower case
`UrGr8t!!`	`123MainStreet`	Home address
`parTe2knite`	`MyDogLassie`	Name of pet
`99Pnt.99%`	`7-6-58`	Birth date of family member

6.11 Choosing the Type of Software to Be Installed

After supplying host information, setting the date and time, and specifying a root password, the next step in the Full Installation is to select the type of software to install. If you are using the graphical user interface, the `Software Selection` dialog box is shown in Figure 6–4. The text-based interface displays the same information.

Figure 6–4: Software Selection Dialog Box

Table 6–6 describes the three classifications of software subsets. Appendix C provides descriptions of the individual software subsets.

Table 6–6: Description of Software Selection Options

Option	Description
Mandatory Only	This option installs the software subsets that are the minimum required to run the base operating system. Mandatory software subsets are always installed. This is the default choice for the graphical user interface.
All Software	This option installs all mandatory software subsets and all optional software subsets, excluding Worldwide Language Support subsets (unless you select additional country support).
Customize	This option lets you choose which optional software subsets to install in addition to the mandatory software. Section 6.11.1 provides hints for customizing the software selection process.
Country Support	This is where you select support for one or more additional languages if you are using the graphical user interface. Each country has a set of software subsets that is designed to allow localization of the operating system. The default is the United States English language. If you install all base operating system subset plus one or more additional languages, all WLS subsets for each selected country are installed.

Refer to Appendix C for a description of the mandatory, optional, and WLS software subsets.

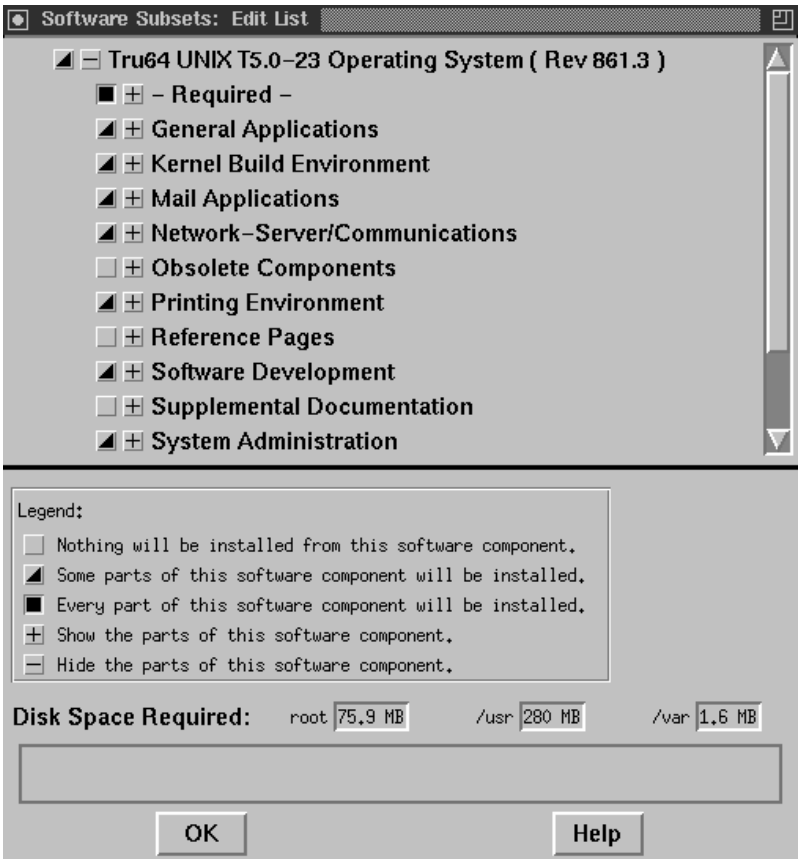
6.11.1 Hints for Custom Software Selection

Selecting the `Customize` option and clicking on the Edit List... button displays the `Software Section: Edit List` dialog box shown in Figure 6–5, which is where you select the optional software you want to install.

Note

The legend at the bottom of the dialog box describes the current status of each software subset. Click on a plus sign (+) to view the individual software subsets contained in a software category; click on a minus sign (–) to close a category.

Figure 6–5: Software Subsets: Edit List Dialog Box



When making software subset selections, you can select a software subset category (such as `General Applications`), or an individual software subset within a category (such as `DOS Tools`). If you select a software subset that has a dependency with another subset that is not yet selected, the other subset is selected automatically. When a dependent subset is automatically selected, a dialog box with a message similar to the following is displayed:

```
The chosen subset(s) require one or more additional subset(s)
which will be loaded automatically:
  * Doc. Preparation Tools  (OSFDCMT500)
```

An alternative to selecting one software subset (or category) at a time is to select the topmost category, `Tru64 UNIX V5.0 Operating System`, and then click on the categories or subsets you do not want. Adding all subsets results in more software than your system needs, so remember to remove all of the hardware-specific subsets related to keyboard types, X servers,

and fonts. The user interface will not let you remove software subsets that are mandatory for your system's hardware configuration.

A suggested procedure for selectively choosing optional software to install:

1. Review Appendix C for a description of all software subsets.
2. In the `Software Selection` Dialog Box, select `Customize`, then click on the Edit List... button.
3. Select the optional software subsets you want. When you have completed selecting the subsets, note the `Disk Space Required` for the /, /usr, and /var file systems, which is shown at the bottom of the dialog box. Use this information to select disks and partitions that are large enough to hold the software you want to install

Note

If you do not want to use the recommended partitions offered by the Full Installation process, read the *Installation Guide – Advanced Topics* for information about partitioning disks, then use the `Disk Space Required` figures to select which disks to select later on in the Full Installation process.

6.12 Choosing the Type of Kernel Components to Build into the Kernel

The next step in the Full Installation is to choose the type of kernel components to build into the kernel later in the configuration phase of the installation process. Regardless of the interface, you have three options for including kernel components into the kernel. Figure 6–6 depicts what you see if you are using the graphical interface.

Figure 6–6: Kernel Options Dialog Box

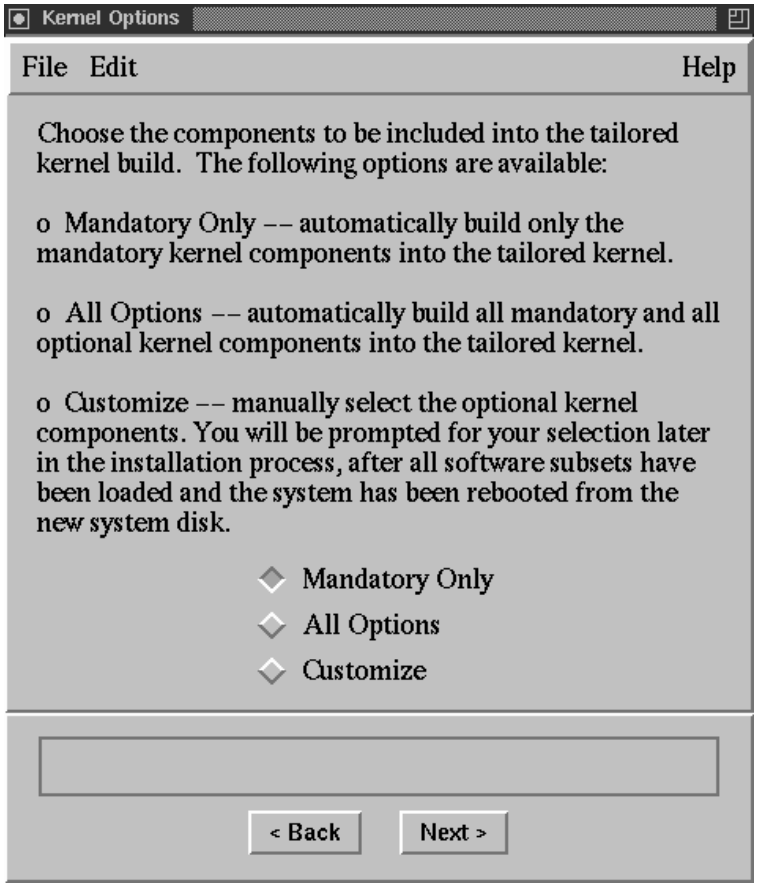


Table 6–7 describes the kernel component options:

Table 6–7: Description of Kernel Selection Options

Option	Description
Mandatory Only	This option builds into the kernel the minimum kernel components required for the proper operation of the software subsets you plan to install. This is the default option for the graphical user interface.
All Options	This option builds all kernel components into the kernel. Each kernel component loads additional code into the kernel; therefore, selecting `All Options` can significantly and unnecessarily increase the size of the kernel and impact performance.
Customize	This option lets you select specific kernel components from a `Kernel Options Selection` menu that is presented after system reboot (see Section 6.16.2). The kernel components presented on the menu depend on the software subsets that were installed.

6.13 Selecting the Type of File System Layout

After selecting the software subsets to install, you have to decide where to install them. Selecting the file system layout involves selecting the disk or disks and disk partitions on which you want to install the standard UNIX file systems: /, `/usr`, `/var`, `/usr/i18n` (if you selected one or more additional languages), and swap space. You have to then decide whether you want to assign the Advanced File System (AdvFS), which is the default, or the UNIX File System (UFS) as the file system type for each file system. The Full Installation offers the option to choose a default file system layout or the option to completely customize the file system layout.

The dialog box shown in Figure 6–7 shows the file system layout choices.

Figure 6–7: Select File System Layout Dialog Box

Section 6.13.1 describes the situations when you should choose the default file system layout, and Section 6.13.2 describes the situations when you should choose to customize the file system layout.

6.13.1 When Should I Use the Default File System Layout?

You should use the default file system layout if any one of the following statements is true:

- Your system has only one disk (which must have 1GB or greater capacity)
- You want to install the operating system on one disk (even if your system has more than one)
- You do not need to create custom disk partitions

- You only need one swap area
- You only want one file system type for all file systems

Regardless of the interface you are using, you have to make a few choices if you want to use the default layout:

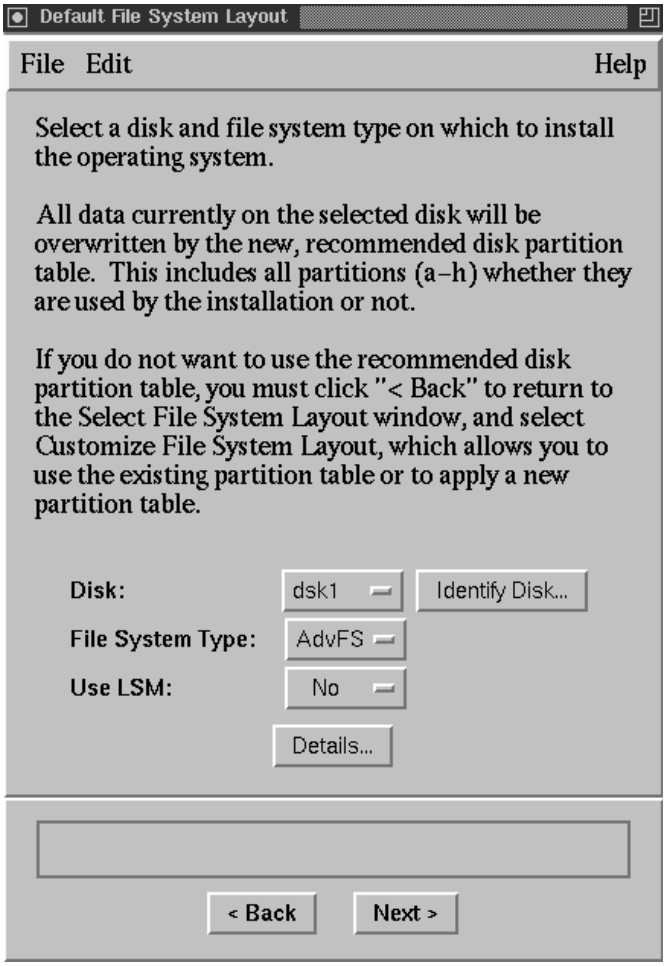
1. **Choose one disk** — The disk you choose to contain the operating system must be 1GB or greater in size. The `a` partition on this disk must be a minimum of 128 MB to hold the / (root) file system.

   As shown in Figure 6–8, instead of the `rz*` device names you may have been accustomed to in previous versions of the operating system, you will see `dsk*` device names. Refer to Appendix A for general information about device naming conventions. Refer to Section A.4 for information about preserving your existing device name database during a Full Installation if your system is already running a previous version of the operating system.
2. **Choose one file system type for all file systems** — Choices are the Advanced File System (AdvFS), which is the default, or the UNIX file system (UFS). For a description and comparison of UFS and AdvFS, see the *Installation Guide – Advanced Topics*.
3. **Decide whether or not to install into LSM volumes** — Section 6.13.4 provides more information about the Logical Storage Manager (LSM) to help you decide whether or not you want to install into LSM volumes.

What you see if you choose the default file system layout depends upon the interface you are using:

- If you are using the graphical user interface, choosing the `Default File System Layout` option opens the dialog box shown in Figure 6–8.

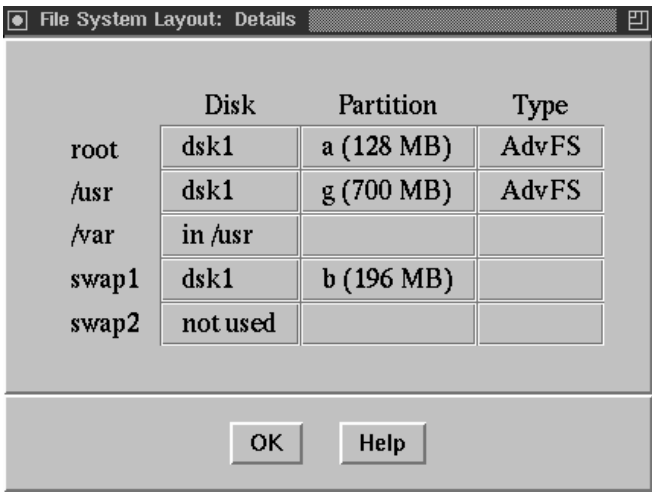
Figure 6–8: Default File System Layout Dialog Box



Hold the left mouse button down over the button labeled `dsk0` to obtain a list of disks available on your system. Highlight the disk you want to use, then release the mouse button.

If you are using the graphical interface, you can verify that you selected the correct disk by clicking on the Details... button to display the disk details shown in Figure 6–9. The partition sizes shown are for illustrative purposes only. Your disk partition sizes will depend upon the software subsets you have chosen. The `/usr/i18n` file system contains the subsets required for *internationalization* (i18n) and is shown only if you selected support for one or more additional languages.

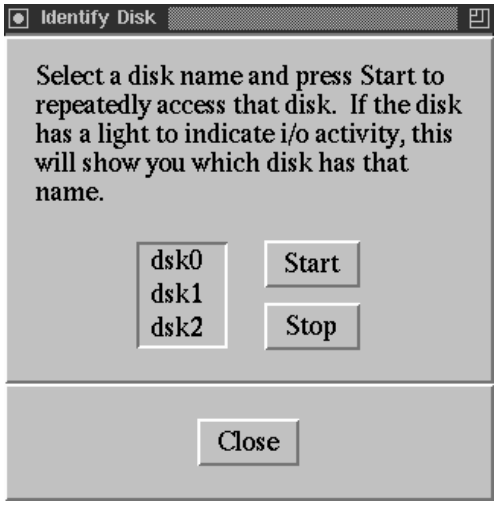
Figure 6–9: Default File System Layout: Details Dialog Box



If after reviewing the disk details you are not satisfied with the disk or file system type you chose, close the Details dialog box and choose another disk or file system type. If you are still not satisfied, go back to the File System Layout dialog box and select the option to customize the file system layout to obtain a more suitable configuration.

If you are unable to determine which of the physical disks is associated with a `dsk*` device name, click on the Identify Disk... button to open the dialog box shown in Figure 6–10. Follow the instructions in the dialog box to blink the input/output light on the disk.

Figure 6–10: Identify Disk Dialog Box



- Example 6–1 shows the text-based interface disk selection dialog box for a default file system layout

Example 6–1: Textual Interface: Default File System Layout

```
Select a disk for the root file system.  The root file system
will be placed on the "a" partition of the disk you choose.

To visually locate a disk, enter "ping <disk>", where <disk>
is the device name (e.g., dsk0) of the disk you want to
locate.  If that disk has a visible indicator light, it will
blink until you are ready to continue.
      Device      Size      SCSI    Controller
      Name       in GB   ID  LUN  Type       ID     Type
1)    dsk0         2.0    0    0  SCSI       2     RZ1BB-CA
2)    dsk1         2.0    1    0  SCSI       2     RZ1BB-CS

Enter your choice: 1

Select the file system type.  All of the file systems will be
created with this type.

1) UFS -- UNIX File System
2) AdvFS -- Advanced File System

Enter your choice: 1

You have requested this file system layout:

  * root file system on dsk0a, type UFS
  * /usr file system on dsk0g, type UFS
  * var will be a directory in the /usr file system
  * i18n will be a directory in the /usr file system
  * first swapping area (swap1) will be on dsk0b
  * no second swapping area (swap2)

Is this the correct file system layout (y/n)
```

Example 6–2 shows a default file system layout screen when the system has only one disk.

Example 6–2: Text—Based Interface: Default File System Layout with One Disk

```
Only one disk detected in this system (/dev/dsk0, SCSI RZ26L
type).  All file systems will be on that disk.
```

Example 6–2: Text—Based Interface: Default File System Layout with One Disk (cont.)

```
Select the file system type.  All of the file systems will be
created with this type.

1) UFS -- UNIX File System
2) AdvFS -- Advanced File System

Enter your choice:
```

If you are using the text-based interface and you are not sure which physical disk is associated with a particular `dsk*` name, you may be able to identify it by entering **ping *disk_name*** as shown in Example 6–3. If the disk has a visible input/output light, it will start blinking. Not all disks have an input/output light, so not all disks can be identified using this method.

Example 6–3: Identifying Disks in the Textual Interface

```
To visually locate a disk, enter "ping <disk>", where <disk> is the device
name (e.g., dsk0) of the disk you want to locate.  If that disk has a visible
indicator light, it will blink until you are ready to continue.
     Device    Size                SCSI     Controller
      Name     in GB    Type    ID    LUN    Type     ID
1)    dsk0      1.0     RZ26L    0      0    SCSI      0
2)    dsk1      1.0     RZ26L    1      0    SCSI      0

Enter your choice: ping dsk1

** Identifying device dsk1
.
.
```

When you have made your decisions for the default file system layout, the Full Installation continues as described in Section 6.14.

6.13.2 When Should I Customize the File System Layout?

You should customize the file system layout if any one of the following statements is true:

- You want to install the standard UNIX file systems on more than one disk. Up to six different disks can be specified; each file system and swap area can reside on its own disk.
- You want to use both AdvFS and UFS file system types.

- You want to create custom disk partition sizes.
- You need two swap areas.
- You want to preserve existing data on disks you are installing to as described in Section 6.13.5.
- You plan to use the system as a dataless server or a RIS server. The *Installation Guide – Advanced Topics* provides details about the extra space needed in the `/var` file system for these types of servers.

You have to make a few choices if you want to use the Custom File System Layout:

1. **Decide whether or not to install into LSM volumes** — Section 6.13.4 provides more information about LSM to help you decide whether or not you want to use it.
2. **Choose a disk and disk partition for each file system** — You must choose a disk and disk partition to hold each of the following file systems: /, `/usr`, `/var`, and `/usr/i18n` (if you want `/usr/i18n` to be a file system rather than a directory). The `/usr/i18n` file system contains the subsets required for *internationalization* (i18n) if you selected additional language support. The / file system must be on the `a` partition of the disk you choose to hold it; you cannot change this. You have the option to locate the `/var` and `/usr/i18n` file systems within the `/usr` file system instead of on their own disk partition.

   If you are unable to determine which of your physical disks is associated with a `dsk*` device name, click on the Identify Disk... button to open the identify disk dialog box shown in Figure 6–10, or enter **`ping`** ***`disk_name`*** if you are using the text-based interface.

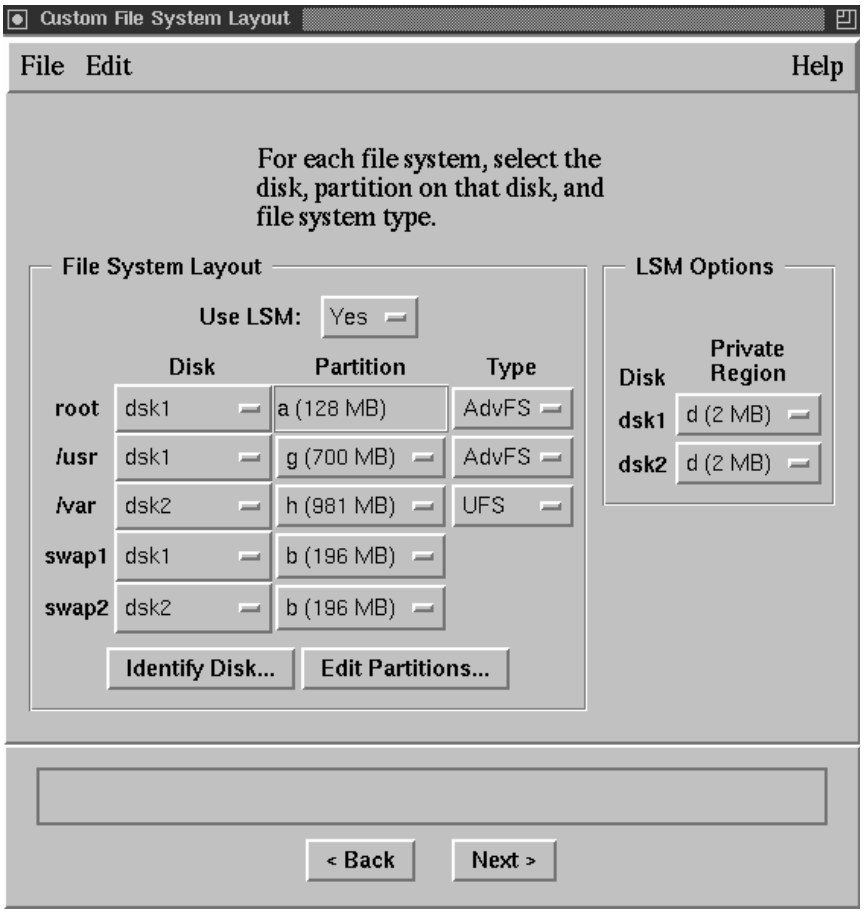
   As shown in Figure 6–11, instead of the `rz*` device names you may have been accustomed to in previous versions of the operating system, you will see `dsk*` device names. Refer to Appendix A for general information about device naming conventions. Refer to Section A.4 for information about preserving your existing device name database during a Full Installation if your system is already running a previous version of the operating system.
3. **Choose a disk and disk partition for one or two swap areas** — You have the option to allocate two swap areas. It is recommended that you place swap areas on different disks and choose the fastest disks for swap areas. The *Installation Guide – Advanced Topics* contains more recommendations for calculating the amount of swap space you need and where to place swap space. As a frame of reference, the recommended file system layout uses 128 MB as the default size of the swap partition.

4. **Choose a file system type for each file system** — Choose between the Advanced File System (AdvFS), which is the default, or the UNIX file system (UFS) for each file system. For a description and comparison of UFS and AdvFS, see the *Installation Guide – Advanced Topics*.

What you see when customizing the file system layout depends upon the interface you are using:

- If you are using the graphical user interface, the `Customize File System Layout` option displays the dialog box shown in Figure 6–11.

Figure 6–11: Custom File System Layout Dialog Box



The `Custom` option lets you configure your disks and file systems any way you choose. For a typical installation, the recommended minimum file system size is shown in Table 6–8.

Table 6–8: Suggested Minimum Partition Size for File Systems

File System or Area	Size in Megabytes (MB)
/ (root)	128
/usr	745
swap1	128

The a partition of the disk that contains the / (root) file system must be at least 128 MB in size or you will not be able to continue the installation.

- The disk selection screens of the text-based interface are similar to those shown in Example 6–4. The interface provides some guidelines for selecting partitions that are large enough to hold each file system. In this example, the user chose to install into LSM volumes, hence the 2 MB d partition to hold the LSM private region.

Example 6–4: Customized Disk Selection Using the Text-Based Interface

```
Select the dsk0 partition where the LSM private region
will reside. This partition must be larger than 2 MB in
order to accommodate the LSM configuration for this disk.

                         Start      End
   Partition    Size     Block     Block    Overlaps
1)     b        128MB    262144    524287   c
2)     d        2.0MB    524288    528383   c
3)     e        372MB    528384   1289621   c g
4)     f        372MB   1289622   2050859   c g
5)     g        743MB    528384   2050859   c e f

Enter your choice: 2

Select the dsk0 partition where the /usr file system
will reside. This partition must be larger than 269 MB in
order to fit the software that you have selected.  However,
a size of 700 MB or greater is recommended to allow for
additional layered software and future upgrade
considerations.
                         Start      End
   Partition    Size     Block     Block    Overlaps
1)     b        128MB    262144    524287   c
2)     e        372MB    528384   1289621   c g
3)     f        372MB   1289622   2050859   c g
4)     g        743MB    528384   2050859   c e f

Enter your choice: g
```

Example 6–4: Customized Disk Selection Using the Text-Based Interface (cont.)

```
Select the file system type for the /usr file system.

1) UFS -- UNIX File System
2) AdvFS -- Advanced File System

Enter your choice: 2
```

Continue making disk and disk partition selections until all file systems and swap areas are assigned.

When you have made your decisions for the customized file system layout, the Full Installation continues as described in Section 6.14.

6.13.3 Partitioning Disks for a Custom File System Layout

Both user interfaces provide access to disk configuration tools if you need to repartition a disk to accommodate a customized file system layout:

Note

Disk partitioning changes take effect immediately even if the installation is canceled.

- The Disk Configuration application, `diskconfig`, is invoked directly from the graphical user interface by clicking on the Edit Partitions... button on the `Custom File System Layout` dialog box. After making your changes and exiting the Disk Configuration application, resume with the Full Installation tasks (all of your previous selections are intact).
- The `disklabel` command is accessed from the text-based interface by pressing Ctrl/c at any prompt to bring the system back to a UNIX shell. After making disk changes, restart the Full Installation; any installation choices you have made up to this point are lost.

Because disk partitioning is considered a task that only experienced users should attempt, the Disk Configuration application, tasks that can be performed from the UNIX shell, and how to use the `disklabel` command are documented in the *Installation Guide – Advanced Topics*.

6.13.4 Should I Install into LSM Volumes?

Whether you choose the default file system layout with one disk or customize the file system layout on more than one disk, you have to decide whether or not to install into LSM volumes. LSM is an integrated, host-based disk storage management tool that protects against data loss, improves disk input/output performance, and customizes the disk configuration. LSM builds virtual disks, called volumes, on top of UNIX system disks. A volume is a special device that contains data used by file systems, databases, or other applications. LSM transparently places a volume between a physical disk and an application, which then operates on the volume rather than on the physical disk. The Full Installation automatically installs the software subsets required by LSM. Section 4.1.3 provides an overview of LSM features if you need more information to make the decision to use it. You need a separate license to use the mirroring and striping features of LSM. Section 6.13.4.1 contains information about selecting a partition to use for the LSM private region.

Installing into LSM volumes is not typical nor required during a Full Installation. But, if you have previous experience using this feature, it is offered as an option now to eliminate the need to install LSM as a separate operation.

Note

Section 6.13.4.2 contains information about the special processing done by a Full Installation on a system that was previously configured to use LSM.

6.13.4.1 Selecting a Partition for the LSM Private Region

If LSM is selected, you are required to select a private region partition for each disk being installed. LSM uses these private regions to hold configuration information for the entire system. Multiple private regions on multiple disks provide backup functionality in the unlikely event of a disk failure. The LSM private region requires 2 MB of disk space. As such, the partitions for the LSM private region need to be at least 2 MB in size. Partitions can be larger, but the excess space will not be available for any other use. The recommended disk partition layout provided by the Full Installation interface includes a 2 MB `d` partition on all disks. This partition should be used for the LSM private region whenever possible.

6.13.4.2 Special Processing for Systems Previously Configured with LSM

If you decide to install and configure LSM on a system with an existing LSM configuration, a clean up procedure prepares the system for the new LSM selections. This procedure removes LSM from the following partitions so that your Full Installation selections can be applied:

- Any sliced disk or simple disk partitions that have been selected for the new file systems (/, usr, var, /usr/i18n, or swap space).
- Any sliced disk or simple disk partitions that overlap those that were selected for the new file systems.
- Any sliced disk or simple disk partition that contains LSM information with one or more of the standard names that the Full Installation procedure will use to create the new LSM configuration. Table 6–9 lists the standard LSM names.

Table 6–9: LSM Standard Names

LSM Component	Standard Names
disk	root01, usr01, var01, swap01, sswap01, i18n01
volume	rootvol, usrvol, varvol, swapvol, sswapvol, i18nvol
plex	rootvol-01, usrvol-01, varvol-01, swapvol-01, sswapvol-01, i18nvol-01
subdisk	root01-01, usr01-01, var01-01, swap01-01, sswap01-01, i18n01-01

This clean up procedure preserves all information (volumes, private regions, disks, and so on) from the existing LSM configuration that is not overwritten by your Full Installation selections. All existing LSM information that is not identified in the four LSM components listed in Table 6–9 will be preserved. This cleanup procedure is applied to any LSM partitions, even if you are installing even if you are installing to a different disk than your current boot disk.

If, for any reason, a component cannot be removed, the Full Installation exits to single user mode with an error message. From this point, various commands can be used to interrogate the existing LSM configuration and manually remove the source of the problem so that the installation can be restarted. See Section G.1.1.1 for more information about the commands that can be used to interrogate the existing LSM configuration and how to manually remove the source of the problem.

6.13.5 Preserving Data on Previously Used Disks

When you are installing the operating system onto a single disk and you want to preserve data on an existing partition, choose the `Customize File System Layout` option so that the existing partition sizes and offsets will not be changed.

By choosing the custom option, you can select the disk partitions on which the /, `/usr`, and `/var` file systems and `swap` areas will be installed. If the partitions you choose contain data or user files, the data is lost (overwritten) when the new file systems are built. Selecting a partition for one of these file systems that overlaps the partitions containing the data to be preserved has the same effect. Also, modifying the partition information in the disk label in such a way that the partitions containing data have their size and offset modified causes the data to be lost. However, if the partitions containing the data are undisturbed, their contents are preserved.

Assuming that the partitions to be preserved were undisturbed during the installation, the data in them can be used on the newly-installed system. If the partition contained a file system, it can be mounted and accessed again. Refer to the `mount`(8) reference page for more information about mounting file systems.

Note

The Full Installation procedure does not update the `/etc/fstab` file with the partitions that contain user data or user file systems. In order to mount these partitions to make the data available to users, you must manually add the entries for partitions with preserved data to the new `/etc/fstab` file after the Full Installation is complete.

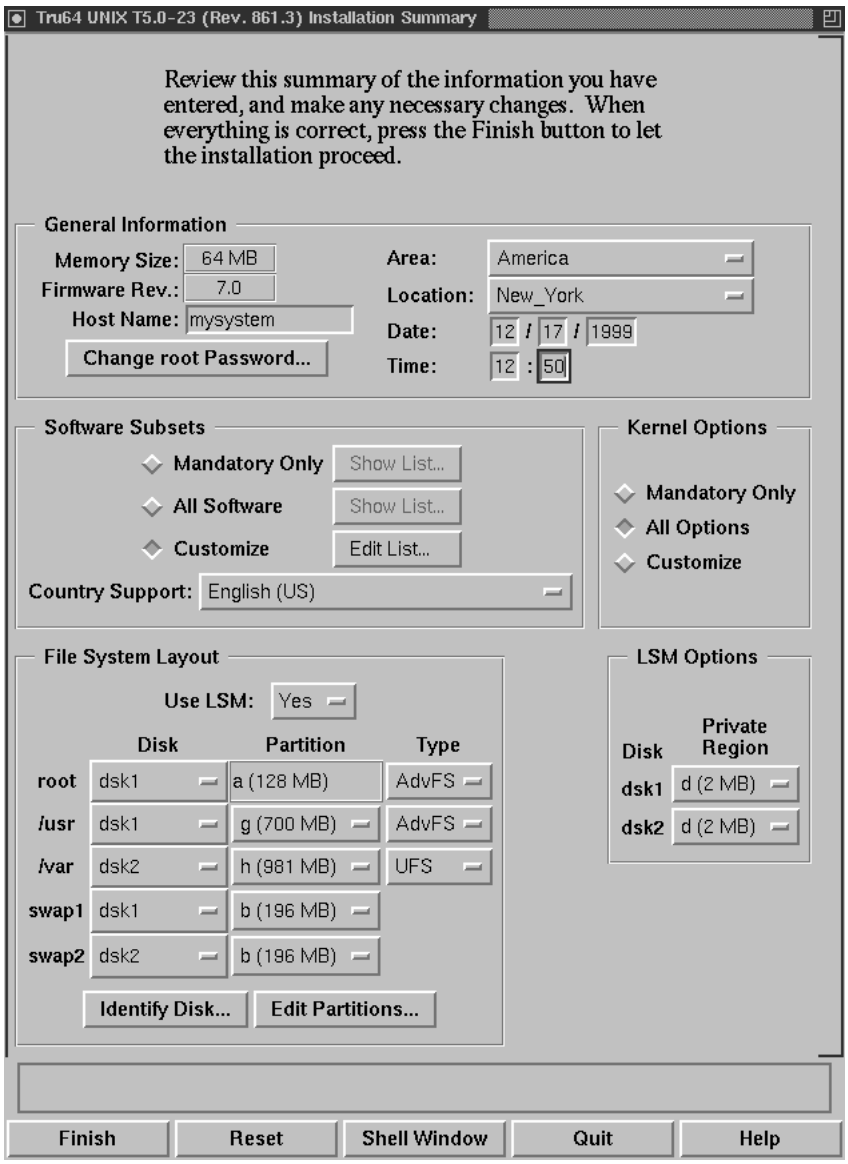
6.14 Step 5: Check Your Selections

Except for the system date and time, your system has not been changed in any way unless you have used the `Disk Configuration` application or `disklabel` command to reconfigure disk partitions. This is the last chance you have to verify your disk and software selections. If you are using the graphical interface, the `Installation Summary` dialog box shown in Figure 6–12 is displayed after you make your disk and file system layout selections. The summary data shown is based on a custom file system layout. You can change any of the information directly from this dialog box.

Once you are satisfied with all your selections, click on Finish. You will have another opportunity to confirm the start of the installation.

If you are using the text-based interface, you are asked to confirm the file system layout. Use the `history` command to revisit any of your entries and change them.

Figure 6–12: Installation Summary Dialog Box

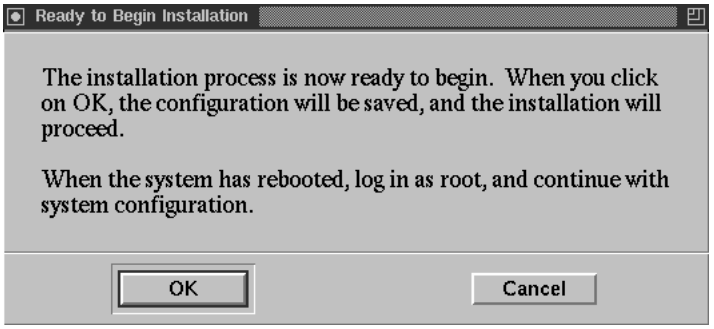


6.15 Step 6: Final Confirmation

After verifying all of your selections, you have one more chance to confirm the start of the installation process:

- If you are using the graphical interface, the confirmation dialog box shown in Figure 6–13 is displayed after you click on Finish in the Summary dialog box. To begin the installation, click on OK here.

Figure 6–13: Ready to Begin Installation Dialog Box



- If you are using the text-based interface, press the Return key at the following prompt to start the installation:

```
You have now answered all questions needed to install
Tru64 UNIX on this system.  Press Ctrl/c to cancel the
installation; or type "history" to modify your earlier
answers; or press RETURN to proceed with installation:
```

Section 6.15.1 describes how to cancel the installation.

6.15.1 Canceling and Restarting the Full Installation

If for any reason you do not want to start the installation at this point, you can cancel it:

- If you are using the graphical interface, click on Cancel in the `Ready to Begin` dialog box to return to the `Installation Summary` dialog box. Then, click on Quit in the `Summary` dialog box to put the system in single-user mode.
- If you are using the text-based interface, press Ctrl/c to put the system in single-user mode.

To restart the Full Installation setup process from single-user mode regardless of the interface you were using, enter the following commands:

```
# cd /
# restart
```

If your system has graphics capabilities but you prefer to restart the installation setup process in the text-based interface, enter the following commands:

```
# cd /
# restart nogui
```

6.16 What Happens Next?

Once you click on OK in the `Ready to Begin` dialog box or press the Return key in the text-based interface, the Full Installation process starts making changes to your system. First, file systems are created and software is loaded followed by a system reboot and software configuration phase.

Possible user interaction required at this stage is:

- If your system does not have automatic reboot capability, the boot command information that must be entered in order to reboot the system is displayed; this is described in Section 6.16.2.
- If you did not supply host- or site–specific information or a root password during Full Installation setup and you did not set up your system to halt before system reboot, you will be prompted to enter this information after software subsets load and the system reboots.
- If you selected WLS software, just before the software configuration phase you will be prompted to insert the CD-ROM labeled *Associated Products Volume 1*, which contains the WLS software.

6.16.1 File System Creation and Software Subset Load Phase

When the actual installation begins, the `/`, `/usr`, `/var`, and `/usr/i18n` file systems and `swap` areas are created on the disks and partitions you selected. The software subset load phase follows file system creation. A progress bar shows the percent complete of each phase to give you an indication of how far along the process is.

If you are using the text-based interface, messages similar to the following are displayed:

```
Continuing installation...

Applying the selected disklabel on device dsk0

Creating the root file system on device dsk0a
```

```
Creating the usr file system on device dsk0g

Creating the var area in the usr file system

Creating the swap1 file system on device dsk0b

The installation procedure will now load a total of 31 software subsets
on your disk partitions. This total includes the following products:

        * 31 Base Operating System subsets

This process will take from 45 to 120 minutes to complete depending on
your distribution media and processor type.

LOADING THE BASE OPERATING SYSTEM SOFTWARE SUBSETS
```

Note

The Full Installation process does not use the default inode density when creating UFS file systems for the /, /usr, and /var file systems. A lower density value is used to maximize available usable file system space.

6.16.2 System Reboot Phase

When you began the installation process, you booted either from the CD-ROM or over the network. Most systems automatically reboot off the newly installed disks after the software subsets are loaded. If your system does not have this capability, the boot commands required to boot from the newly created system disk are displayed on the screen. At the console prompt (>>>), enter the boot command sequence shown on your screen. *Do not* enter the boot variables that are shown in Example 6–5.

Example 6–5: Sample Boot Command Sequence

```
Issue the following console commands to set your default bootpath
variable and to boot your system disk to multiuser:

        >>> set boot_osflags A
        >>> set bootdef_dev DKA0
        >>> boot

syncing disks... done
CPU 0: Halting... (transferring to monitor)

?05 HLT INSTR
  PC= FFFFFC00.0044CA90 PSL= 00000000.00000005
```

Write down your system's boot commands here for future reference:
>>>
>>>
>>>

Software configuration begins after the system boots, which is followed by the kernel build procedure.

6.16.3 Software Configuration Phase

Software configuration occurs automatically after your system reboots from the system disk and refers to the process of tailoring the software subsets, setting the host name, root password, and time zone, system tuning, and building a tailored kernel for use by the operating system and by your hardware.

If you did not provide certain essential host– and site-specific information (such as a root password, your system's host name, the date and time, and location and time zone) earlier in the installation procedure, you will be prompted to enter that information now.

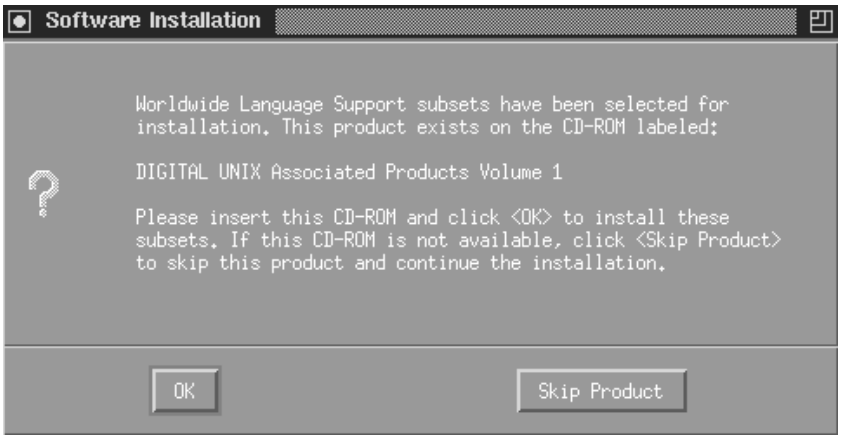
If you chose to install Worldwide Language Support (WLS) software, and you are installing from CD-ROM, you will see the dialog box shown in Figure 6–14 . Remove the CD-ROM labeled *Operating System Volume 1* from the drive and insert the CD-ROM labeled *Associated Products Volume 1*, which contains the WLS software.

If, for any reason, you do not have the second CD-ROM available, you can skip WLS installation at this time, and install it later using the `wwinstall` script. The *Installation Guide – Advanced Topics* provides instructions for running the `wwinstall` script.

Note

If you are performing the WLS installation from RIS, you are not prompted at all because the WLS software subsets are already available in the RIS area to which your system is registered and they were installed onto the system before the system reboot.

Figure 6–14: Software Installation Dialog Box



If you chose the option to select optional kernel components during the Full Installation setup, go to Section 6.17 to select kernel options.

6.17 Optional Step 7: Select Kernel Components

If you chose the option to install mandatory or all kernel components during the Full Installation setup, the kernel is built automatically with the required kernel components for your system configuration. After the kernel build, continue with Section 6.18, which shows you how to log in to your system for the first time. If you want to build a kernel with optional components later, refer to the `doconfig`(8) reference page.

If you chose the option to customize kernel component selection during the Full Installation setup, a `Kernel Option Selection` menu is displayed after the system reboots.

The kernel components you see listed on the `Kernel Option Selection` menu depend on the software subsets that were installed. The installation procedure gives you the option to include or exclude the use of these components in the kernel. If you need to install a kernel component after Full Installation is complete, use the `doconfig`(8) command.

If you need a description of any kernel component, use the `Help` option to display an online description.

The Kernel Option Selection menu is similar to the following:

```
    Selection   Kernel Option
-----------------------------------------------------------------
        1       System V Devices
        2       NTP V3 Kernel Phase Lock Loop (NTP_TIME)
        3       Kernel Breakpoint Debugger (KDEBUG)
        4       Packetfilter driver (PACKETFILTER)
```

```
        5       Point-to-Point Protocol (PPP)
        6       STREAMS pckt module (PCKT)
        7       Data Link Bridge (DLPI V2.0 Service Class 1)
        8       X/Open Transport Interface (XTISO, TIMOD, TIRDWR)
        9       ISO 9660 Compact Disc File System (CDFS)
        10      Audit Subsystem
        11      Alpha CPU performance/profiler (/dev/pfcntr)
        12      ACL Subsystem
        13      All of the above
        14      None of the above
        15      Help
        16      Display all options again
---------------------------------------------------------------

Enter your choices.

Choices (for example, 1 2 4-6) [14]: 5 9
```

Note

The `ISO 9660 Compact Disc File System` (CDFS) is a dynamically loadable kernel module. You can build it into the kernel by selecting it now, otherwise, it will be loaded on an as needed basis.

After entering your choice of kernel components, the system verifies the list of options you selected and asks you to confirm your choice. For example:

```
You selected the following kernel options:

        Point-to-Point Protocol (PPP)
        ISO 9660 Compact Disc File System (CDFS)

Is that correct? (y/n) [y]:
```

If the displayed kernel components are the ones you want, enter **y** or press Return to accept the default response. If the displayed kernel components are not the ones you want, enter **n** at the prompt. The `Kernel Option Selection` menu is redisplayed for you to select kernel components again.

6.17.1 Optional Step: Edit the Kernel File if Necessary

After you select and confirm your kernel options, you have the option to edit the kernel file. The kernel configuration file is a text file that defines the components built into the kernel; it is located in the `/usr/sys/conf/`*`SYSTEM_NAME`* file.

Caution

Although you are given the option to edit this file, it is not recommended.

The *Command and Shell User's Guide* contains a tutorial that teaches you how to use the `ed` text editor (as well as the `vi` text editor).

You will see a prompt similar to the following:

```
Do you want to edit the configuration file? (y/n) [n]:
```

If you enter **n** or press Return (to enter the default response) to skip the edit of the configuration file, the kernel build process begins as shown in Section 6.17.2.

If you enter **y** to edit the file, the following message is displayed:

```
Using 'ed' to edit the configuration file.  Press return
when ready, or type 'quit' to skip the editing session:
```

Enter the word **quit** if you want to skip the editing session and start the kernel build process or press the Return key if you want to edit the file. The kernel build begins when you write and quit the editing session.

6.17.2 The Kernel Build Phase

When the subsets are configured, the installation procedure invokes the `doconfig` utility to automatically make the device special files needed by the hardware and build the kernel for your system. Messages similar to the following are displayed:

```
       The system will now automatically build a kernel
       and then reboot. This will take approximately 15
       minutes, depending on the processor type.
       When  the login prompt appears after the system
       has rebooted, use 'root' as the  login name and
       the SUPERUSER  password that was entered during
       this procedure, to log into the system.


*** PERFORMING KERNEL BUILD ***
        Working....Fri Dec 17 15:45:24 EST 1999
        Working....Fri Dec 17 15:47:24 EST 1999
        Working....Fri Dec 17 15:49:25 EST 1999
        Working....Fri Dec 17 15:51:26 EST 1999
```

6.17.3 If Your System Boots to Single-User Mode

Your system may boot to single-user mode if the `boot_osflags` variable was not set as described in Section 6.16.2. To bring the system to multiuser mode, press Ctrl/d at the root prompt (#). You are prompted to enter the run level. Four run levels are available:

- `0` specifies the halt state
- `S` or `s` specifies single-user mode
- `2` specifies multiuser mode without network services
- `3` specifies multiuser mode with network services

Enter the following command to boot the system to multiuser mode:

```
# init 3
```

6.18 Step 8: Log in to the System as the User root

After the final system reboot, the next step is to log into the newly installed system as the user `root`. On newly installed systems, the only user name recognized by the system is `root`. When prompted, enter the root password you set earlier.

6.19 Step 9: Review Installation Log Files

Before you configure the system for general use, it is recommended that you review the installation log files to make sure the software was installed and configured correctly. If any installation errors occurred, they will be listed in the log files, which are described in Appendix F.

6.20 Full Installation Is Done

After reviewing the installation log files, the Full Installation is done. Go to Chapter 7, which describes the SysMan (System Management) tools that you use to configure the system for general use by yourself and other users.

7

Configuring the System For General Use After a Full Installation

This chapter contains the following information:

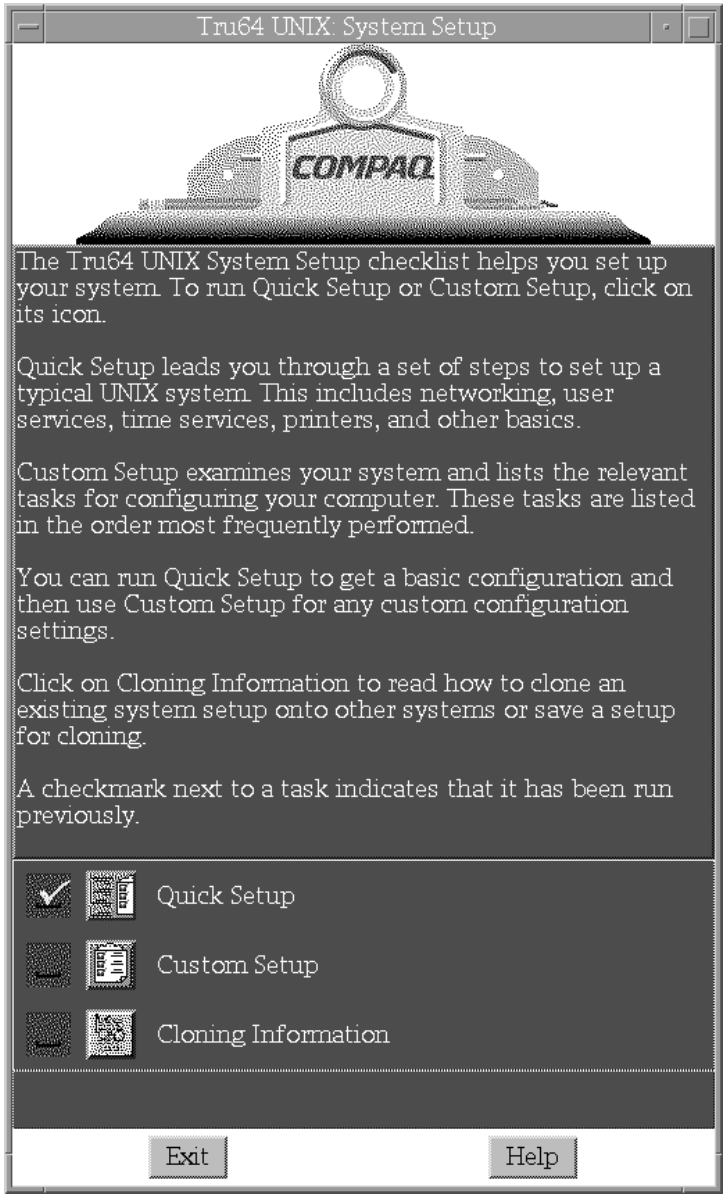
- Using the graphical System Setup application to configure and set up your system for general use
- Invoking the System Setup application after the initial system configuration
- Using the text-based System Setup menu to configure and set up your system for general use if your system does not have graphics capabilities
- An overview of additional system management and monitoring tools
- Pointers to system administration and configuration documentation
- Reconstructing the `/etc/fdmns` directory if your system was previously installed with the operating system and was using AdvFS as a file system type
- Enabling realtime preemption after the installation
- Enabling unattended reboots on multiprocessor systems

7.1 Graphical Interface: The System Setup Application

To make a newly installed system able to communicate with other systems and users, network services, printers, software licenses, and mail delivery must be configured. Initial system configuration tasks are performed from the `Quick Setup` application or the `Custom Setup` application (in the previous releases, this application was called the `Checklist`).

When you log in to a newly-installed system as the user `root` for the first time, and your system has graphics capabilities, the `System Setup` window shown in Figure 7–1 is displayed:

Figure 7–1: The Tru64 UNIX System Setup Window



The `System Setup` window is the launch point for the following configuration tools:

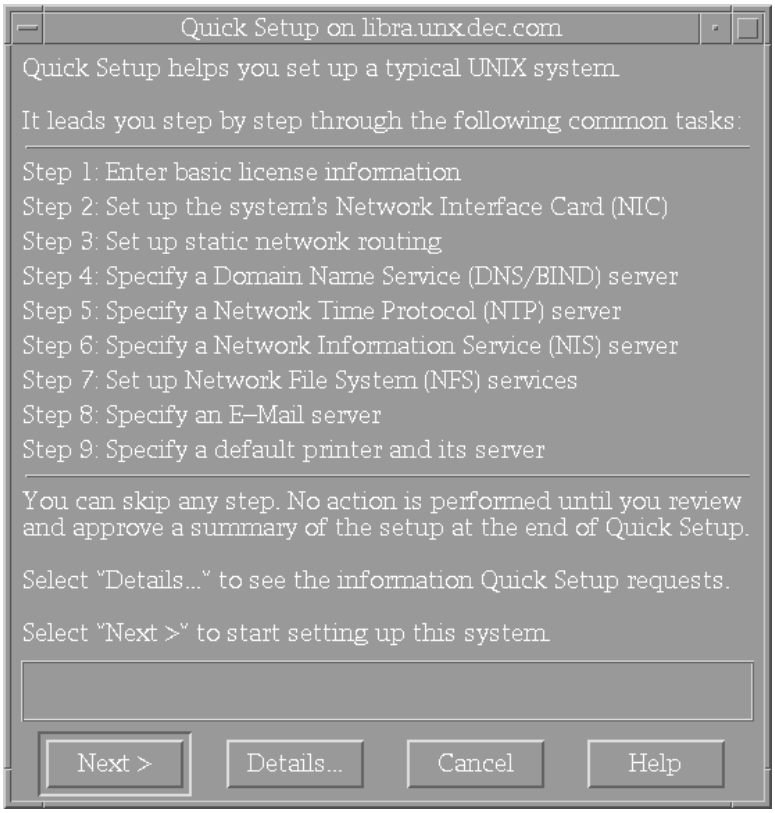
- `Quick Setup`, which is a way to quickly configure a system with basic services, is described in Section 7.1.1.

- `Custom Setup`, which is a launch point for more advanced configuration tasks, is described in Section 7.1.2.
- `Cloning Information` provides basic information about Configuration Cloning. Configuration Cloning duplicates the configuration from an already configured system onto one or more systems to eliminate the need to perform configuration tasks at each system. Configuration cloning procedures are documented in the *Installation Guide – Advanced Topics* book.

7.1.1 The Quick Setup Application

If your system does not use an asynchronous transfer mode (ATM) adapter for network connections, you can quickly set up your system for general use through `Quick Setup`. As shown in Figure 7–2, `Quick Setup` requires you to answer a few simple questions about basic system configuration items. `Quick Setup` is a task–oriented application that leads you step by step through basic system configuration tasks. If your system configuration needs are not complicated, using `Quick Setup` is a way to quickly get your system up and running on the network. `Quick Setup` also has online help if you need assistance. If you need to configure additional items, you have the option to use the `Custom Setup` application later.

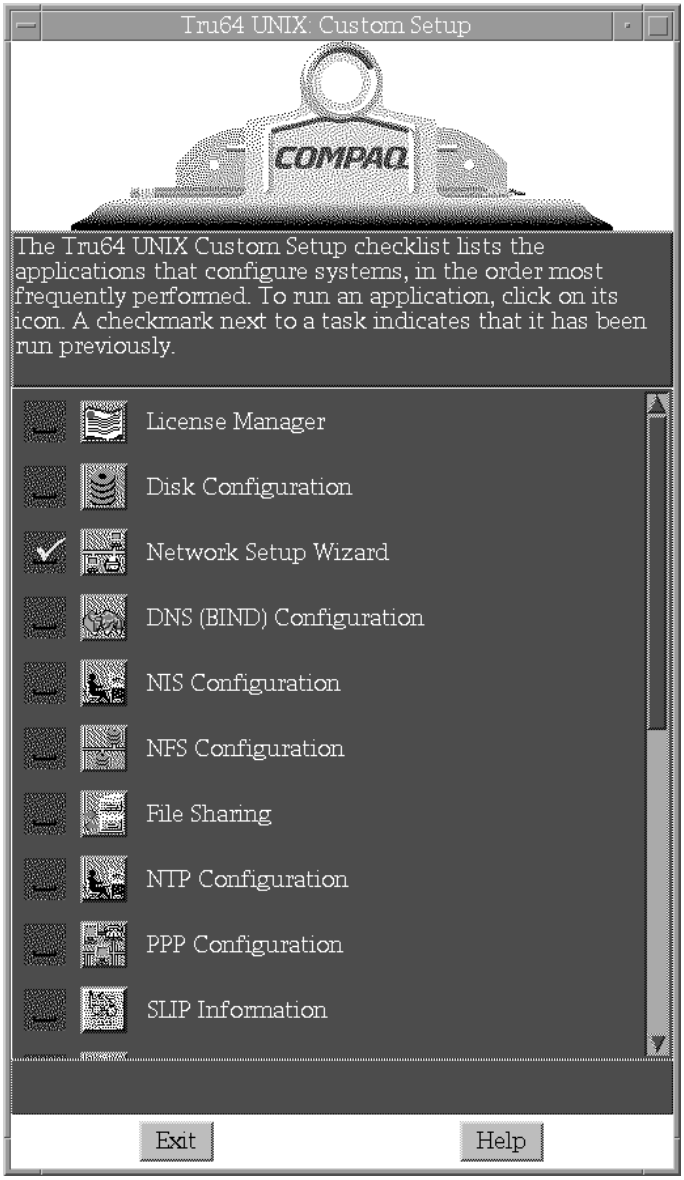
Figure 7–2: The Quick Setup Application



7.1.2 The Custom Setup Application

The `Custom Setup` application is shown in Figure 7–3 and is the launch point for additional SysMan configuration applications. Use `Custom Setup` if your system requires additional configuration or if you want to perform additional system administration tasks such as adding users or groups. In previous releases of the operating system, the `Custom Setup` application was known as the `Checklist`.

Figure 7–3: The Custom Setup Application



The applications on the `Custom Setup` application are listed in the approximate order in which it is recommended they be run. For instance, if you plan to connect or add the system to a network, the first task you should perform is to set up the network by using the `Network Configuration` application followed by the `DNS(BIND)Configuration` application, `NIS - Network Information Service`, and the `NFS`

Configuration application. If you do not want to set up networking, the first task you should perform is to load and register your Product Authorization Keys (PAKs) by using the License Manager application.

After you open and exit an application, a check mark appears in the box to the left of the icon. The date and time you last opened an application is shown under the application name. The time stamp does not mean that the application was executed; it only indicates that the application was opened. If an application is *dimmed*, it cannot be opened.

Online help is available for each application by clicking on the Help button or Help menu in the application. The online help describes the tasks that can be performed from the application and provides a description of all fields, buttons, and menus in each window or dialog box.

7.2 Invoking the System Setup Application After the Initial Configuration

Use one of the following methods to invoke the System Setup application after the initial system configuration:

- To start the Tru64 UNIX: System Setup application from the command line, as superuser or root, enter the following command:

  ```
  # /usr/sbin/checklist
  ```

  Either a graphical or text-based interface is displayed depending upon the type of hardware you have.

- To start the Tru64 UNIX: System Setup application from the Common Desktop Environment (CDE) front panel:

  1. Click on the application manager icon

     on the CDE front panel.
  2. Double click on the System_Admin application group icon.
  3. Double click on the Tru64 UNIX: System Setup application icon.

7.3 Text-Based Interface: The System Setup Application

When you log in to a newly-installed system as the user root for the first time, and your system does not have graphics capabilities, the System Setup window shown in Example 7–1 is displayed.

Example 7–1: Text-Based Interface: The System Setup Application

```
                Tru64 UNIX: System Setup

Tru64 UNIX System Setup helps you set up your system.
To run Quick Setup, press return, or enter one of the
numbered choices and press return.

Quick Setup leads you through a set of steps to set up
a typical UNIX system. This includes networking, user services,
time services, printers,and other basics.

Custom Setup examines your system and lists the relevant tasks
for configuring your computer. These tasks are listed in the
order most frequently performed.

You can run Quick Setup to get a basic configuration and then
use Custom Setup for any custom configuration settings.

Click on Cloning Information to read how to clone an existing
system setup onto other systems or save a setup for cloning.

1) Quick Setup
2) Custom Setup
3) Cloning Information
4) Exit

Please enter your selection [1]:
```

The `System Setup` window is the launch point for the following text-based configuration tools:

- `Quick Setup` is a way to quickly configure a system with a basic network, print, and mail configuration. The graphical user interface is described in Section 7.1.1, but the same setup information is presented in the text-based interface.
- `Custom Setup` is a launch point for more advanced configuration tasks. The graphical user interface is described in Section 7.1.2, but the same configuration applications are available for the text-based interface.
- `Cloning Information` provides basic information about configuration cloning. Configuration cloning replicates the configuration from an already configured system onto one or more systems and eliminates the need to perform configuration tasks manually. Configuration cloning procedures are documented in the *Installation Guide – Advanced Topics*.

7.4 System Management and Monitoring

This section provides overview information about the SysMan tools that are available to monitor and manage a system after it is installed and configured:

- **SysMan Menu** - provides a menu of system management tasks in a tree-like hierarchy with branches of general categories, and leaves for actual tasks. You can expand or contract a branch to show the subbranches and leaves within a main branch. Selecting a leaf invokes a task which opens a dialog box for performing the task. There are branches for Accounts, Mail, Monitoring and Tuning, Networking, Printing, Security, Hardware, Software, Storage, Support and Services, and General Tasks. To start the SysMan Menu from a command prompt, enter the following command:

  ```
  # /usr/sbin/sysman
  ```

- **SysMan Station** - provides a high profile view and status of a system's physical and logical objects. It is intended to be the central point from which to manage a system. SysMan Station launches other SysMan tools to perform the tasks. The SysMan Station lets you monitor a system, group of systems, or an entire cluster and administer system resources. You can launch the SysMan Menu or invoke applications directly from the Tools menu in the SysMan Station. It can run on a standard Java capable display (such as a UNIX workstation) or within a PC's browser, or it can be downloaded and run directly on a PC. To start the SysMan Station from a command prompt, enter the following command:

  ```
  # /usr/sbin/sysman -station
  ```

- **Event Manager** - provides a single point of focus for the multiple channels through which system components report event and status information by combining events from all sources into a single event stream. You can either monitor the combined stream in realtime or view historical events retrieved from storage. EVM's viewing facilities include a graphical event viewer, which is integrated with the SysMan application suite, and a full set of command line utilities, which allow events to be filtered, sorted, and formatted in a variety of ways. To start the Event Manager from a command prompt, enter the following command:

  ```
  # /usr/sbin/sysman -viewer
  ```

- **Insight Manager** - is a web-based management utility that enables you to look across a heterogeneous computing services environment and access information about any entity connected to the network. Entities are referred to as devices and can be computer systems, networked printers, or network components such as routers. You can obtain information about the configuration of systems and their components or peripherals and in some cases, perform certain administrative tasks. For example, systems can be configured to enable remote booting and Insight Manager enables you to boot remote systems from their own

local system. Insight Manager can facilitate other administrative tasks such as asset management, asset security, workload management, and event management. You can activate these Web browsing features from a dedicated HTTP port, or from the Compaq Insight Manager CIM32 or CIMXE Management Consoles running on Compaq NT servers. Insight Manager Agents for Tru64 UNIX includes SNMP based subagents and WBEM capabilities to present SNMP data in a format viewable by a Web browser. It provides a rich view of the data using HTML 2.0 and JavaScript in the form of Web pages.

Section 7.5 provides pointers to system administration and configuration documents.

7.5 System Administration and Configuration Documents

If you need more information about configuring, administering, or monitoring your system, read the relevant sections of these books in the documentation set:

- The *Network Administration* guide provides information about configuring and administering a network.
- The *System Administration* guide provides information about system administration tasks such as configuring printers, file system management, adding user accounts, backing up and restoring files, shutting down the system, event management, using the Insight Manager, SysMan invocation, and other topics pertaining to system administration.
- The *Software License Management* guide provides information about loading and registering license PAKs.
- The *AdvFS Administration* guide provides information about Advanced File System (AdvFS) administration.
- The *Logical Storage Manager* guide provides information about administering the Logical Storage Manager (LSM).
- The *System Configuration and Tuning* guide provides information about tuning the kernel to achieve optimum system performance.

To view the documentation set on line on a system that is capable of graphical display, mount the documentation CD-ROM as described in Chapter 8, then use Netscape or Acrobat Reader to view the books. If your system does not have online viewing capabilities, use the order sheet in the back of this book or contact your support representative to order a printed copy of the documentation set.

7.6 Reconstructing the /etc/fdmns Directory

If your system was running a previous version of the operating system and was using the Advanced File System (AdvFS) type, the Full Installation overwrote the `/etc/fdmns` directory, which contained important AdvFS configuration data.

To reconstruct this directory, you must run the `advscan` utility with the `-r` flag for each disk on the system. Because of the new device naming conventions in Version 5.0, simply restoring the directory from a backup copy is not sufficient. Refer to the *AdvFS Administration* for more information about using the `advscan` utility.

7.7 Enabling Realtime Preemption

The operating system kernel provides options to enhance the performance of realtime applications conforming to POSIX® 1003.1b-1993 (formerly 1003.4 Draft 14). The realtime kernel makes it possible for the operating system to guarantee that an application has access to resources in a timely and predictable manner.

The realtime kernel that supports kernel preemption was previously an option during an installation. Now, the POSIX 1003.lb portions are included in the kernel automatically and a separate kernel is not needed. Preemption capabilities are disabled by default but can be selected and enabled when the kernel is configured and built.

To enable realtime preemption capabilities, follow this procedure to modify the `/etc/sysconfigtab` file:

1. Use the text editor of your choice to add the following lines to a temporary file (such as `/tmp/stanza`):

   ```
   generic:
                       rt_preempt_opt=1
   ```

2. Use the `sysconfigdb` command to merge the temporary file with the existing `/etc/sysconfigtab` file:

   ```
   # sysconfigdb -m -t /etc/sysconfigtab -f /tmp/stanza generic
   ```

Note

Never use a text editor to directly modify the `/etc/sysconfigtab` file.

7.8 Enabling Unattended Reboots on Multiprocessor Systems

To reduce system down time due to a processor failure on a multiprocessor system, an unattended reboot feature is available for multiprocessor platforms.

To enable unattended reboot functionality, log in as the user `root` and set the following console variables:

```
# consvar -s boot_osflags a
# consvar -s boot_reset off
# consvar -s auto_action restart
# consvar -a
```

When processor failures are detected on a multiprocessor platform, the system marks the faulting processor as failed, and the entire system is rebooted without any operator intervention. The faulting processor will not be restarted when the reboot occurs. To restart the faulting processor, corrective action must be taken. The system will not try to restart the failed processor until the power has been recycled on the system or the console `init` command is issued at the console prompt (`>>>`).

8

Using Online Documentation

In addition to online help, which is already integrated into many applications, all other documentation associated with the operating system, including books and reference pages, can be viewed online from the CD-ROM labeled *Documentation Volume 1*.

This chapter contains the following information:

- An overview of documentation file formats and online viewers
- Mounting the Documentation CD-ROM
- Using the Netscape Navigator® application to view HTML versions of the online documentation set
- Netscape application integration
- Installing the Adobe® Acrobat® Reader application
- Using the Adobe Acrobat Reader application to view PDF versions of the documentation
- Copying the documentation set files to your system's hard disk

8.1 Supported Documentation Formats and Online Viewers

The online documentation set is available in both Hypertext Markup Language (HTML) and Portable Document Format (PDF) versions.

- You can use the Netscape Navigator application to view the HTML or PDF versions of the documentation. This version of the operating system is shipped with Netscape Communicator 4.51, which includes Netscape Navigator. The Netscape software subset is installed automatically if the installation process detects graphics capability on your system.

  After installing the operating system, you can invoke Netscape through the CDE front panel or from the command line in a terminal emulator window. Detailed help for Netscape is available through the Help menu.

- You can use the Adobe Acrobat Reader application to view PDF versions of the documentation.

After installing the operating system, you can invoke Acrobat Reader either as a Netscape helper application or from the command line in a terminal emulator window. Detailed help for Acrobat Reader is available through the Help menu.

Refer to the *Adobe Acrobat Reader Online Guide* for information about setting up Netscape Navigator to view PDF files. You can access this document from the Acrobat Reader Help menu.

8.2 Mounting the Documentation CD-ROM

The operating system documentation is shipped on the CD-ROM labeled *Documentation Volume 1*. Follow these steps to mount the CD-ROM so that you can view the online documentation set with Netscape Navigator or Acrobat Reader:

1. Log in as `root` or use the `su` command to gain `root` privileges.
2. Insert the CD-ROM into your system's CD-ROM drive.
3. Use the following command to mount the CD-ROM on `/usr/share/doclib/online` if you have only one CD-ROM attached to your system:

   ```
   # mount -r /dev/disk/cdrom0c /usr/share/doclib/online
   ```

   If you have more than one CD-ROM device, enter a command similar to the following to determine the CD-ROM devices connected to your system. Then, decide which CD-ROM device you want to use.

   ```
   # ls /dev/disk/cdrom*c
   /dev/disk/cdrom0c
   /dev/disk/cdrom1c
   ```

8.3 Viewing Online Documents with Netscape

Follow these steps to view the online documentation set with Netscape Navigator:

1. Mount the Documentation CD-ROM as described in Section 8.2.
2. Start Netscape Navigator by using one of the following methods:
   - From the CDE desktop:
     a. Click on the arrow above the Text Editor icon on the CDE Front Panel to display the Personal Applications subpanel.
     b. Click on the Netscape icon.

- Enter the following command to start Netscape Navigator from the command line in the background:

  ```
  # /usr/bin/X11/netscape &
  ```

  Refer to the netscape(1) reference page for more information.

3. When the Netscape Navigator is displayed, click on the Home icon to access the home page located at:

   ```
   /usr/doc/netscape/Digital_UNIX.html
   ```

4. Click on the **Documentation** link to go to the Documentation home page.
5. Documentation categories are listed in the frame down the left side of the page. Click on a category to display links to HTML and PDF versions of the individual books in that category.

Section 8.5 describes how to install Acrobat Reader. The *Adobe Acrobat Reader Online Guide*, available from the Acrobat Reader Help menu, provides information about setting up Netscape Navigator to view PDF files.

8.4 Netscape Application Integration

The following information is provided to help you when you use Netscape applications on this operating system:

- A sample resource defaults file for Netscape Communicator is located in the /usr/doc/netscape/Netscape.ad file. Comments within this file indicate possible settings for each resource. This file is provided for informational purposes and need not be installed.
- The file /usr/bin/X11/netscape is actually a shell script that performs the following actions:
  - Creates a Communicator user configuration directory if $HOME/.netscape does not already exist.
  - Copies the Navigator preferences file from /usr/doc/netscape/default-netscape-preferences to $HOME/.netscape/preferences.js if it does not already exist in the $HOME directory.
  - Sets the MOZILLA_HOME environment variable to point to the Communicator installation directory /usr/lib/netscape. The Communicator Java™ class files, nethelp files, plugins, registry, and others are all installed under this directory. See the /usr/lib/netscape/README file for more information on MOZILLA_HOME and other environment variables.

– Invokes the /usr/bin/X11/real-netscape file, which is the actual Communicator binary.

This information may be important to know if you should download newer copies of Navigator from other sources (for example, the Netscape web site) and install the files from those kits over the links in $HOME/.netscape. If you want to use the previous version, you need to remove these files so that the /usr/bin/X11/netscape script is able to recreate the symbolic links listed above that point to the older versions of these files.

8.4.1 Mosaic-to-Netscape Bookmark Conversion

If Mosiac was your previous browser, you need to convert your Mosaic hotlist files to equivalent Netscape Communicator bookmark files. To accomplish this conversion, invoke the shell script /usr/doc/netscape/hot-convert.sh with no arguments.

It is recommended that you define the Global Types File and Global Mailcap File used by Netscape as follows:

- Global Types File: /usr/lib/netscape/mime.types
- Global Mailcap File: /usr/lib/netscape/mailcap

These files allow Netscape to invoke the proper helper applications for viewing file types not directly viewable in Netscape. You can do this by selecting Preferences... from the Netscape Options menu. Then select Helper Applications and enter the correct values.

For more information about using Netscape, refer to the *Netscape Navigator Online Handbook*, which is available by clicking on the link to Other documentation on the home page.

8.5 Installing Acrobat Reader

The PDF versions of the online documents are best viewed by using Acrobat Reader as a Netscape Navigator helper application. This section tells you how to install Acrobat Reader on your system.

Note

Acrobat Reader requires 16 MB of free disk space. Ensure that the file system where you install Acrobat Reader has sufficient space.

Follow these steps to install Acrobat Reader on your system:

1. Log in as `root` or use the `su` command to gain `root` privileges.
2. Mount the Documentation CD-ROM as described in Section 8.2.
3. Change to the `/usr/share/doclib/online/ACROREAD/DIG_UNIX` directory:

   ```
   # cd /usr/share/doclib/online/ACROREAD/DIG_UNIX
   ```

4. Uncompress the installation file:

   ```
   # uncompress -c ACROREAD.Z > /tmp/acroread_osf_301.tar
   ```

   Note

   The `00README.TXT` file in this directory also explains how to uncompress the `ACROREAD.Z` installation file.

5. Change to the `/tmp` directory:

   ```
   # cd /tmp
   ```

6. Unpack the installation files:

   ```
   # tar xpf /tmp/acroread_osf_301.tar
   ```

7. Run the Acrobat Reader installation script:

   ```
   # ./INSTALL
   ```

   Note

   Detailed instructions in the `INSTGUID.TXT` file also explain how to run the `INSTALL` script.

8. After you read the license agreement, enter **`accept`** to accept the license terms and continue.
9. Select an installation directory for Acrobat Reader. The default is `/usr/local/Acrobat3`. If you accept this default and the directory does not exist, it is created automatically.
10. The installation completes and you see the command line prompt. Section 8.6 describes how to start and use Acrobat Reader once it is installed.

The *Adobe Acrobat Reader Online Guide*, available from the Acrobat Reader Help menu, provides information about setting up Netscape Navigator to view PDF files.

8.6 Viewing Online Documents with Acrobat Reader

The PDF versions of the online documents are best viewed by using Acrobat Reader as a Netscape Navigator helper application. You can, however, view them directly with Acrobat Reader. You should review the 00README.TXT file in the ACRO_DUX and ACRO_SUP subdirectories under the /usr/share/doclib/online/DOCS directory. These files map file names to document names so that you can locate specific documents.

Follow these steps to view the online documentation set with Acrobat Reader:

1. Mount the documentation CD-ROM as described in Section 8.2.
2. Install Acrobat Reader as described in Section 8.5.
3. Run Acrobat Reader in the background:

   ```
   # /usr/local/Acrobat3/bin/acroread &
   ```

   Refer to the *Adobe Acrobat Reader Online Guide*, available from the Help menu, for information on how to use Acrobat Reader.
4. Select Open... from the File menu to open the Open dialog box, where you can select a PDF file.

   The PDF documents reside under the /usr/share/doclib/online/DOCS directory on the documentation CD-ROM.

   - The ACRO_DUX subdirectory contains the base operating system documentation set.
   - The ACRO_SUP subdirectory contains the supplementary documentation set.

   The 00README.TXT file in both subdirectories maps file names to document names so that you can locate specific documents. You cannot use Acrobat Reader to view text files. To view this file you might consider using the more command. For example:

   ```
   # more /usr/share/doclib/online/DOCS/ACRO_DUX/00README.TXT
   ```

8.7 Copying Online Documentation to Disk

Instead of reading the online documentation set from the CD-ROM, you can copy the documentation files to a disk on your system. Copying the documentation files to a disk eliminates the need to keep the CD-ROM

permanently mounted. The entire set of online documentation files consumes about 190 MB of disk space in the /usr file system.

Follow these procedures to copy the documentation files to a disk on your system. Use the same directories shown in the examples so you will not have to modify library bookshelf files.

1. Log in as root or use the su command to become superuser.
2. Insert the Documentation CD-ROM into the drive (assume the CD-ROM device name is /dev/disk/cdrom0c).
3. Mount the CD-ROM on /mnt:

   ```
   # mount -r /dev/disk/cdrom0c /mnt
   ```

4. Enter commands similar to the following examples to copy the online documents from the CD-ROM to the right subdirectories in the /usr/share/doclib/online/DOCS directory. This example illustrates the process with the CD-ROM mounted on the /mnt directory .

   Note

   The backslashes (\) in the following examples represent line continuation characters; do not enter them on the command line.

   - To copy the documentation HTML files, enter the following commands:

     ```
     # cd /mnt/DOCS/HTML
     # tar chpvf - . |     \
     (cd /usr/share/doclib/online/DOCS/HTML;tar xvpf -)
     ```

     The documentation HTML files consume about 90 MB of disk space.

   - To copy the base documentation PDF files, enter the following commands:

     ```
     # cd /mnt/DOCS/ACRO_DUX
     # tar chpvf - . |     \
     (cd /usr/share/doclib/online/DOCS/ACRO_DUX;tar xvpf -)
     ```

     The documentation PDF files consume about 30 MB of disk space.

- To copy the supplemental documentation set PDF files, enter the following commands:

  ```
  # cd /mnt/DOCS/ACRO_SUP
  # tar chpvf - . |  \
  (cd /usr/share/doclib/online/DOCS/ACRO_SUP;tar xvpf -)
  ```

  The supplemental documentation set PDF files consume about 10 MB of disk space.

5. Unmount the CD-ROM:

   ```
   # cd /
   # umount /mnt
   ```

Follow the instructions in Section 8.3 if you want to start Netscape Navigator or Section 8.6 if you want to start Acrobat Reader.

9

Software Subset Management After an Installation

This chapter contains the following information:

- An overview of software management tools
- Using the SysMan Menu to perform software management tasks
- Using the `setld` utility to perform software management tasks
- A description of the command line options supported by the `setld` utility and tasks that can be performed, including:
  - Listing installed software
  - Displaying a list of files within a software subset
  - Removing software subsets and dependencies
  - Installing optional software subsets after a Full or Update Installation
- Rebuilding the kernel after installing kernel build environment software subsets

9.1 Software Management Overview

Optional operating system software subsets, optional worldwide language support (WLS) software subsets, and layered product software subsets can be installed or removed from a system after a Full or Update Installation.

Software subsets can be installed from any CD-ROM shipped with the operating system, a Remote Installation Services (RIS) server, a mounted disk or file system, or a third-party software CD-ROM.

This chapter describes the two software management tools that can be used to perform software management tasks—the SysMan Menu and the `setld` utility. Both tools provide the same features. The difference between the two is that `setld` is strictly a command line utility, while the SysMan Menu can be invoked and run in three environments: X, text-based, or web.

This chapter focuses more on the `setld` command line utility because the SysMan Menu software management tasks have an online help system, which is available if you need assistance.

9.2 Software Management from the SysMan Menu

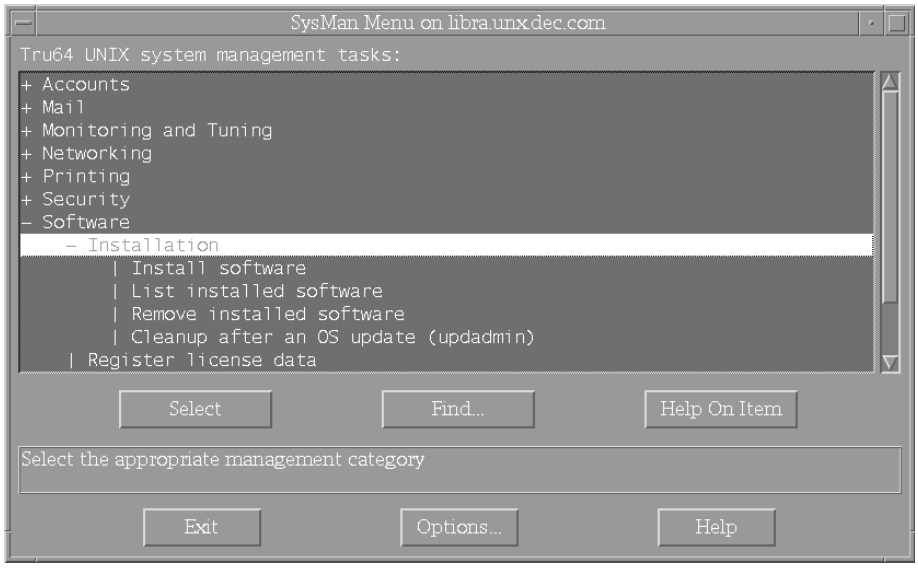
The SysMan Menu is a menu of system management tasks, which is organized in a tree-like hierarchy with main branches of general functionality. Selecting a leaf invokes a task, which opens a dialog box for performing the task. Depending on the capabilities of your display device, the SysMan Menu provides either a graphical or text-based interface. The SysMan Menu can be invoked from the command line or from the CDE Application Manager if your system is running the CDE desktop.

Invoke the SysMan Menu from the command line by entering the following command:

```
# /usr/sbin/sysman
```

From the SysMan Menu, expand the **Software** and **Installation** branches to view the software management tasks as shown in Figure 9–1.

Figure 9–1: SysMan Menu: Expanded Software and Installation Branches



The following is a brief description of each software management leaf shown in Figure 9–1:

- **Install software**— installs additional optional software subsets on a system after a Full or Update Installation of the operating system. Supported distribution media includes CD-ROM, RIS server, or mounted disk or file system.

- **List installed software** — lists the software subsets that are already installed or displays a list of the system files contained within a particular software subset
- **Remove installed software** — removes software already installed on the system. Dependencies between software subsets are automatically recognized and reported.
- **Cleanup after an OS update** — invokes the Update Administration Cleanup utility, which is used to remove the backup files created by an Update Installation. This utility is described in Section 3.10.

Each software management task has online help, which is available by selecting `Help` from within the task. The online help describes the functions that can be performed as well as a detailed description of all windows, dialog boxes, and fields that require entries.

9.3 Using the setld Utility

The `setld` command line utility lets you add, list, or remove software subsets after a Full or Update Installation.

The syntax of the `setld` utility is:

setld [-D *root-path*] -c *subset-id message*

setld [-D *root-path*] -d *subset-id* [*subset-id...*]

setld [-D *root-path*] -i [*subset-id* [*subset-id...*]]

setld [-D *root-path*] -l *location* [*subset-id* [*subset-id...*]]

setld [-D *root-path*] -v *subset-id* [*subset-id...*]

Table 9–1 provides a brief description of the options for the `setld` utility. To list all the options available for the `setld` utility, use the following command:

```
# setld -h
```

Table 9–1: Options for the setld Utility

Option	Description
–D	In conjunction with any other option, specifies an alternative root directory. For example: # **setld -D /usr/doctools -i** The directory specified must be the root directory of an entire file system hierarchy. Do not attempt to use this option to place software in a directory that is not a system root.

Table 9–1: Options for the setld Utility (cont.)

Option	Description
–c	Runs the configuration phase of the named software subset's subset control program (SCP). Refer to the documents supplied by your software vendor for the command syntax. For example: # **setld -c DNABASE100 INSTALL**
–d	Deletes the named software subset or software subsets. For example: # **setld -d OSFMANOS500 OSFMANOP500**
–i	Displays a list of software subsets and their installation status. If a software subset is named, displays a list of that software subset's contents. For example: # **setld -i OSFMANOS500**
–l	Loads the software kits that are in the specified location; if software subsets are specified, only the named software subsets are installed. For example: # **setld -l /mnt/ALPHA/BASE DNABASE100**
–v	Runs the named software subset's Installation Verification Procedure (IVP). For example: # **setld -v OSFMANOS500** To verify the files of a specific subset, use the `fverify` command. The `fverify` command reports missing files and inconsistencies in file size, checksum, user ID, group ID, permissions, and file type. Refer to the `fverify(8)` reference page for more information.

9.4 Listing Installed Software

You can use the `setld` utility to list the software subsets recognized by your system, showing the status (`installed`, `incomplete`, or `not installed`) of each software subset.

Enter the following command to list installed software:

```
# /usr/sbin/setld -i
Subset          Status       Description
------          ------       -----------
OSFACCT500                   System Accounting Utilities (System Administration)
OSFBASE500   installed       Base System (- Required -)
OSFBIN500    installed       Standard Kernel Objects (Kernel Build Environment)
   .
   .
```

9.5 Listing Files Contained in a Subset

If you use the –i option and specify a software subset, the `setld` utility displays a list of the files in the specified software subset. This is useful if you want to determine which software subset you need to reload or delete if a particular file is damaged or deleted.

The following command displays the files in the OSFCLINET500 software subset:

```
# /usr/sbin/setld -i OSFCLINET500
  ./etc/.new..acucap
  ./etc/.new..hosts
    .
    .
```

9.6 Deleting Software Subsets

Deleting a software subset requires that you know the subset name (OSFACCT500 for example). Refer to Appendix C for the name and description of each software subset, as well as the dependencies between software subsets (if any). To delete a software subset, log in as root, and use the setld –d command with the following syntax:

/usr/sbin/setld [-D *root_path*] -d [*subset-id* [*subset-id*...]]

If you attempt to delete a software subset on which another subset depends, a message similar to the following is displayed:

```
# setld -d OSFDCMT500

The following subsets need "Doc. Preparation Tools" (OSFDCMT500)
to operate correctly:

  Ref Pages: CDE Development (OSFCDEMANOP500)
  Ref Pages: CDE Admin/User (OSFCDEMANOS500)
  Doc. Preparation Tools Extensions (OSFDCMTEXT500)
  Ref Pages: Programming (OSFMANOP500)
  Ref Pages: Admin/User (OSFMANOS500)
  Ref Pages: Windows Programming (OSFMANWOP500)
  Ref Pages: Windows Admin/User (OSFMANWOS500)

Are you sure you wish to delete "Doc. Preparation Tools"
(OSFDCMT500)? (y/n): y

Deleting "Doc. Preparation Tools" (OSFDCMT500).
#
```

In the previous example, the reference page software subsets depend on the Doc. Preparation Tools (OSFDCMT500) subset in order to operate properly. If you continue with the delete operation, run the setld -d command on the dependent software as well. If you do not delete the dependent subsets, the dependent subsets will not function properly.

9.7 Installing Software Subsets

This section describes how to install software subsets from a specified location. Refer to Appendix C for the name and description of all software subsets. To install a software subset, log in as root, and use the setld –l command with the following syntax:

/usr/sbin/setld [-D *root_path*] -l *location* [*subset-id* [*subset-id*...]]

The *location* parameter specifies the location of the software subset that you want to install. The following are valid locations:

- *ris_server:* specifies the name of the remote host (RIS server) appended with a colon (:)
- *directory* specifies the disk distribution directory

The *subset-id* variable specifies the name of the software subset. If you do not specify a *subset-id* variable, a list of software subsets is displayed, which lets you choose the software subsets to install. If you specify one or more *subset-id* variables, only those software subsets are installed.

Use the following procedure to install software subsets from a CD–ROM. The distribution path shown in the following examples is for the base operating system CD–ROM. For other distribution kits, refer to the document supplied by your software vendor.

1. Insert the CD–ROM into the disc drive.
2. As superuser or `root` create a directory to be the mount point for the CD-ROM. This example creates a directory called `/cdrom`:

   ```
   # mkdir /cdrom
   ```

3. Mount the CD–ROM on `/cdrom`. Refer to Appendix B if you do not know how to determine the location of the CD-ROM device. The following example assumes a single CD–ROM device is attached to the system:

   ```
   # mount -r /dev/disk/cdrom0c /cdrom
   ```

   After mounting the CD–ROM, you can change to the `/cdrom` (`cd /cdrom`) directory to view the directories located on the CD–ROM.
4. Enter a command similar to the following to install the base operating system software subsets:

   ```
   # setld -l /cdrom/ALPHA/BASE
   ```

   Note

   If you are using a RIS server as the source of the software, make sure your system is registered as a client of the RIS server, then enter a command similar to the following:

   ```
   # setld -l ris_server_name:
   ```

5. The `setld` utility displays a numbered list of software subset descriptions and prompts you to enter the number of the software subsets you want to install.

Enter the number or numbers associated with the software subsets you want to install. There may be more software subsets presented in the menu than can be displayed on a single screen. You can either select software subsets in each screen or select them all together on the last screen. If you select software subsets as each screen is displayed, all your choices are presented for you to confirm on the final screen. You can also change your choices or redisplay the software subset options.

Only the software subsets not yet installed on your system are displayed. The software subset selection list looks similar to the following:

```
The subsets listed below are optional:

There may be more optional subsets than can be presented on a single
screen. If this is the case, you can choose subsets screen by screen
or all at once on the last screen. All of the choices you make will
be collected for your confirmation before any subsets are installed.

 - General Applications :

     1) Additional Terminfo databases
     2) Computer Aided System Tutor
     3) DOS tools
     4) Local Area Transport (LAT)
     5) Perl Runtime
     6) UNIX(tm) SVID2 Compatibility
     7) UNIX(tm) to UNIX(tm) Copy Facility

 - Kernel Build Environment :

     8) Logical Storage Manager Kernel Modules
     9) POLYCTR advfs Kernel Modules

 - Kernel Software Development :

    10) Hardware Kernel Objects
    11) POLYCTR advfs Kernel Objects
    12) Standard Kernel Objects

 - Mail Applications :

    13) DECwindows Mail Interface
    14) RAND Corp. Mail Handler (MH)

 - Network-Server/Communications :

    15) ATM Commands
    16) Additional Networking Services
    17) Dataless Management Services
    18) Remote Installation Service

 - Printing Environment :

    19) Adobe Font Metric Files

--- MORE TO FOLLOW ---
Enter your choices or press RETURN to display the next screen.
```

```
Estimated free diskspace(MB) in root:62.3 usr:405.6

Choices (for example, 1 2 4-6): 11
```

At the bottom of each screen, the disk space available in the /, /usr, var, and i18n file systems is shown. As you select additional subsets, the amount of free disk space is reduced accordingly.

If you choose a subset that depends on another subset to be installed, the setld utility automatically selects the dependent subset or subsets. For example, if you choose POLYCTR advfs Kernel Objects, the following is displayed:

```
The chosen subset(s) require one or more additional subset(s)
which will be loaded automatically:

 * 9 POLYCTR advfs Kernel Modules        (OSFADVFSBIN500)

 - Software Development :

    20) CDA(tm) Software Development
    21) CDA(tm) for X/Motif Development
    22) CDE Software Development and Programming Examples
    23) GNU Revision Control System
    24) Ladebug Debugger Version 4.0-43
    25) Ladebug Debugger Version 4.0-43 Release Notes
    26) Ladebug Debugger graphical user interface
    27) Ladebug Debugger remote server
    28) Programming Examples
    29) Software Development Desktop Environment
    30) Software Development Tools and Utilities
    31) Source Code Control System
    32) Standard Header Files
    33) Standard Programmer Commands
    34) Static Libraries
    35) X Window and X/Motif Header Files
    36) X Window and X/Motif Programming Examples
    37) X Window and X/Motif Software Development
    38) X Window and X/Motif Static Libraries

 - Supplemental Documentation :

    39) XIE Version 5 Online Documentation

 - System Administration :

    40) ATM Configuration Application
    41) Advanced File System Daemon
    42) Advanced File System Graphical User Interface
    43) C2-Security
    44) C2-Security GUI

--- MORE TO FOLLOW ---

Add to your choices or press RETURN to display the next screen.

Estimated free diskspace(MB) in root:61.2 usr:403.9

Choices (for example, 1 2 4-6):  11 40
```

6. After you enter all your choices, the following confirmation message is displayed:

```
You are installing the following optional subsets:

 - Kernel Build Environment :

        POLYCTR advfs Kernel Modules

 - Kernel Software Development :

        POLYCTR advfs Kernel Objects

 - System Administration :

        ATM Configuration Application
        POLYCTR advfs

Estimated free diskspace(MB) in root:56.6 usr:402.8

Is this correct? (y/n): y
```

7. After you confirm your choice, messages similar to the following are displayed as the software subsets are loaded and configured:

```
Checking file system space required to install selected subsets:

File system space checked OK.

4 subset(s) will be installed.

Loading subset 1 of 4 ...

POLYCTR advfs Kernel Modules
   Copying from dumper (inet)
   Verifying

Loading subset 2 of 4 ...

POLYCTR advfs
   Copying from dumper (inet)
        Working....Fri Dec 17 14:48:02 EST 1999
   Verifying

Loading subset 3 of 4 ...

ATM Configuration Application
   Copying from dumper (inet)
   Verifying

Loading subset 4 of 4 ...

POLYCTR advfs Kernel Objects
   Copying from dumper (inet)
        Working....Fri Dec 17 14:48:34 EST 1999
   Verifying

4 of 4 subset(s) installed successfully.
```

```
Configuring "POLYCTR advfs Kernel Modules" (OSFADVFSBIN500)

Configuring "POLYCTR advfs" (OSFADVFS500)

Configuring "ATM Configuration Application" (OSFATMGUI500)

Configuring "POLYCTR advfs Kernel Objects" (OSFADVFSBINOBJECT500)
```

8. If you are installing from CD–ROM, unmount the CD–ROM after the software subsets are installed:

   # **umount /dev/disk/cdrom0c**

9.8 Rebuilding the Kernel After Installing Kernel Build Environment Subsets

Certain base operating system products (such as the Logical Storage Manager, Advanced File System, and Asynchronous Transfer Mode) contain a kernel component. If you use `setld` to install one of these software subsets after the installation, you must run the `doconfig` utility to rebuild the kernel with the new kernel component; otherwise you will not be able to use the software product. After building a new kernel, move the new kernel to the / (root) file system, and reboot with the new kernel to make the product available for use.

Refer to Appendix C for a list of the software subsets that contain kernel components for which you must run the `doconfig` utility to build a new kernel. Refer to the `doconfig`(8) reference page for more information.

If you install the Asynchronous Transfer Mode (ATM) DGLTA adapter after installing the operating system, you must boot the system off the generic kernel `genvmunix`, install the ATM software subsets from the CD-ROM, and then run the `doconfig` utility to rebuild your system kernel to enable the added ATM support. To configure the adapter, run the ATM configuration utility from the SysMan Menu.

A

Device Naming Conventions

This chapter contains the following information:

- The history of device naming from the old style device naming to the device naming conventions that are in use starting with Version 5.0
- Creating device special file names using the new naming conventions
- How device names are assigned including an example of how device names are assigned after moving an existing disk and adding a new disk
- Preserving device names during a Full Installation
- How an Update Installation maps old and current device names
- How to obtain more information about devices attached to your system

A.1 History of Device Naming

In versions of the operating system earlier than Version 5.0, all devices resided in the `/dev` directory and were named as shown in Table A–1.

Table A–1: Previous Device Naming Convention

Device	Directory	Name
Generic	`/dev`	`std, drum, kmem, mem, null, trace, tty, local`
Disks	`/dev`	`rz*, ra*, re*`
Tapes	`/dev`	`tz*, ta*`
Terminals	`/dev`	`pty`
Printers	`/dev`	-

Starting with Version 5.0, each class of device has a separate subdirectory named for the class as shown in Table A–2.

Table A–2: Version 5.0 Device Naming Conventions

Device	Directory	Device Names
Generic	/dev/generic	
Disks	/dev/disk, /dev/rdisk	dsk, floppy, cdrom, worm, optical
Tapes	/dev/tape, /dev/ntape	9trk, qic, 8mm, 3480, dlt, dat
Terminals	/dev/term	serial, ptm, pts, ptm_v, pts_v
Printers	/dev/printer	lp
Logical Storage Manager (LSM)	/dev/vol , /dev/rvol	rootdg/root_vol, rootdg/swap_vol, rootdg/usr_vol

The directory and actual device names are self explanatory, with a few notable exceptions:

`disk, rdisk` The `disk` subdirectory refers to block device nodes. The `rdisk` subdirectory refers to character device nodes.

`tape, ntape` The `tape` subdirectory refers to rewind-on-close device nodes. The `ntape` subdirectory refers to no-rewind-on-close device nodes.

Table A–3 shows how old-style device names map to the current device names.

Table A–3: Mapping of Old Style and Current Device Names

Device	Old Style Device Name	Current Device Name
System disk, character device	/dev/rrz0	/dev/rdisk/dsk0
System disk, block device	/dev/rz0	/dev/disk/dsk0
Diskette drive	/dev/fd0c	/dev/disk/floppy0c
CD-ROM	/dev/rz4c	/dev/disk/cdrom0c

A.2 Creating Device Special Files

Every time the system is booted, the system hardware is scanned and any new device special files are created automatically. If you add a new device

to the system and want to create the device special file without rebooting the system, use the `hwmgr` command. For example, the following command scans the SCSI bus for any new devices and automatically creates the device special files for any new devices.

```
# hwmgr -scan scsi
```

Note

Starting with Version 5.0, the `/dev/MAKEDEV` command is no longer used to create device special files.

A.3 How Device Names Are Assigned

Each time a new device is created, it is assigned the next available device name. When the system is initially installed, the hardware is probed in order to determine what devices exist on the system. The hardware probe starts at `bus 0/target 0` and probes each successive target on bus 0. It then proceeds to probe bus 1 and all of its targets starting from target 0. As each new device is discovered, it is assigned the next available device number, starting from 0. Table A–4 shows a sample device naming scenario:

Table A–4: Sample Device Naming Scenario

Bus #	Target #	Old Style Device Name	New Device Name	Worldwide ID
0	0	rz0	dsk0	DEC100
0	4	rz4	dsk1	DEC101
1	3	rz11	dsk2	DEC102
1	6	rz14	dsk3	DEC103
1	7	rz15	dsk4	DEC104

Once a physical disk has been assigned to a device name, it retains that device name, regardless of its position on the bus. Each physical device is given a unique worldwide identifier at the time it is manufactured. It is this worldwide identifier that is used to map the physical device to the new device name. This means that a disk can be moved from slot to slot on the bus without having to change the device name. So, if you move a disk from one slot to another you would continue to refer to the disk using the same device name. Using the example in Table A–4, if the disk known as `dsk0` were to move from `bus 0/target 0` to `bus 1/target 4`, the new device name would remain the same. Under previous releases the device would need to be accessed as `rz12`, but in the new release the device name

remains dsk0. This is because the device name is tied to the worldwide identifier and not to the position of the disk on the bus.

Once a device is assigned a new device name, it retains that name across system reboots. New devices are given the next available device name. Continuing the example used in Table A–4, assume that the DEC100 device (dsk0) has been moved from bus 0/target 0 to bus 1/target 4. Also assume that a new device (DEC099) has been added to the system on bus 0/target 0. Table A–5 shows the new device names when the system reboots:

Table A–5: Device Name Assignments After Moving and Adding a Device

Bus #	Target #	Old Style Device Name	New Device Name	Worldwide ID
0	**0**	**rz0**	**dsk5**	**DEC099**
0	4	rz4	dsk1	DEC101
1	3	rz11	dsk2	DEC102
1	**4**	**rz12**	**dsk0**	**DEC100**
1	6	rz14	dsk3	DEC103
1	7	rz15	dsk4	DEC104

Table A–5 shows that the DEC100 device still retains the dsk0 device name, even though it has moved to another bus/target. The new device (DEC099) has been assigned the next available device name (dsk5). See Section A.6 for information on obtaining device information from the operating system.

A.4 Preserving Device Names During a Full Installation

When a Full Installation is performed, the existing device naming databases are lost. This means that the new device names will be assigned based upon the order in which the devices are found. This new naming scheme may be different from the naming scheme used in older versions of the operating system. However, there is a way to save this information during a Full Installation. This feature is particularly useful if you have applications that use the existing devices names and you intend on running those applications on the new version of the operating system. If you do not preserve the device naming databases, your applications may access the wrong devices. The device names can be preserved across Full Installations using the following steps:

1. Shut down the system to console mode:

```
# shutdown -h now
```

2. Examine the bootdef_dev console variable:

   ```
   >>> show bootdef_dev
   ```

   If the value of the bootdef_dev variable is set to the disk containing the / (root) file system, the Full Installation procedure automatically preserves the hardware device database and there is no need to do anything. If not, proceed to the next step.

3. If the value of bootdef_dev is not set to the disk containing the / file system, set it:

   ```
   >>> set bootdef_dev dka0
   ```

4. Perform the Full Installation. The Full Installation preserves the device databases from the previous version of the operating system. It does this by mounting the device specified by the bootdef_dev variable and saving the necessary device database files. These files are then placed on the newly created system. This means the devices on the new system will be mapped exactly as they were from the previous installation.

If you do not want to preserve the device naming from the previous installation, set the bootdef_dev console variable to " " (double quotes).

A.5 Update Installation Device Names

The Update Installation maps the old device names to the new device names, so that the new system will have both the old rz* devices and the new dsk* devices. The mapping of the old device names to the new device names can be found in the /etc/dfsl.dat file. This mapping is determined dynamically each time the system is booted. This is because the old device name is based upon the bus and target location while the new device name remains constant. Therefore, if the disk moves from one bus to another bus, the old device name will change, but the new device name will not. See Table A–2 for details on device naming conventions.

Note

The /etc/dfsl.dat file should not be modified. This is a database used by the kernel to access system devices. Modifying this file may render devices inoperable.

As in releases earlier than Version 5.0, the kernel does not mount the same device more than once. For example, in previous releases of the operating system, you could not mount /dev/rz0a on /mnt and then mount /dev/rz0a on /mnt1. This restriction still applies to Version 5.0 of the

operating system. This means that if you have an old device name mounted and attempt to mount the same device using the new device name, the mount will fail. For example, if both `/dev/rz0a` and `/dev/disk/dsk0a` map to the same physical disk, you cannot mount both `/dev/rz0a` and `/dev/disk/dsk0a` at the same time.

A.6 Obtaining More Device Information

You can retrieve information regarding the state of the hardware (including all disks connected to your system) by using the SysMan Station (SMS). The SysMan Station lets you monitor one system or a group of systems and administer system resources. You can set the `View` to see all hardware connected to the system.

If you are logged in as the `root` user, the SysMan Station is available from an icon on the CDE front panel. To open the SysMan Station from the command line, enter:

```
# /usr/sbin/sysman -station
```

B

Compact Disc Overview

The operating system software is distributed on four read-only compact discs (CD-ROM):

- The CD-ROM labeled *Operating System Volume 1* contains the base operating system software subsets. The software subsets contained on this CD–ROM are described in Section C.1.
- The CD–ROM labeled *Associated Products Volume 1* contains the Worldwide Language Support (WLS) software and other layered products that are compatible with the operating system. WLS software subsets are described in Section C.4.1, and layered products are described in Appendix D.
- The CD-ROM labeled *Associated Products Volume 2* contains additional layered products.
- The CD-ROM labeled *Documentation Volume 1* contains the documentation set in `HTML` and `PDF` formats. Chapter 8 describes how to mount this CD-ROM to view documents.

This appendix describes how to:

- Load a CD-ROM into a caddy
- Insert and remove a CD-ROM
- Mount a CD-ROM
- Unmount a CD-ROM

B.1 Loading a CD-ROM in a Caddy

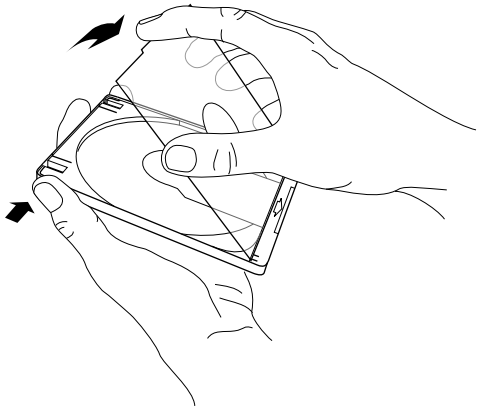
A CD-ROM must be placed in a caddy before it can be inserted in an RRD42 or RRD44 disc drive. Caddies are not required for newer, faster types of disc drives. Follow these steps to load a CD-ROM in to a caddy:

1. Remove the cellophane wrapper (if present) before using the caddy.
2. Press the tabs on both sides of the caddy and lift the lid.
3. Remove the CD-ROM from its packaging. Hold the CD-ROM by its edge.

4. Place the CD-ROM in to the caddy, making sure that the labeled side faces up.
5. Close the lid of the caddy by pressing both corners down firmly.

Figure B–1 shows how to press the tabs of the caddy and lift the lid.

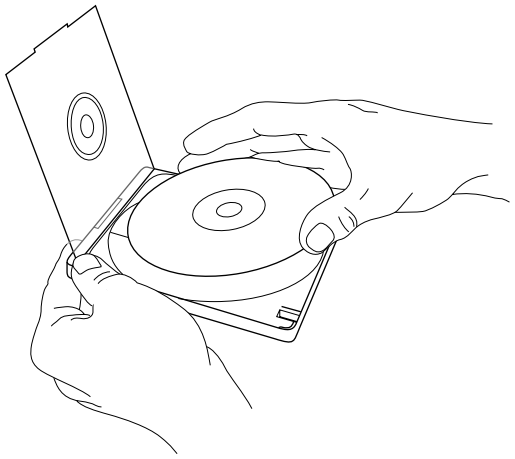
Figure B–1: Pressing Tabs and Lifting Lid of a CD-ROM Caddy



ZS-0443-MH

Figure B–2 shows how to place the disc in to the caddy.

Figure B–2: Placing a Disc in to a CD-ROM Caddy



ZS-0444-MH

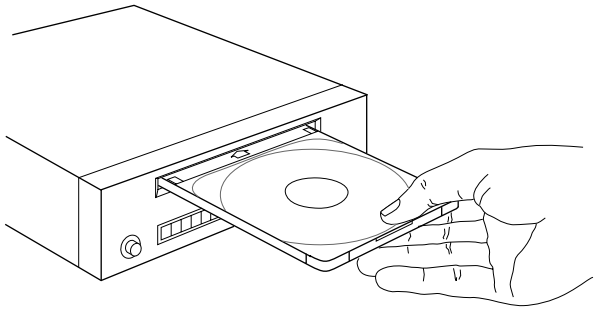
B.2 Inserting a CD-ROM into a Disc Drive

After placing the CD-ROM into a caddy, follow these steps to insert the disc caddy into a disc drive:

1. Insert the caddy in to the slot in the disc drive. The disc label should be facing up.
2. Push the caddy in until it stops.

Figure B–3 shows a CD-ROM (in its caddy) being inserted in to a disc drive:

Figure B–3: Inserting a CD-ROM in to a Disc Drive



ZS-0445-MH

B.3 Mounting a CD-ROM

Before you can access the files and directories on a CD-ROM, it must be mounted on a mount point. Follow these steps to mount a CD-ROM:

1. Log in as root or become superuser.
2. Enter the following command to find the CD–ROM device name if necessary:

   ```
   # ls /dev/disk/cdrom*c
   /dev/disk/cdrom0c
   ```

3. Use the `mkdir` command to make a directory to be the mount point for the CD-ROM. Then mount the CD-ROM using the `mount` command with the following syntax, substituting the unit number of your CD-ROM drive for the *unit_number*.

   mount /dev/disk/cdrom<*unit_number*>c /*mount-point*

   For example, to mount the CD-ROM in drive `/dev/disk/cdrom0c` on the directory `/cdrom`, enter the following commands:

```
# mkdir /cdrom
# mount /dev/disk/cdrom0c /cdrom
```

4. To ensure that the CD-ROM is remounted in the event that your system crashes or is rebooted, add the following line to the `/etc/fstab` file:

   ```
   /dev/disk/cdrom0c        /cdrom   ufs   ro   0  0
   ```

   The system will mount the CD-ROM on the `/cdrom` mount point on every system reboot.

B.4 Unmounting a CD-ROM

You must unmount a CD-ROM from its mount point by using the `umount` command before you can eject it from the disc drive. To unmount a CD-ROM, you must be superuser or `root` and you must be at least one directory above the mount point of the CD-ROM. Use commands similar to the following to unmount a CD–ROM:

```
# cd /
# umount /cdrom
```

If you do not unmount the CD–ROM before trying to remove it, the CD-ROM will not eject from the drive when you press the EJECT button. If you are in the directory of the mount point of the CD-ROM when you execute the `umount` command, you will see the message `device busy`.

To remove the disc from the disc drive after it is unmounted, press the EJECT button on the disc drive.

If the EJECT button is disabled by software or if the drive does not eject the caddy after you press the EJECT button, refer to your *Optical Disc Drive Owner's Manual* for instructions.

C

Software Subset Descriptions

This chapter provides descriptions of all software subsets that are part of the current version of the operating system.

C.1 Base Operating System Software Subset Descriptions

The software subsets described in this section are located on the CD-ROM labeled *Operating System Volume 1*.

Software subsets are divided into the following categories:

- **Mandatory software subsets** are installed automatically during Full Installations. These software subsets represent the minimum software needed to install and run the operating system.
- **Optional software subsets** represent a variety of applications that can be installed to enrich the features of the operating system. Refer to Chapter 9 for information about using the `setld` command to install optional subsets after the installation.
- **Conditionally mandatory software subsets** are considered mandatory only when certain hardware or software is detected during the installation procedure, which makes the software mandatory. Table C–1 lists the software subsets that are conditionally mandatory. In Table C–1, a group of software subsets that contains the word `or` means that at least one of the software subsets is mandatory when the condition is met.

Table C–1: Conditionally Mandatory Software Subsets

Software Subset Name	What Makes It Mandatory?
DECwindows 75dpi Fonts DECwindows 100dpi Fonts	The resolution of the graphics adapter attached to the system.
X Servers for PCbus X Servers for TurboChannel	The type of graphics adapter attached to the system.

Table C–1: Conditionally Mandatory Software Subsets (cont.)

Software Subset Name	What Makes It Mandatory?
Graphical Base System Management Utilities Graphical Print Configuration Application Graphical System Administration Utilities Netscape Communicator V4.51 CDE Desktop Environment Basic X Environment X Servers X Fonts Adobe Font Metric Files CDE Mail Interface DECwindows Mail Interface	A graphics adapter is attached to the system.
LK201 Keyboard Support LK401 Keyboard Support LK411 Keyboard Support LK421 Keyboard Support LK444 Keyboard Support OR PCXAL Keyboard Support	The type of keyboard attached to the system.
AdvFS AdvFS Kernel Modules	Choosing AdvFS as the file system type for the /, /usr, or /var file systems during the Full Installation.
LSM Kernel Modules LSM Kernel Objects LSM GUI	Choosing LSM during the Full Installation.
ATM Kernel Header and Common Files ATM Kernel Modules ATM Commands	ATM hardware is detected by the Full Installation.

In this appendix, the conditionally mandatory software subsets are described in the software category in which they would appear during an installation if they were not mandatory for your system.

C.2 Mandatory Software Subsets

The mandatory subsets shown in Table C–2 always are installed automatically during a Full Installation.

The Base System and the Base System–Hardware Support subsets cannot be deleted once they are installed.

The Standard Kernel Modules, the Kernel Header and Common Files, the Hardware Kernel Modules, the Hardware Kernel Header and Common Files, and the Compiler Back End subsets contain all the files needed to

build a standard kernel. You can delete these subsets after the installation by using the `setld -d` command to reclaim disk space after the kernel is built. However, you will not be able to rebuild your kernel. If you need to rebuild your kernel for any reason, you must reinstall these subsets with the `setld` command.

Table C–2 describes the mandatory subsets.

Table C–2: Description of the Mandatory Software Subsets

Title and Contents	Subset Name
Base System - This software subset includes fundamental utilities and data files for the base operating system. This software subset cannot be deleted.	OSFBASE500
Base System–Hardware Support - This software subset provides the hardware dependent portion of the OSFBASE subset. This subset cannot be deleted. This software subset also contains the Monitoring Performance History (MPH) utility that gathers information on the reliability and availability of the operating system and associated platforms.	OSFHWBASE500
Base System Management Applications and Utilities - This software subset contains all files related to the base system management (SysMan) applications and utilities.	OSFSYSMAN500
Basic Networking Services - This software subset contains the software required to provide services over the network using the TCP/IP protocols. These services include remote login (`rlogin`) and Network Time Protocol (`xntp`).	OSFCLINET500
Compiler Back End - C Language Compiler. This software subset provides the minimum level of C language support required to build operating system kernels. The subset also contains the C compiler executables. This software subset must be used in conjunction with the Software Development Tools and Utilities subset. This software subset is mandatory during the initial system installation, but can be removed if you do not intend to build kernels on your system.	OSFCMPLRS500
Hardware Kernel Modules - This software subset provides hardware dependent kernel modules that together with the Standard Kernel Modules let you configure and build the kernel. This software subset is mandatory during the initial system installation, but can be removed if you do not intend to build kernels on your system.	OSFHWBIN500

Table C–2: Description of the Mandatory Software Subsets (cont.)

Title and Contents	Subset Name
Hardware Kernel Header and Common Files - This software subset provides the hardware dependent kernel header and data files that together with the Standard Kernel Modules and Hardware Kernel Modules let you configure and build the kernel. If you do not plan to build kernels on your system, this subset can be removed. This software subset supports uniprocessor, symmetric multiprocessing (SMP), and realtime configurations.	OSFHWBINCOM500
Kernel Header and Common Files - This software subset provides the common kernel header and data files that together with the Standard Kernel Modules and Hardware Kernel Modules let you configure and build the kernel. This software subset is mandatory during the initial system installation, but can be removed if you do not intend to build kernels on your system.	OSFBINCOM500
NFS Utilities - This software subset provides the software required to mount remote file systems using the Network File System (NFS).	OSFNFS500
Standard Kernel Modules - This software subset provides common kernel modules that together with the Hardware Kernel Modules let you configure and build the kernel. This software subset is mandatory during the initial system installation, but can be removed if you do not intend to build kernels on your system.	OSFBIN500

C.3 Optional Software Subsets

The following is a list of the optional software subset categories. Locate the category you are interested in and refer to the corresponding table for subset descriptions. The optional software subsets can be deleted after they are installed.

- General Applications – Table C–3
- Kernel Build Environment – Table C–4
- Kernel Software Development — Table C–5
- Mail Applications – Table C–6
- Network-Server/Communications – Table C–7
- Printing Environment – Table C–8
- Obsolete Components — Table C–9
- Reference Pages – Table C–10
- Software Development – Table C–11

- Supplemental Documentation – Table C–12
- System Administration – Table C–13
- Text Processing – Table C–14
- Windowing Environment – Table C–15
- Windows Applications – Table C–16

C.3.1 General Applications Software Subsets

Table C–3 describes the software subsets in this category.

Table C–3: Description of the General Applications Software Subsets

Title and Contents	Subset Name	Dependencies
Additional Terminfo Databases - This software subset contains the additional terminal information databases to support terminals from other vendors.	OSFTERM500	
Computer Aided System Tutorial - This software subset provides a simple, interactive online tutorial about subjects such as basic UNIX file handling, the `vi` text editor, the capabilities of the `ls` command, `ms` macros, editors in general, `eqn` (a language for typesetting mathematics), and the `C` Programming Language. Refer to the `learn`(1) reference page for more information.	OSFLEARN500	
DOS Tools - This software subset provides a collection of tools for manipulating MS-DOS files. The mtools commands are a public domain collection of programs that let you read, write, and manipulate files on an MS-DOS file system (typically a floppy disk) from a UNIX system. Each command attempts to emulate the MS-DOS equivalent command as closely as possible. The following commands are available: `mattrib`, `mcd`, `mcopy`, `mdel`, `mdir`, `mformat`, `mlabel`, `mmd`, `mrd`, `mread`, `mtype`, and `mwrite`.	OSFDOSTOOLS500	
xemacs Runtime - This software subset contains the X Emacs editor.	OSFEMACS500	

Table C–3: Description of the General Applications Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
JAVA Environment - This software subset contains the class libraries, tools, and run-time libraries necessary for JAVA environment development.	OSFJAVA500	
Local Area Transport (LAT) - Local Area Transport (LAT) is a protocol that provides a means of logically connecting terminal servers to one or more nodes on the same local area network (LAN). LAT software has the features required for a host to function as a service node, so requests for connections can be made by server users.	OSFLAT500	Requires Kernel Header and Common Files and Basic Networking Services.
PERL Runtime - This software subset contains the run-time libraries needed to run PERL programs.	OSFPERL500	
Tk Toolkit Commands - This software subset contains the Tool Command Language (TCL) graphical extensions package.	OSFTKBASE500	Requires TCL Commands and Basic X Environment.
TCL Commands - This software subset contains the binary distribution of the Tool Command Language (TCL) and the TCLX extension package without graphical components. TCL is a scripting language. The package consists of the TCL/TCLX shared libraries, the TCL/TCLSH shells, and script libraries. Install this software subset if you want to write or run TCL programs.	OSFTCLBASE500	

Table C–3: Description of the General Applications Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
UNIX SVID2 Compatibility - This software subset brings the operating system into compliance with the Base System and Kernel Extensions of the System V Interface Definition Issue 2 (SVID2). It also adds a higher degree of compatibility with the Basic Utilities Extensions of SVID2.	OSFSVID2500	
UNIX to UNIX Copy Facility - This software subset provides programs and data files needed for a system to participate in a network of machines using the UUCP facility. This facility transmits files over serial communications lines.	OSFUUCP500	

C.3.2 Kernel Build Environment Software Subsets

Table C–4 describes the software subsets in this category.

Table C–4: Description of the Kernel Build Environment Software Subsets

Title and Contents	Subset Name	Dependencies
ATM Kernel Header and Common Files - This software subset provides the ATM kernel header and data files and together with the ATM Kernel Modules subset lets you configure and build a kernel that supports the ATM hardware.	OSFATMBINCOM500	Requires Kernel Header and Common Files.
ATM Kernel Modules - This software subset contains the ATM kernel modules. This software subset is mandatory if ATM hardware is detected during the installation process. ATM technology is a connection-oriented wide area/local area technology based on the high-speed switching of 53-byte cells across a network.	OSFATMBIN500	Requires Standard Kernel Modules.

Table C–4: Description of the Kernel Build Environment Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
Logical Storage Manager Kernel Modules - This software subset provides the kernel modules to build the kernel with LSM drivers. This software subset supports uniprocessor, SMP, and realtime configurations.	OSFLSMBIN500	Requires Standard Kernel Modules.
AdvFS Kernel Modules - This software subset contains the Advanced File System (AdvFS) kernel modules. AdvFS is a log based file system that allows for faster system restarts in case of system crashes.	OSFADVFSBIN500	Requires Standard Kernel Modules and Kernel Header and Common Files.

C.3.3 Kernel Software Development Software Subsets

Table C–5 describes the software subsets in this category. These software subsets are optional after the installation. They will not appear on the optional software subset list during a Full Installation. Use the `setld` command if you want to install these software subsets.

Table C–5: Description of the Kernel Software Development Software Subsets

Title and Contents	Subset Name	Dependencies
ATM Kernel Objects - This software subset contains the Asynchronous Transfer Mode (ATM) Kernel Objects needed for software development of code that is to be built into the kernel.	OSFATMBINOBJECT500	Requires ATM Kernel Modules.
Hardware Kernel Objects - This software subset contains the Hardware Kernel Objects needed for software development of code that is to be built into the kernel.	OSFHWBINOBJECT500	Requires Hardware Kernel Modules.

Table C–5: Description of the Kernel Software Development Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
AdvFS Kernel Objects - This software subset contains the AdvFS Kernel Objects needed for software development of code that is to be built into the kernel.	OSFADVFSBINOBJECT500	Requires AdvFS Kernel Modules.
Standard Kernel Objects - This software subset contains the Standard Kernel Objects needed for the software development of code that is to be built into the kernel.	OSFBINOBJECT500	Requires Standard Kernel Modules.

C.3.4 Mail Applications

Table C–6 describes the software subsets in this category.

Table C–6: Description of the Mail Applications Software Subsets

Title and Contents	Subset Name	Dependencies
CDE Mail Interface - This software subset contains the Common Desktop Environment mail system. This software subset is mandatory on a system with graphics capabilities.	OSFCDEMAIL500	Requires CDE Desktop Environment.
DECwindows Mail Interface - This software subset provides the DECwindows mail application for `dxmail`.	OSFXMAIL500	Requires RAND Corp. Mail Handler (MH) and Additional DECwindows Applications.
RAND Corp. Mail Handler (MH) - This software subset provides programs that constitute the RAND Corporation MH mail reader interface.	OSFMH500	Required for DECwindows Mail Interface.

C.3.5 Network-Server/Communications Software Subsets

Table C–7 describes the software subsets in this category.

Table C–7: Description of the Network-Server/Communications Software Subsets

Title and Contents	Subset Name	Dependencies
ATM Commands - This software subset contains the software that provides the Asynchronous Transfer (ATM) mode commands. This software subset is mandatory if ATM hardware is detected during the installation process.	OSFATMBASE500	Requires Basic Networking Services and ATM Kernel Header and Common Files.
Additional Networking Services - This software subset contains the software that provides the networking services; IMAP4, Post Office Protocol (POP3), Berkeley Internet Name Domain (BIND) and Network Information Services (NIS).	OSFINET500	Requires Basic Networking Services Required for Remote Installation Services (RIS) and Dataless Management Services (DMS).
Dataless Management Services - This software subset provides the software needed to run Dataless Management Services (DMS). In a DMS environment, a server maintains the / (root), `/usr`, and `/var` file systems for client systems. Paging, swapping, and dumping is done on the clients local disks. The UNIX-SERVER product authorization key (PAK) must be loaded and registered to use DMS.	OSFDMS500	Requires Additional Networking Services.
Remote Installation Services (RIS) - This software subset provides the ability to perform installations of the operating system and applications over a network. The UNIX-SERVER product authorization key (PAK), must be loaded and registered to use RIS.	OSFRIS500	Requires Additional Networking Services.

C.3.6 Printing Environment Software Subsets

Table C–8 describes the software subsets in this category.

Table C–8: Description of the Printing Environment Software Subsets

Title and Contents	Subset Name	Dependencies
Adobe Font Metric Files - This software subset contains font metrics (character bounding box, width, name, ligature, kerning, and font properties) for PostScript outline fonts used by text formatting applications on PostScript output devices. This software subset is needed to view files.	OSFAFM500	
Local Printer Support - This software subset provides printer commands such as `lpr`, `lpq`, and `lpd` utilities; configuration files; filters; and PostScript printer support.	OSFPRINT500	

C.3.7 Obsolete Components Software Subsets

Table C–9 describes the software subsets in this category.

Table C–9: Description of the Obsolete Components Software Subsets

Title and Contents	Subset Name	Dependencies
Obsolete Commands and Utilities - This software subset contains the commands and utilities that are no longer supported in the current version of the operating system.	OSFOBSOLETE500	

C.3.8 Reference Pages Software Subsets

Table C–10 describes the software subsets in this category.

Table C–10: Description of the Reference Pages Software Subsets

Title and Contents	Subset Name	Dependencies
Ref Pages: Admin/User - This software subset provides the online reference pages for system administrators and general users.	OSFMANOS500	Requires Doc. Preparation Tools.
Ref Pages: CDE Admin/User - This software subset contains the reference pages for Common Desktop Environment general users and system administrators.	OSFCDEMANOS500	Requires Doc. Preparation Tools.

Table C–10: Description of the Reference Pages Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
Ref Pages: CDE Development - This software subset contains the Common Desktop Environment development reference pages.	OSFCDEMANOP500	Requires Doc. Preparation Tools.
Ref Pages: Programming - This software subset provides the online reference pages for programmers. It also contains the online reference pages for the Realtime kernel.	OSFMANOP500	Requires Doc. Preparation Tools.
Ref Pages: Windows Admin/User - This software subset provides the online reference pages for windows administrators and users.	OSFMANWOS500	Requires Doc. Preparation Tools.
Ref Pages: Windows Programming - This software subset provides the online reference pages for windows programmers.	OSFMANWOP500	Requires Doc. Preparation Tools.

C.3.9 Software Development Software Subsets

Table C–11 describes the software subsets in this category.

Table C–11: Description of the Software Development Software Subsets

Title and Contents	Subset Name	Dependencies
CDE Software Development and Programming Examples - This software subset contains the header files, static libraries, and tools needed for Common Desktop Environment (CDE) development.	OSFCDEDEV500	Requires CDE Desktop Environment, X Window Software Development, and X Window Header Files.
GNU Revision Control System - This software subset contains programs that make up the UNIX Revision Control System (RCS), which provides a regulation mechanism for large software projects.	OSFRCS500	
JAVA Development Environment - This software subset contains JAVA development tools.	OSFJAVADEV500	Requires JAVA Environment.

Table C–11: Description of the Software Development Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
Ladebug Debugger - This software subset contains the command line interface for the Ladebug Debugger. The Ladebug Debugger is a symbolic source-level debugger that supports debugging of ADA, C/C++, Fortran, and Fortran 90 applications.	OSFLDBBASE500	
Ladebug Debugger Release Notes - This software subset contains the Ladebug Debugger Release Notes. The release notes are located at `/usr/doc/ladebug/ladebug-relnotes.txt` when this subset is installed.	OSFLDBDOC500	
Ladebug Debugger Graphical User Interface - This software subset contains all the files needed to install the graphical user interface to the Ladebug Debugger.	OSFLDBGUI500	
Ladebug Debugger Remote Server - This software subset contains all the files needed to install the Ladebug Debugger server. The server is used to do remote debugging.	OSFLDBSRV500	
Programming Examples - This software subset contains programming examples.	OSFEXAMPLES500	
Software Development Desktop Environment - This software subset contains the Common Desktop Environment (CDE) files necessary to start the Ladebug Debugger and the Porting Assistant from the CDE desktop.	OSFSDECDE500	Requires CDE Desktop Environment.
Software Development Tools and Utilities - This software subset provides additional software development environment extensions. This software subset includes the ATOM tools `hiprof`, `pixie`, and `third`. The OSF-DEV-USER Product Authorization Key (PAK), is required to use the tools and utilities included in this software subset.	OSFSDE500	Requires Compiler Back End.

Table C–11: Description of the Software Development Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
Source Code Control System - This software subset contains programs that make up the UNIX Source Code Control System (SCCS), which provides a regulation mechanism for large software projects.	OSFSCCS500	
Standard Header Files - This software subset contains the standard header files for C programming.	OSFINCLUDE500	
Standard Programmer Commands - This software subset contains libraries and utilities useful for software development. It includes the libraries for linking programs to be analyzed with the `dbx` debugger and `lex` and `yacc` parser packages. Also included in this software subset is the ATOM performance analysis and debugging tool kit.	OSFPGMR500	Requires Compiler Back End.
Static Libraries - This software subset contains the static libraries for linking programs that do not use shared libraries. Some software development tools work only with static linked programs.	OSFLIBA500	Requires Compiler Back End.
X Window and X/Motif Header Files - This software subset contains the X window header files needed for X11 and Motif software development.	OSFXINCLUDE500	Requires Basic X Environment and Standard Header Files.
X Window and X/Motif Programming Examples - This software subset contains examples of X and Motif programs.	OSFXEXAMPLES500	

Table C–11: Description of the Software Development Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
X Window and X/Motif Software Development - This software subset provides the library and data files needed to produce X/Motif Window System client applications. This software subset also includes example programs demonstrating how to get started.	OSFXDEV500	Required for CDA for X/Motif Development.
X Window and X/Motif Static Libraries - This software subset contains the X Window static libraries for linking programs that do not use shared libraries. Some software development tools only work with static linked programs.	OSFXLIBA500	Requires X Window Software Development and X Window Header Files.

C.3.10 Supplemental Documentation Software Subset

Table C–12 describes the software subset in this category.

Table C–12: Description of the Supplemental Documentation Software Subset

Title and Contents	Subset Name	Dependencies
XIE Version 5 Online Documentation - This software subset provides compressed PostScript files of documents for the X Window System Image Extension (XIE) Version 5.0 software.	OSFXIEDOC500	
Online Documentation for JAVA - This software subset contains online documentation for the JAVA development tools.	OSFJAVADOC500	Requires Netscape.

C.3.11 System Administration Software Subsets

Table C–13 describes the software subsets in this category.

Table C–13: Description of the System Administration Software Subsets

Title and Contents	Subset Name	Dependencies
AdvFS - The subset contains the system administration commands required for creating and managing the Advanced File System (AdvFS).	OSFADVFS500	Requires AdvFS Kernel Modules.
Advanced File System Daemon - This software subset contains the AdvFS daemon.	OSFADVFSDAEMON500	Requires AdvFS
Advanced File System GUI - This software subset contains the graphical user interface for the AdvFS administration utility.	OSFXADVFS500	Requires AdvFS Daemon and CDE Desktop Environment.
Basic Networking Configuration Applications - This software subset contains the network configuration applications.	OSFNETCONF500	Requires Base System Management Applications and Utilities and Basic Networking Services.
DECevent Base Kit (Translation/Analysis) - This software subset contains the DECevent event management utility, which provides an interface between a user and the operating system's event logger. DECevent translates system events into ASCII reports and monitors and analyzes system events to identify failing device components.	OSFDIABASE500	Requires CDE Minimum Runtime Environment.
Enhanced Security - This software subset provides additional configurable system security features such as identification, authentication and audit.	OSFC2SEC500	
Enhanced Security GUI - This software subset provides the graphical user interface for the C2 Security subset.	OSFXC2SEC500	Requires C2 Security.

Table C–13: Description of the System Administration Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
Environmental Monitoring - This software subset provides a means of detecting the thermal state, fan status, and redundant power supply status of AlphaServer systems (specifically AlphaServer 1000A systems, AlphaServer 4100 systems, and AlphaServer 8200 systems) in enough time to prevent damage to the system itself. This subset contains the components needed to implement Environmental Monitoring.	OSFENVMON500	Requires Additional Networking Services and Base System Management Applications and Utilities.
Graphical Base System Management Utilities - This software subset contains the graphical system management Tool Command Language (TCL/TK) shell, some utility libraries, the configuration checklist application (for postinstallation use), and the Common Desktop Environment (CDE) application manager rules files for the creation of system management applications within the application manager. It also contains all the system management application icons. This software subset is mandatory on systems with graphics capabilities.	OSFXSYSMAN500	Requires Base System Management Applications and Utilities, Tk Toolkit Commands, and CDE Minimum Run-time Environment.
Graphical Print Configuration Application - This software subset contains all files relating to the graphical print configuration application, `printconfig`. This software subset is mandatory on systems with graphics capabilities.	OSFXPRINT500	Requires Graphical Base System Management Utilities and Local Printer Support.
Graphical System Administration Utilities - This software subset contains all files relating to the following graphical system administration utilities: `account manager`, `archiver`, `file sharing`, `host manager`, `system info`, `kernel tuner`, `license manager`, `process tuner`, and `shutdown`. This software subset is mandatory on systems with graphics capabilities.	OSFXADMIN500	Requires Graphical Base System Management Utilities.

Table C–13: Description of the System Administration Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
Insight Manager - This software subset contains agents that allow the system to be managed remotely by the Insight Manager system administration tool.	OSFIMXE500	Requires JAVA Environment and Basic Networking Services.
Kernel Debugging Tools - This software subset provides tools for analyzing and debugging kernels.	OSFKTOOLS500	
Logical Storage Manager - This software subset contains the LSM administrative commands and tools required to manage an LSM configuration. This subset is mandatory if you select to install LSM during a Full Installation.	OSFLSMBASE500	Requires LSM Kernel Build Modules.
Logical Storage Manager Graphical User Interface - This software subset contains the LSM Motif-based graphical user interface (GUI) management tool and related utilities.	OSFLSMX11500	Requires Basic X Environment.
NFS Configuration Application - This software subset contains the files related to the Network File System (NFS), which allows you to export (share) local directories and import (mount) remote directories over the network.	OSFNFSCONF500	Requires Base System Management Applications and Utilities and NFS Utilities.
Single-Byte European Locales - This software subset provides basic internationalization and localization information for 21 Western European countries.	OSFEURLOC500	
Service Tools - This software subset contains the `syscheck` service tool, which is used to capture, print, and escalate system problems into reports to mail to corporate customer support representatives.	OSFSERVICETOOLS500	

Table C–13: Description of the System Administration Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
System Accounting Utilities - This software subset provides programs and data files needed to perform system accounting. This software subset contains log files that grow automatically.	OSFACCT500	
System Exercisers - This software subset provides programs that help to diagnose problems with hardware and peripheral devices.	OSFEXER500	

C.3.12 Text-Processing Software Subsets

Table C–14 describes the software subsets in this category.

Table C–14: Description of the Text Processing Software Subsets

Title and Contents	Subset Name	Dependencies
Doc. Preparation Tools - This software subset provides tools to format, manage, and display reference pages, including the `nroff` formatter and required macros.	OSFDCMT500	Required for all reference page subsets.
Doc. Preparation Tools Extensions - This software subset contains additional `nroff` macro packages, bibliography tools, and `roff` tools.	OSFDCMTEXT500	Requires Doc. Preparation Tools.

C.3.13 Windowing Environment Software Subsets

Table C–15 describes the software subsets in this category.

Table C–15: Description of the Windowing Environment Software Subsets

Title and Contents	Subset Name	Dependencies
Basic X Environment - This software subset provides programs required for the following X window applications: `dxconsole`, `dxkeycaps`, and `dxterm`. This software becomes mandatory and is installed automatically on systems with graphics capabilities.	OSFX11500	
CDE Desktop Environment - This software subset contains the user interface (that is, the front panel, colors, and so forth) to the Common Desktop Environment (CDE). This subset is mandatory if graphics capabilities are detected on the system.	OSFCDEDT500	Requires CDE Minimum Run-time Environment and Local Printer Support.
CDE Minimum Run-time Environment - This software subset contains the Common Desktop Environment minimum run-time environment, which includes shared libraries and executables for new client development. This subset is mandatory if graphics capabilities are detected on the system.	OSFCDEMIN500	Requires Basic X Environment and NFS Utilities.
DECwindows 75dpi Fonts - This software subset provides fonts for X11/DECwindows and is needed for specific layered products and low resolution (1024 x 768) monitors. This software subset becomes mandatory (instead of OSFFONT150500) when low resolution graphics are detected during the installation.	OSFFONT500	Requires Basic X Environment.
DECwindows 100dpi Fonts - This software subset provides workstation font files for systems using either the VR160 15-inch monitor or higher resolution graphics (1280 x 1024). This software subset is mandatory when high resolution graphics are detected during the installation.	OSFFONT15500	Requires Basic X Environment.

Table C–15: Description of the Windowing Environment Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
LK201 Keyboard Support - This software subset provides keyboard support for the Model LK201 keyboard. A label affixed to the underside of your keyboard shows the model number of the keyboard. This software subset becomes mandatory if this keyboard type is detected during the installation.	OSFKBDLK201500	Requires Basic X Environment.
LK401 Keyboard Support - This software subset provides support for the Model LK401 keyboard. A label affixed to the underside of your keyboard shows the model number of the keyboard. This software subset becomes mandatory if this keyboard type is detected during the installation.	OSFKBDLK401500	Requires Basic X Environment.
LK411 Keyboard Support - This software subset provides support for the Model LK411 keyboard. A label affixed to the underside of your keyboard shows the model number of the keyboard. This software subset becomes mandatory if this keyboard type is detected during the installation.	OSFKBDLK411500	Requires Basic X Environment.
LK421 Keyboard Support - This software subset provides support for the Model LK421 keyboard. A label affixed to the underside of your keyboard shows the model number of the keyboard. This software subset becomes mandatory if this keyboard type is detected during the installation.	OSFKBDLK421500	Requires Basic X Environment.
LK444 Keyboard Support - This software subset provides support for the Model LK444 keyboard. A label affixed to the underside of your keyboard shows the model number of the keyboard. This software subset becomes mandatory if this keyboard type is detected during the installation.	OSFKBDLK444500	Requires Basic X Environment.

Table C–15: Description of the Windowing Environment Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
PCXAL Keyboard Support - This software subset provides support for the Model PCXAL keyboard. A label affixed to the underside of your keyboard shows the model number of the keyboard. This software subset becomes mandatory if this keyboard type is detected during the installation.	OSFKBDPCXAL500	Requires Basic X Environment.
X Customizations for OEM - This software subset contains X Window customizations and special logo information for use by specific original equipment manufacturers (OEMs) when they install the operating system on their own hardware. This software subset is not intended for general use and should not be installed if your site is not an OEM.	OSFXOEM500	
X Fonts - This software subset provides X11 fonts from the X Consortium compiled for the X server. This software subset becomes mandatory and is installed automatically on systems with graphics capabilities.	OSFMITFONT500	Requires Basic X Environment.
X Servers Base - This software subset provides X11/DECwindows server support. A DECwindows server is the software that provides windowing on a workstation. This software subset becomes mandatory and is installed automatically on systems with graphics capabilities.	OSFSER500	Requires Basic X Environment.
X Servers for PCbus - This software subset provides graphics support for systems using the PCI bus. This software subset is loaded automatically when the installation procedure detects a PCI bus. This software subset also provides graphics support for EISA and PCI based systems that support QVision. This software subset is loaded automatically when the installation procedure detects QVision.	OSFSERPC500	Requires X Servers Base.

Table C–15: Description of the Windowing Environment Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
X Servers for TurboChannel - This software subset provides graphics support for systems with Turbochannel cards. This software subset is mandatory and is installed automatically when the installation procedure detects a Turbochannel card.	OSFSERTC500	Requires X Servers Base.
X/Motif 1.1 - This software subset contains the Motif Version 1.1 shared libraries for compatibility with programs that may not work with the Version 1.2 shared libraries.	OSFMOTIF11500	Requires Basic X Environment.

C.3.14 Windows Applications Software Subsets

Table C–16 describes the software subsets in this category.

Table C–16: Description of the Windows Applications Software Subsets

Title and Contents	Subset Name	Dependencies
Additional DECwindows Applications - This software subset provides additional X11/DECwindows client applications such as `dxdiff` (a visual differences program), `dxnotepad`, and `dxpresto` (a graphical display of Prestoserve state and statistics).	OSFDECW500	
Additional X Applications - This software subset contains the additional X Consortium X11 R5 client applications such as: `appres`, `bitmap`, `bmtoa`, `atobm`, `bdftopcf`, `editres`, `ico`, `iconv`, `listres`, `lndir`, `maze`, `mkdirhier`, `oclock`, `puzzle`, `resize`, `showfont`, `showrgb`, `viewres`, `x11perf`, `x11perfcomp`, `x11perfcomp`, `xauth`, `xbiff`, `xcalc`, `xclipboard`, `xclock`, `xcmsdb`, `xcmstest`, `xcutsel`, `xdpr`, `xdpyinfo`, `xedit`, `xev`, `xeyes`, `xfd`, `xfontsel`, `xgc`, `xkill`, `xload`, `xlogo`, `xlsatoms`, `xlsclients`, `xlsfonts`, `xmag`, `xman`, `xmh`, `xmkmf`, `xon`, `dxpresto`, `xpr`, `xprop`, `xrefresh`, `xstdcmap`, `xwd`, `xwininfo`, and `xwud`. Refer to the reference page for each of these applications for more information.	OSFXMIT500	
CDE Additional Applications - This software subset contains the Common Desktop Environment additional applications such as: `dxkeyboard`, `dxkeycaps`, and `dxdiff`. This subset also provides access to the following binaries: `dximageview`, `dtcm`, `dticon`, `dtimsstart`, and `dxkeyboard`. This software subset is mandatory on systems with graphics capabilities.	OSFCDEAPPS500	Requires CDE Desktop Environment.
Demo X Applications - This software subset contains X window demonstration applications to provide examples of the capabilities of the X windowing software that can be developed for the operating system.	OSFXDEMOS500	Requires Basic X Environment.

Table C–16: Description of the Windows Applications Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
Nested X Server - This software subset provides the Xnest server and contains the following: the Xnest server binary `/usr/bin/X11/Xnest`, the Xnest shared library `/usr/shlib/libxnest.so`, and the Xnest configuration file `/var/X11/Xnest.conf`. Xnest is a client and a server. Xnest is a client of the real Xserver and appears in a window no more than 3/4 the size of the real server. Xnest is also a server. Clients specify the Xnest server display; Xnest then manages graphics requests on behalf of the clients.	OSFXNEST500	Requires Basic X Environment.
Netscape Communicator V4.51 - This software subset contains the Netscape Communicator World Wide Web viewer that is used to view the documentation set on line. This software subset is mandatory on systems with graphics capabilities.	OSFNETSCAPE500	Requires Basic X Environment.
Old Additional DECwindows Applications - This software subset provides additional X11/DECwindows client applications such as `dxnotepad`. These applications will be retired in a future release of the operating system.	OSFOLDDECW500	Requires Basic X Environment.

Table C–16: Description of the Windows Applications Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
Print X Server - This software subset provides X print services.	OSFXPRT500	Requires Basic X Environment.
Virtual X Frame Buffer - This software subset provides the Xvfb server and contains the following: Xvfb server binary `/usr/bin/X11/Xvfb`, the Xvfb shared library `/usr/shlib/libxvfb.so`, and the Xvfb configuration file `/var/X11/Xvfb.conf`. The Xvfb server can run on machines with no display hardware and no physical input devices. It emulates a dumb frame buffer using virtual memory.	OSFXVFB500	Requires Basic X Environment.

C.4 Worldwide Language Support (WLS) Subsets

The WLS software subsets described in this section are located on the CD-ROM labeled *Associated Products Volume 1*.

When you install WLS software, a set of WLS base software subsets that is compatible with the current version of the operating system is installed automatically. These subsets are prefixed with `IOSWW`. When you choose a country, additional optional subsets as well as language- and country-specific subsets are installed. The language- and country-specific subsets provide localization (translation) support of language-specific libraries, tools, and utilities. With the exceptions noted in Section C.4.1.1, Section C.4.2.4, and Section C.4.2.2, all WLS software subsets have a United States English equivalent.

Table C–17 lists the countries for which software subsets are available.

Table C–17: Supported Countries and Languages

Country or Language Name	Country or Language Name
Belguim (French)	Canada (French)
Czech Republic	France
Germany	Greece
Hong Kong	Hungary
Israel	Italy

Table C–17: Supported Countries and Languages (cont.)

Country or Language Name	Country or Language Name
Japan	Korea
Lithuania	Poland
Russia	Slovakia
Slovenia	Spain (Catalan)
Spain (Spanish)	Sweden
Switzerland (French)	Switzerland (German)
Taiwan	Thailand
The People's Republic of China	Turkey

C.4.1 Worldwide Language Support Base Subsets

Table C–18 lists the base subsets provided for Worldwide Language Support as well as the base subsets provided with specific languages. Included in the table is the United States English subset equivalent, as well as the table in Section C.2 or Section C.3 where you can get a description of the subset.

Table C–18: Worldwide Language Support (WLS) Base Subsets

Base Worldwide Language Support Subset	US English Equivalent	Description Location	Languages in Which Subset Is Available
IOSWWBASE500	OSFBASE500	Table C–2	All
IOSWWBIN500	OSFBIN500	Table C–2	Chinese, Japanese, Korean, Thai
IOSWWBINCOM500	OSFBINCOM500	Table C–2	Chinese, Japanese, Korean, Thai
IOSWWPRINT500	OSFPRINT500	Table C–2	Chinese, Greek, Japanese, Korean, Thai, Turkish
IOSWWSYSMAN500	OSFSYSMAN500	Table C–2	All
IOSWWPGMR500	OSFPGMR500	Table C–11	All
IOSWWXDEV500	OSFXDEV500	Table C–11	All

Table C–18: Worldwide Language Support (WLS) Base Subsets (cont.)

Base Worldwide Language Support Subset	US English Equivalent	Description Location	Languages in Which Subset Is Available
IOSWWMOTIF11500	OSFMOTIF11500	Table C–15	All
IOSWWX115500	OSFXII500	Table C–15	All

C.4.1.1 WLS Base Subsets with No United States English Equivalent

The following subsets have no direct United States English equivalent. All subsets are prefixed with `IOSWW`.

EURLOC500 — Worldwide European Unicode Locales – This optional subset contains European UTF-8 Unicode locales, which are required to support the display of European currency symbols. It is available for all languages.

FGC500 — Worldwide Composite Unicode Fonts – This subset contains the renderer to display composite Unicode fonts for supporting the UTF-8 locales. It is available and mandatory for all languages if the response is **`yes`** to the Euro support question, which is displayed by the `wwinstall` script.

FONTM500 — Worldwide DECwindows Fonts (Windowing Environment) – This software subset contains workstation font files mandatory for Asian languages. It is available to Chinese (including Simplified Chinese), Japanese, Korean, and Thai languages.

FONTP500 — Worldwide DECwindows Fonts (Windowing Environment) – This software subset contains some public domain Unicode fonts. It is part of the WLS base and is available to all languages.

*FONT100M500 — Worldwide DECwindows 100dpi Fonts (Windowing Environment) – This software subset contains mandatory workstation 100dpi font files. This software subset is mandatory for systems using either a VR160 15-inch monitor or a higher resolution graphics monitor. This software subset is

optional for systems using a low resolution graphics monitor. There are mandatory font files for ISO-LATIN2 (LAT2FONT100M), ISO-LATIN4 (LAT4FONT100M), ISO-LATIN9 (LAT9FONT100M), and ISO-LATIN Cyrillic (LATCFONT100M).

*FONT100P500 — Worldwide DECwindows 100dpi Additional Fonts (Windowing Environment) – This optional software subset contains additional Workstation 100dpi font files. There are additional font files for ISO-LATIN2 (LAT2FONT100P), ISO-LATIN4 (LAT4FONT100P), ISO-LATIN9 (LAT9FONT100P), and ISO-LATIN Cyrillic (LATCFONT100P).

*FONT75M500 — Worldwide DECwindows 75dpi Fonts (Windowing Environment) – This software subset contains mandatory workstation 75dpi font files. This software subset is mandatory for systems using either a VR160 15-inch monitor or a higher resolution graphics monitor. This software subset is optional for systems using a low resolution graphics monitor. There are mandatory font files for ISO-LATIN2 (LAT2FONT75M), ISO-LATIN4 (LAT4FONT75M), ISO-LATIN9 (LAT9FONT75M), and ISO-LATIN Cyrillic (LATCFONT75M).

*FONT75P500 — Worldwide DECwindows 75dpi Additional Fonts (Windowing Environment) – This optional software subset contains additional Workstation 75dpi font files. There are additional font files for ISO-LATIN2 (LAT2FONT75P), ISO-LATIN4 (LAT4FONT75P), ISO-LATIN9 (LAT9FONT75P), and ISO-LATIN Cyrillic (LATCFONT75P).

*OLFONT500 — Worldwide Outline Fonts (Windowing Environment) – This optional software subset contains outline font files. This software subset requires the OSFAFM500 software subset. There are outline font files for ISO-LATIN2 (LAT2), and ISO-LATIN Cyrillic (LATC). Table C–19 lists the outline fonts and the associated languages.

Table C–19: Font Subsets and the Language Association

Font Subset	Languages in Which the Subset Is Available
LAT2FONT100M, LAT2FONT100P, LAT2FONT75M, LAT2FONT75P, LAT2OLFONT	Czech, Hungarian, Polish, Slovak, Slovene
LAT4FONT100M, LAT4FONT100P, LAT4FONT75M, LAT4FONT75P	Lithuanian
LATCFONT100M, LATCFONT100P, LATCFONT75M, LATCFONT75P, LATCOLFONT	Russian
LAT9FONT75M500, LAT9FONT100M500, LAT9FONT75P500, LAT9FONT100P500	Euro-Support

MULE500 Worldwide MULE (General Applications) –This software subset contains MULE (Multilingual Emacs) software. MULE is a multilingual enhancement of GNU Emacs. MULE Version 1 was based on GNU Emacs Version 18 and MULE Version 2 is based on GNU Emacs Version 19. MULE Version 1 is no longer supported. This software subset is part of the WLS base, is optional, and is available to all languages.

MULESRC500 Worldwide MULE Source Files (Public Domain Source) – This software subset contains the source files for MULE. This software subset is part of the WLS base, is optional, and is available to all languages.

PHRASE500 Worldwide Phrase Input Support (Operating System) – This software subset contains binary files for the Asian phrase input methods and daemons. This software subset is optional and requires the

	IOSWWBASE500 software subset. It is available for the Chinese, Japanese, Korean, and Thai languages.
SVEDEV500	Worldwide SVE MNLS Migration Tools (Software Development) – This software subset contains the migration tools of SVE MNLS, System V Environment Multinational Languages Support. It is part of the WLS base, is optional, and is available to all languages.
UCSBASE	Worldwide Unicode UCS-4 Locales Support (Operating System) – This software subset contains the codeset converters for Unicode UCS4 locales and method library of Unicode UCS4 locales, and is available and mandatory for all languages.
UDCOS500	Worldwide User Defined Character Support (Operating System) – This software subset contains tools to create user-defined characters in OS level. It also contains kernel objects for on demand font loading for terminal drivers. This software subset is optional and the requires IOSWWBASE500 software subset. It is available for the Chinese, Japanese, Korean, and Thai languages.
UDCWOS500	Worldwide User Defined Character Workstation Service (Windowing Environment) – This software subset contains a tool to create user-defined character fonts for X11/DECwindows. It is optional and requires the IOSWWX11500 software subset. It is available for the Chinese, Japanese, Korean, and Thai languages.
XFR500	Worldwide Two-Byte Outline Font Renderer (Windowing Environment) – This software subset contain the outline font renderer for two-byte outline font. It is part of the WLS base, is optional, and is available to all languages. This software subset requires the IOSWWX11500 software subset.

C.4.2 Language-Specific Subsets

This section lists each supported language as well as the software subsets provided with each language. To reconstruct the actual software subset

name, prefix each subset name with IOS*LL*, where *LL* is the two-letter language code. For example, subset CDEMAIL for Germany (the prefix for German is DE) becomes IOSDECDEMAIL. Each subset also has a three-digit suffix that represents the software version number; so, IOSDECDEMAIL becomes IOSDECDEMAIL500.

Certain countries share a language; for example, Canada and France both can use the French language subsets. The resulting subset name would use both the country and language code (IOS*LLCC*: *LL*=language, *CC*=country). So, the French-Canada X11 subset name, for example, would be IOSFRCAX11500. Table C–20 lists the mail application subset and the languages in which the subset is available. The United States English equivalent software subset is described in Table C–6.

Table C–20: Mail Application Subsets

Language	Mail Application Subsets Supported
	CDEMAIL
Catalan (CA)	×
Czech (CS)	×
German (DE)	×
Greek (EL)	
Spanish (ES)	×
French (FR)	×
Hebrew (IW)[a]	
Hungarian (HU)	×
Italian (IT)	×
Japanese (JP[b])	×
Korean (KO)	×
Lithuanian (LT)	
Polish (PL)	×
Russian (RU)	
Slovak (SK)	×
Slovene (SL)	
Swedish (SV)	×

Table C–20: Mail Application Subsets (cont.)

Language	Mail Application Subsets Supported
	CDEMAIL
Thai (TH)	×
Turkish (TR)	

[a] HE is the current language code for Hebrew; the old IW code is used for compatibility reasons, but it may be changed in a future release.
[b] JA is the language code for Japanese. However, JP is used for reasons of compatibility.

Table C–21 lists the software development subsets and the languages in which the subsets are available. The United States English equivalent software subsets are described in Table C–11.

Table C–21: Software Development Subsets

Language	Software Development Subsets Supported	
	CDEDEV	XDEV
Catalan (CA)	×	×
Czech (CS)	×	×
German (DE)	×	×
Greek (EL)		
Spanish (ES)	×	×
French (FR)	×	×
Hungarian (HU)	×	×
Italian (IT)	×	×
Hebrew (IW)[a]		×
Japanese (JP[b])	×	×
Korean (KO)	×	×
Lithuanian (LT)		
Polish (PL)	×	×
Russian (RU)		×
Slovak (SK)	×	×
Slovene (SL)		
Swedish (SV)	×	×
Thai (TH)	×	×
Turkish (TR)		
Simplified Chinese (ZHS)		×

Table C–22 lists the windowing environment subsets and the languages in which the subsets are available. The United States English equivalent software subsets are described in Table C–15.

Table C–22: Windowing Environment Subsets

Language	Windowing Environment Subsets Supported			
	CDEDT	CDEMIN	X11	CDEHLP[a]
Catalan (CA)	×	×	×	
Czech (CS)	×	×	×	
German (DE)	×	×	×	×
German - Swiss (DECH)			×	
Greek (EL)	×	×	×	
Spanish (ES)	×	×	×	×
French (FR)	×	×	×	×
French - Belgian (FRBE)			×	
French - Canadian (FRCA)			×	
French - Swiss (FRCH)			×	
Hungarian (HU)	×	×	×	
Italian (IT)	×	×	×	×
Hebrew (IW)[a]	×	×	×	
Japanese (JP[b])	×	×	×	×
Korean (KO)	×	×	×	×
Lithuanian (LT)			×	
Polish (PL)	×	×	×	
Russian (RU)	×		×	
Slovak (SK)	×	×	×	
Slovene (SL)	×		×	
Swedish (SV)	×	×	×	×

Table C–22: Windowing Environment Subsets (cont.)

Language	Windowing Environment Subsets Supported			
	CDEDT	CDEMIN	X11	CDEHLP[a]
Thai (TH)	×	×	×	
Turkish (TR)	×	×	×	
Simplified Chinese (ZHS)			×	

[a]The CDEHLP subset contains the online help files for the Common Desktop Environment. This software subset is optional and requires the CDEDT subset.

Table C–23 lists the windowing applications subsets and the languages in which the subsets are available. The United States English equivalent software subsets are described in Table C–16.

Table C–23: Windowing Applications Subsets

Language	Windowing Application Subsets Supported	
	CDEAPPS	DECW
Catalan (CA)	×	×
Czech (CS)	×	×
German (DE)	×	×
Greek (EL)		
Spanish (ES)	×	×
French (FR)	×	×
Hebrew (IW)[a]		
Hungarian (HU)	×	×
Italian (IT)	×	×
Japanese (JP [b])	×	×
Korean (KO)	×	×
Lithuanian (LT)		
Polish (PL)	×	×
Russian (RU)	×	×
Slovak (SK)	×	×
Slovene (SL)		
Swedish (SV)	×	×
Thai (TH)	×	×
Turkish (TR)		

Table C–24 lists the miscellaneous subsets and the languages in which the subsets are available.

Table C–24: Miscellaneous Subsets

Language	Miscellaneuous Subsets Supported				
	BASE	UCSBASE	OLFONT	FONT100[a]	FONT75[b]
Catalan (CA)					
Czech (CS)		×			
German (DE)					
Greek (EL)		×	×	×	×
Spanish (ES)					
French (FR)					
Hungarian (HU)		×			
Italian (IT)					
Hebrew (IW)[a]	×	×	×	×	×
Japanese (JP[b])	×	×		×	×
Korean (KO)	×	×	×		
Lithuanian (LT)					
Polish (PL)		×			
Russian (RU)		×			
Slovak (SK)		×			
Slovene (SL)					
Swedish (SV)					
Thai (TH)	×		×		
Turkish (TR)		×	×	×	×

[a]Includes M (mandatory) and P (additional) fonts
[b]Includes M (mandatory) and P (additional) fonts

C.4.2.1 Additional Subsets Provided for Asian Languages Other than Chinese

Table C–25 shows the additional subsets that have United States English equivalents provided for Asian languages.

Table C–25: Additional Asian-Language Subsets

Subset	Japanese (JP[b])	Korean (KO)	Thai (TH)
DOSTOOLS (see Table C–13)	×		
FONTM[a]	×	×	×
FONTP[b]		×	
LDBBASE (see Table C–11)	×		
LDBGUI (see Table C–11)	×		
LSMX11 (see Table C–13)	x		
MANOS (see Table C–10)	×		
MANWOS (see Table C–10)	×		
NETSCAPE (see Table C–16	x		
PGMR (see Table C–11)	×	×	×
SYSMAN (see Table C–13)	x		
XADMIN (see Table C–13)	x		
XADVFS (see Table C–13)	x		

[a]The FONTM subset contains workstation fonts.
[b]The FONTP subset contains additional workstation fonts.

C.4.2.2 Additional Subsets Provided for Japanese

The following subsets have no United States English equivalents, and are provided for the Japanese language only. All subsets are prefixed with IOSJP.

ABASE	Additional Japanese Software – This software subset contains additional general applications. This software subset is optional and requires the IOSJPBASE500 software subset.
AMANOS	Japanese Reference Pages for Additional Software – This software subset contains the reference pages for the Japanese software in IOSJPABASE500. This software subset is optional and requires the OSFDCMT500 software subset.
SDECDE	Japanese Software Development Desktop Environment – This software subset is optional and requires the IOSJPCDEDT500 and OSFSDECDE500 software subsets.
MSG	Japanese Message Catalogs (Operating System) – This software subset contains the Japanese message catalogs for Japanese commands. This software subset is optional and requires the IOSJPBASE500 software subset.
MSGSJIS	Formatted SJIS Japanese Message Catalogs (Operating System) – This software subset contains the same message catalogs as IOSJPMSG500 , but in SJIS (simplified Japanese) format. This software subset is optional and requires the IOSJPBASE500 software subset.
WNN	Wnn Software Development (Software Development) – This software subset contains the header files and libraries for the Wnn input method development. It is optional and requires the IOSJPBASE500 software subset.
WNNPGMR	Wnn Software Development (Software Development) – This software subset contains the header files and libraries for the Wnn input method

development. It is optional and requires the IOSJPBASE500 software subset.

WNNSRC — Wnn Source Files (Public Domain Source) – This software subset contains the source file for the Wnn input method. This software subset is optional and has no other software subset dependencies.

C.4.2.3 Additional Subsets Provided for Thai

The following subsets are provided for the Thai language only. All subsets are prefixed with IOSTH. The United States Language equivalent software subsets are described in Table C–2.

BIN — Standard Kernel Modules (Kernel Build Environment) – This software subset contains the kernel modules for the Thai terminal driver. This software subset is mandatory. This software subset requires the IOSWWBINCOM500 and OSFBIN500 software subsets.

PRINT — Thai Printer Support Environment (Operating System) – This software subset contains the printer filters for Thai printers. This software subset is optional and requires the IOSWWPRINT500 and IOSTHBASE500 software subsets.

C.4.2.4 Subsets Provided for Chinese

WLS provides Chinese language support for the People's Republic of China (PRC), Hong Kong, and Taiwan. Subsets available in the Chinese Language group have prefixes that include IOSZH (base Chinese), IOSZHT (traditional Chinese), IOSZHS (simplified Chinese), IOSZHTW (Taiwan Chinese), IOSZHCN (PRC Chinese), and IOSZHHK (Hong Kong Chinese). Table C–26 shows the subsets with United States English equivalents available in each Chinese language group.

Table C–26: Subsets With US English Equivalents Provided for Chinese

Subset (prefix: IOSZH)	Chinese Language Category		
	People's Republic of China (CN)	Hong Kong (HK)	Taiwan (TW)
Mail Applications			
CDEMAIL	×		×
Software Development			
CDEDEV	×		×
SXDEV	×		
TXDEV			×
Windowing Environment			
CDEDT	×		×
CDEMIN	×		×
CDEHLP	×		×
Windowing Applications			
CDEAPPS	×		×
SDECW	×		
TDECW			×
Miscellaneous			
BASE	×	×	×
UCSBASE	×	×	×
SFONTM,P	×		
TFONTM,P			×

The following subsets have no United States English equivalents, and are provided for the Chinese language only. All of the following subsets are unique to Chinese. All subsets are prefixed with IOSZH.

BIG5 — Big-5 Character Set Support (Operating System) – This software subset contains all the BIG5 related libraries, charmaps, methods and terminal drivers. This software subset is optional and requires the IOSZHBASE500 software subset.

CNLOC, TWLOC	Additional Chinese Locales for People's Republic of China and Taiwan (Operating System) – This software subset contains the @ variant locales that have different collating rules. These software subsets are optional and require the IOSZHCNBASE500 software subset.
CONV	Traditional and Simplified Chinese Conversion (Operating System) – This software subset contains the terminal drivers, kernel objects and services for Traditional and Simplified Chinese conversion. This software subset is mandatory and requires the IOSZHBASE500 software subset.
SOLFONT	Simplified Chinese Chinese Outline Fonts.
SX11	Simplified Chinese Chinese Basic X Environment.
TELEX	Telecode Character Set Support (Operating System) – This software subset contains all Telecode related methods and terminal drivers. This software subset is available for Taiwan Chinese, is optional, and requires the IOSZHBASE500 software subset.
TOLFONT	Traditional Chinese Chinese Outline Fonts.
TX11	Traditional Chinese Chinese Basic X Environment.

D

Associated Product Descriptions

This appendix describes the associated products (also known as layered products) and software subsets that are shipped in addition to the base operating system.

Table D–1 lists the directories and the products contained on the CD-ROM labeled *Associated Products Volume 1*. Table D–2 lists the directories and products contained on the CD-ROM labeled *Associated Products Volume 2*.

Table D–1: Contents of Associated Products CD-ROM Volume 1

Directory Name	Documented In...
Advanced_Printing	Section D.2
Alternative_Compiler	Section D.3
COM (Component Object Model)	Section D.4
Data_Direct	Section D.5
DEC_C++_RTL	Section D.6
DEC_Cobol_RTL	Section D.7
DEC_Fortran_RTL	Section D.8
DEC_Pascal_RTL	Section D.9
DEC_Sort_RTL	Section D.10
GNUSRC	Section D.11
Multimedia_Service	Section D.12
Netscape_FastTrack_Server	Section D.13
Performance_Manager	Section D.14
Porting_Assistant	Section D.15
Program_Analyzers	Section D.16
SCSI_CAM_Layered_Components	Section D.17
Tru64_UNIX_Retired	Section D.18

Table D–1: Contents of Associated Products CD-ROM Volume 1 (cont.)

Directory Name	Documented In...
Visual_Threads	Section D.19
Worldwide_Language_Support	Section D.20

Table D–2 lists the Associated Products on the CD-ROM labeled *Associated Products Volume 2*. There may be additional products on this CD-ROM that are not shown in Table D–2. To view the contents of this CD-ROM, mount it as described in Section B.3, and use the `ls` command to list the product directories.

Table D–2: Contents of Associated Products CD-ROM Volume 2

Product Directory	Documented In...
Advanced_Server	Section D.21
Networker	Section D.22

D.1 General Procedures for Installing Associated Products

Associated products are installed after the initial Full Installation by using the `setld` command. The installation can be invoked from CD-ROM or from a RIS server.

Most of the product directories on the associated products CD-ROM have a `doc` subdirectory, which contains the documentation (in HTML and text formats) for the product if it is available.

Follow these steps if you are installing an associated product from the associated products CD-ROM:

1. Mount the CD-ROM. Refer to the Section B.3 if you do not know how to mount a CD-ROM.
2. Enter the following command as superuser or `root`:

   # **/usr/sbin/setld -l /mnt/***product_directory***/kit**

   The previous example assumes the CD-ROM is mounted under `/mnt`. Replace *product_directory* with the name of the directory where the product is located. Table D–1 and Table D–2 list the directory names for each product.

   The `setld` command displays a list of software subsets available to install. Choose the software subsets you want from the list.

Follow these steps if you are performing a RIS installation of an associated product:

1. Ask your RIS server administrator to ensure that your system is a client of the RIS server and is registered for the right software product.
2. Ensure that your system can communicate with the RIS server by executing the /sbin/ping command to verify the network connection. Enter the command in the following format and replace *ris_server_name* with the name of your local RIS server:

   ```
   # /sbin/ping -c2 ris_server_name
   ```

   Successful output of the /sbin/ping command is similar to the following:

   ```
   # ping -c2 system9
   PING system9 (16.59.l24.96): 56 data bytes
   64 bytes from 16.59.l24.96: icmp_seq=0 ttl=255 time=1 ms
   64 bytes from 16.59.l24.96: icmp_seq=1 ttl=255 time=0 ms

   ----system9 PING Statistics----
   2 packets transmitted, 2 packets received, 0% packet loss
   round-trip (ms)  min/avg/max = 0/0/1 ms
   ```

   In the previous example, system9 is the name of the RIS server. If your system is not connected to the network, open the System Setup application (/usr/sbin/checklist) and then use Quick Setup to configure basic network services.
3. Enter the following command to begin the RIS installation:

   ```
   # /usr/sbin/setld -l ris_server_name:
   ```

   Replace *ris_server_name:* with the name of your RIS server appended with a colon (:). The setld command displays a list of software subsets available to install. Choose the software subsets you want from the list.

D.1.1 Updating the whatis Database After Installing Reference Pages for Associated Products

The apropos and man commands access reference page entries in the whatis database. The whatis database that is created in the /usr/share/man directory when you initially install base operating system reference pages includes entries only for those reference pages.

The whatis database provided as part of the operating system is not updated automatically when an associated product, layered product, third party, or site-specific reference pages are installed after the initial

operating system installation. If the `whatis` database exists on your system, you should update the database by executing the `catman -w` command if you install product-specific reference pages. For information about using the `catman -w` command to rebuild the `whatis` database, see the `catman`(8) reference page.

D.2 Advanced Printing

The `Advanced_Printing` directory contains the following software subsets:

- `APXADMIN100` — Software Administrator Utilities
- `APXBASE100` — Software BASE and Client Commands
- `APXGUI100` — Software Graphical User Interface
- `APXGW100` — Software lpr/lpd Gateways
- `APXSVR100` — Software Spooler and Supervisor

Follow the instructions in Section D.1 to install this product.

Advanced Printing Software is a flexible, distributed, client/server print system for the UNIX operating system. This print system includes the following features:

- A set of client and server programs that work together to manage and perform print-related functions.
- It provides administrators and operators a set of tools to manage printing in a network environment.
- It provides end users with utility programs for printing documents and monitoring their print jobs.

The print system is based on the following industry printing standards:

- ISO/IEC 10175 - Document Printing Application (DPA)
- POSIX 1387.4 - System Administration – Part 4: Printing Interfaces

The DPA standard defines a set of abstract print objects, their states, syntax, protocol, and a comprehensive set of standard attributes. The POSIX document specifies a set of command operations and arguments relating to printing and management of a print system.

In addition to a command line interface, the Advanced Printing Software contains a graphical user interface (GUI) that can be used to submit print jobs and monitor print jobs.

The `pdprint` program is used to submit print jobs and the `pdprintinfo` program is used to obtain job and printer status. The `pdprintadmin` program is an administrative program that can be used to configure and

manage the printing system. These GUIs are accessible from the command line or from the Print Manager icon of the CDE desktop.

The Advanced_Printing directory on the *Associated Products Volume 1* contains a doc directory, which has HTML and PDF formats of the documents associated with this product.

D.3 Development Enhancements

The Alternative_Compiler directory contains the following software subsets. Follow the instructions in Section D.1 to install this product.

- CMPDEVENH500 – There are static and shared libraries, which contain the malloc() system call as it was implemented in Version 1.2 and Version 1.3 of the operating system. The libraries are shipped to ensure backwards compatibility with previous versions of the operating system. The file mmap_32.c is a C source file that provides a jacket for the mmap() system call. This is provided to support the Truncated Address Support Option (TASO) in Version 1.3 of the operating system. Refer to the TASO documentation for more information if your TASO code contains mmap() calls.
- CMPDEVALT500 – This software subset provides an alternative application compiler suite in the /usr/lib/cmplrs/cc.alt directory. This suite is accessed through the /usr/bin/cc.alt command and differs from the default /usr/lib/cmplrs/cc compiler suite by providing components that may deliver faster run-time performance. Performance improvements provided by the components in this suite will be delivered in the default compiler suite in future releases of the operating system. In this version of the software subset, the DEC C compiler is the only component in the cc.alt directory that is different from the default compiler suite. The features supported by this suite are the same as those documented for the default compiler suite in the Version 5.0 release. However, the compiler included in this suite does not contain the features necessary to build kernel objects. Do not copy the compiler provided in this suite to the default compiler directory, /usr/lib/cmplrs/cc, or you lose the ability to rebuild kernels on your system. The cc.alt suite is intended to provide more recent versions of the compiler components than those in the base operating system. Because the cc.alt components will change more frequently than the base operating system components, any problems reported against cc.alt will be addressed in a later release of cc.alt.

D.4 COM for Tru64 UNIX Software Kit

COM (Component Object Model) is a set of standard APIs (Application Programming Interfaces) and tools that allow programmers to develop

client applications that use common objects across remote servers. COM and its extension, Distributed COM, were developed by Microsoft® and their use results in reusable objects that are language independent, can be distributed in binary form, upgraded without recompilation, and implemented on different machines. The COM for Tru64 UNIX software kit consists of four software subsets:

- `CUERTS100` - The COM Run-Time Environment includes the shared libraries (DLLs) and tools that enable COM objects to run in a heterogeneous Windows NT client/Tru64 UNIX server configuration. This is a required subset.
- `CUEDOC100` - The COM documentation subset contains the *Release Notes*, the *COM for Tru64 UNIX Installation Guide*, and *COM for Tru64 UNIX, Building and Running Server Applications*. This is an optional subset.
- `CUEMAN100` - The COM reference page subset contains reference pages for the various COM utilities and services. The reference pages contain capsule descriptions of `com`, `dcomsetup`, `df2t`, `makedef`, `midl`, `ntwopper`, `regsvr`, `sermon`, `stgview`, and `uuidgen`. This is an optional subset.
- `CUEDEV100` - COM Software Development includes the tools, MIDL compiler, shared libraries, and header files that an application programmer uses to compile COM server applications for execution on the Tru64 UNIX platform. This is an optional subset. If you do not install this subset, you only can run existing executables that have been compiled on a similar Tru64 UNIX system.

Follow the instructions in Section D.1 to install this product.

D.5 DataDirect Software Products

The `Data_Direct` directory contains the family of INTERSOLV DataDirect software products to enable Microsoft Open Database Connectivity (ODBC) connectivity for your applications of Tru64 UNIX and for integration with Windows NT. There are two alternatives for your software to use: the SequeLink ODBC Edition and the DataDirect Connect ODBC Drivers. SequeLink ODBC Edition is a universal ODBC client component. DataDirect SequeLink ODBC provides connectivity transparently to any almost any type of client, network, server, or database. You do not need to know the specific traditional database client to use. SequeLink gives you access to any database server. The SequeLink software is the recommended approach for new projects. It is also a simpler programming interface and gives you more flexibility for choosing platforms and databases as your application evolves. However, if you do have a database client installed already, you can use the DataDirect Connect ODBC Drivers. For example,

if you have Oracle and Oracle's database client, SQL*NET, installed then you may install only the Connect ODBC Driver for Oracle.

The Data_Direct directory contains the following software subsets.

- DAUDOC100 - Online Help
- DAUJDBCODBC100 - JDBC-ODBC Bridge
- DAUODBCCON100 - Connect ODBC Drivers
- DAUSQLNKJAVA100 - SequeLink JAVA Edition
- DAUSQLNKODBC100 - SequeLink ODBC Edition
- DAUSQLNKSVR100 - SequeLink Server

Follow the instructions in Section D.1 to install this product.

D.6 DEC C++ Class Library for Tru64 UNIX Alpha Systems

The DEC_C++_RTL directory contains the following software subsets: CXXLSHRDA500 and CXXLLIBA500. Follow the instructions in Section D.1 to install this product.

The DEC C++ Version 5.0 compiler kits no longer provide the Class Library archive libraries when installed on the current version of the operating system.

The CXXLSHRDA500 software subset contains the shared libraries required for the C++ Complex and Task Packages. The CXXLLIBA500 software subset contains the corresponding archive libraries.

The mandatory base operating system software subset, OSFBASE500 contains the shared library for the remaining packages, including IOStream, as well as the run-time support. The optional base operating system subset, OSFLIBA500 contains the corresponding archive library.

If you run C++ applications on your system, install the CXXLSHRDA500 software subset. If you develop C++ applications on your system, install both C++ subsets, CXXLSHRDA500 and CXXLLIBA500 as well as the base operating system software subset OSFLIBA500.

The CXXLLIBA500 subset will not install if your system has the DEC C++ Version 1. *n* compiler installed. Before you install the CXXLLIBA500 subset, it is recommended that you upgrade the DEC C++ compiler to Version 5.0 or later.

D.7 DEC COBOL Run-Time Support Library for Tru64 UNIX Systems

The DEC_Cobol_RTL directory contains the following software subsets: DCARTL260 and 02ABASE260. Follow the instructions in Section D.1 to install this product.

The DEC COBOL Run-Time Support Library for Alpha Systems is a software library that provides compiled code support for file processing, format processing, I/O processing and other capabilities to the DEC COBOL programming language implementation. The DEC Fortran Alpha Run-Time Support subsets must be installed at the same time as the DEC COBOL Run-Time Support subsets.

The software subsets contain:

- DCARTL - DEC COBOL Run-Time Support Library
- O2ABASE - DEC Decimal Run-Time Support Library

Both subsets must be installed together. The following table lists the contents of the DCARTL250 subset.

File Name	Description
libcob.a	DEC COBOL Run-time (archive) library
libcob.so	DEC COBOL Run-time (shared) library
libisam_stub.a	DEC COBOL ISAM stub (archive) library
cob_msg.cat	DEC COBOL Run-time library message catalog

The following table lists the contents of the O2ABASE250 subset:

File Name	Description
libots2.a	DEC Decimal Support Run-time (archive) Library
libots2.so	DEC Decimal Support Run-time (shared) Library

D.8 DEC Fortran for Alpha Run-Time Support

The DEC_Fortran_RTL directory contains the DFARTL384 software subset. Follow the instructions in Section D.1 to install this product.

The DEC Fortran for Alpha Run-Time Support is a software library that provides compiled code support for file processing, format processing, I/O processing and other capabilities to the DEC Fortran programming language implementation. The following table lists the contents of the DEC Fortran for Alpha Run-Time Support kit:

File Name	Description
libFutil.a	DEC Convert RTL
libUfor.a	DEC Fortran Unsupported RTL
libfor.a	DEC Fortran RTL
libFutil.so	DEC Convert RTL
libUfor.so	DEC Fortran Unsupported RTL
libfor.so	DEC Fortran RTL
for_msg.cat	DEC Fortran RTL Message Catalog

D.9 Compaq Pascal

The DEC_Pascal_RTL directory contains the DPORTL563 software subset. Follow the instructions in Section D.1 to install this product.

Compaq Pascal (formerly known as DEC Pascal) runs on the VAX and Alpha architectures, on OpenVMS and Tru64 UNIX operating systems. Compaq Pascal supports code compatible with either level of the ISO specification, meets Federal Information Processing Standard Publications (FIPS-109) requirements, and supports many features from the Extended Pascal Standard. Compaq Pascal has a solid reputation as a production quality, high performance, robust compiler. It is a full compiler–not an interpretive one. Tightly integrated with the Alpha architecture, it delivers optimal power and speed. The DEC Fortran for Alpha Run-Time Support subsets must be installed at the same time as the Compaq Pascal subset.

File Name	Description
libpas.a	Compaq Pascal Run-time (archive) library
libpas.so	Compaq Pascal Run-time (shared) library
libpas_msg.cat	Compaq Pascal RTL message catalog

D.10 DEC Sort Run TIme Library

The DEC_Sort_RTL directory contains the SORLIB400 software subset. Follow the instructions in Section D.1 to install this product.

The Sort subset provides a run-time library of sort routines that provide applications programming interface compatibility with a subset of the OpenVMS sort/merge utility. This functionality is provided to assist in the migration to this operating system of several OpenVMS products that depend on OpenVMS SORT. It also provides a high performance sort

package that takes advantage of the Alpha architecture for better performance.

The following table lists the contents of the SORLIB400 subset.

File Name	Description
libsort.so	Shareable object of Sort RTL routines
libsort.a	Library of Sort RTL routines
libsort.cat	Sort message catalog

D.11 Free Software Foundation GNU Source

Follow the instructions in Section D.1 to install this product. The GNUSRC directory contains the following software subsets from the GNU Free Software Foundation:

- FSFINDENTSRC500 — The GNU ident Source subset, FSFINDENTSRC500, contains the source files for the ident utility, which searches for all occurrences of a pattern in the named files or, if no file name is specified, the standard input. Refer to the ident(1) reference page for more information.
- FSFEMACSSRC500 — The GNU Emacs Source subset, FSFEMACSSRC500, contains the source files for the GNU Emacs editor. The GNU Emacs editor is a new version of Emacs, written by the author of the original (PDP-10) Emacs. The documentation for GNU Emacs is available on line and can be viewed using Info, a subsystem of the Emacs facility. Refer to the emacs(1) reference page for more information.
- FSFRCSSRC500 — The GNU Revision Control System Source subset, FSFRCSSRC500, contains source files for the GNU Revision Control System (RCS). Refer to the rcs(1) reference page for more information.
- FSFGZIPSRC500 — The GNU gzip source subset, FSFGZIPSRC500, contains the source files for the gzip utility, which compresses or expands files. Refer to the gzip(1) reference page for more information.
- FSPERL500 — The PERL Source subset, FSPERL500, contains source files for the PERL (Practical Extraction and Report Language) programming language. Refer to the perl(1) reference page for more information.

D.12 Multimedia Services

The Multimedia_Services directory contains the following software subsets: MMERELNOTES245, MMEMANRT245, MMERT245, MMECDE245,

MMERTSMPLDAT245, MMEDRVAV201245, MMEDRVAV3X1245, MMEDRVMSB245, MMEDRMMSESS245, MMEDRVA300245, and MMEDRVBBA245. Follow the instructions in Section D.1 to install this product.

Multimedia Services Version 2.4E for this operating system brings audio and video capabilities to supported workstations and provides a full programming library for use by developers of new applications. The developer kit is available on the *Software Product Library* CD-ROM and is not distributed with the operating system.

Installing the reference pages for Multimedia Services (MMEMANRT245) automatically updates the whatis database.

Ready-to-use applications included in Multimedia Services are:

- DECsound - an audio record, playback, and edit utility.
- AlphaVCR - a video and audio playback and record utility. AlphaVCR can play back AVI files with JPEG, Intel's Indeo(tm), or YUV data and MPEG-1 audio/video files.
- Video Odyssey - a video screen saver that displays motion JPEG files.
- Audio Control - a utility to control volume and port selection for all audio devices.

Multimedia Services supports standard Microsoft® Resource Interchange File Format (RIFF) file I/O in AVI and WAVE file formats in the utilities. This allows sharing of many audio and some video files between PCs and Alpha systems.

Users can play back video and audio clips from the Common Desktop Environment (CDE), from MIME enabled mailers, and from the Netscape browser. Users may record audio messages to send and if their systems contain a supported video capture device, they may record full audio and video messages. Multimedia Services also enables such tools as presentation authoring and teleconferencing.

No additional video hardware is needed to play back video clips. If your system is configured with an audio card, you can play back full video and audio clips as well as record audio messages.

Multimedia Services consists of the following subsets:

- MMERELNOTES245 - Release Notes. Contains product release notes, Software Product Description (SPD) and a cover letter. Files are installed in /usr/opt/MMERELNOTES245.

- Run-Time Kit:
  - MMEMANRT245 - Run-time Reference Pages. This subset contains the reference pages for run-time applications and commands. Requirements: OSFDCMT500 Doc. Preparation Tools
  - MMERT245 - Run-time. This subset contains the static and shared versions of the run-time libraries, the multimedia server, mmeserver, the server device libraries for the software video and audio CODECs, and audio and video capture and playback utilities. This subset is required for all other subsets listed below.
  - MMERTCDE245 - CDE Integration. This subset contains the icons and action files to enable multimedia integration with the Common Desktop Environment (CDE). Requirements: MMERT245 and OSFCDEEDT500.
  - MMERTSMPLDAT245 - Sample Data. This subset contains sample audio and video clips. Requirements: MMERT245 and OSFCDEEDT245.
- Hardware Option Support for PCI/EISA/ISA Bus Machines:
  - MMEDRVAV201245 - FullVideo Basic (AV201) Device Support. This subset contains the device support files for the FullVideo Basic option module. Requirements: MMERT245, PCI bus machine. Installation requires a kernel rebuild.
  - MMEDRVAV3X1245 - FullVideo Supreme (AV321/AV301) Device Support. This subset contains the device support files for the FullVideo Supreme option modules. Requirements: MMERT245, PCI bus machine. Installation requires a kernel rebuild.
  - MMEDRVMSB245 - Microsoft Sound Board Device Support. This subset contains the device support files for the Microsoft Sound Board option module. Requirements: MMERT245, ISA or EISA bus machine. Installation requires a kernel rebuild.
  - MMEDRVMMSESS245 - Personal Workstation Audio (ES1888/7) Device Support. This subset contains the support files for Personal Workstation audio devices. Installation requires a kernel rebuild.
- Hardware Option Support for TurboChannel Bus Machines:
  - MMEDRVA300245 - Sound and Motion (J300) Device Support. This subset contains the device support files for the Sound and Motion option module. Requirements: MMERT245, TurboChannel bus machine. Installation requires a kernel rebuild.
  - MMEDRVBBA245 - Base Board Audio Device Support. This subset contains the device support files for the Base Board Audio module. Requirements: MMERT245, TurboChannel bus machine. Installation does not require a kernel rebuild.

D.13 Netscape FastTrack Server

The `Netscape_Fastrack_Server` directory contains the `WEBNETSCAPEFASTTRACK301` software subset.

The Netscape FastTrack Server Version 3.1 product from Netscape Communications Corporation is an easy-to-use, entry-level Web server designed to let novices create and manage a Web site. It is a complete solution for creating and managing Web sites on the Internet or intranet. FastTrack Server is an open platform for publishing traditional Internet documents as well as developing and deploying live network-centric and media-rich applications.

Because the FastTrack Server has its own installation program, instructions to install this product are different from the instructions for installing the other associated layered products that use the `setld -l` command. The Netscape FastTrack Server kit is located on the *Associated Products Volume 1* CD-ROM. To install FastTrack on your system, perform the following steps:

1. Log in to the root account on your system.
2. Insert the CD-ROM labeled *Associated Products Volume 1* into your CD-ROM drive and mount the CD-ROM drive as a read-only device. For this example, we will assume that your CD-ROM device is located at `/dev/disk/cdrom0c` and that you want to mount it under a preexisting directory called `/mnt`. The actual device path is system dependent, but the directory under which you want to mount it is your choice.

   ```
   # mount -r /dev/disk/cdrom0c /mnt
   ```

3. Change your directory to the FastTrack Server kit directory:

   ```
   # cd /mnt/ALPHA/Netscape_FastTrack_Server
   ```

4. Read the `readme.txt` file:

   ```
   # more readme.txt
   ```

   This `readme.txt` file contains information from Netscape about the FastTrack Server kit. Because you will be installing FastTrack from the *Associated Products Volume 1*, and not from a CD-ROM that was shipped to you by Netscape, you can ignore Steps 1 through 5 of the installation instructions contained in the `readme.txt` file. Steps 1 through 5 are installation instructions specific to installing from the Netscape CD-ROM.

5. Run the `ns-setup` installation program to begin the installation process, and follow the instructions in the `readme.txt` file:

   ```
   # ./ns-setup
   ```

   The installation program will query you for information and then install the FastTrack Server software under a directory on your system that you have specified. The Netscape installation program recommends `/usr/ns-home` as a default installation location, but it is recommended that you choose a default location of `/usr/opt/ns-home` instead. A directory created under `/usr/opt` is typically a more suitable place than a directory directly under `/usr` for software (like FastTrack Server) that creates and writes to files in its installed area while it is running.

D.14 Performance Manager

The following Performance Manager software subsets are located in the `Performance_Manager` directory:

- `PMGRBASE500` - Daemons and Base
- `PMGRGUI500` - Graphical User Interface
- `PMGRAPP500` - Additional Applications
- `PMGRMAN500` - Reference Pages
- `PMGRUTIL500` - Additional Utilities

Follow the instructions in Section D.1 to install this product.

Performance Manager Version 5.0 (PM V5.0) is a realtime performance monitoring, analysis, and management application. PM V5.0 can be used for single system, cluster, and distributed systems management.

This release of Performance Manager is a maintenance update. This version is provided as a migration path to the future Performance Manager for Version 4.0x customers, and will be available through Performance Manager 5.0. No new functionality will be added to this version.

The `Advanced_Printing` directory on the *Associated Products Volume 1* contains a `doc` directory, which has HTML and PDF formats of the documents associated with this product.

The *Performance Manager Installation Guide* and *Release Notes* are located in the `DOCUMENTATION/PERFORMANCE_MANAGER` directory on the CD-ROM labeled *Documentation Volume 1*. These documents are in portable document format (PDF).

Features of the Performance Manager include:

- Monitoring - Monitoring capabilities include user-selectable graphs and charts showing hundreds of different system values, including CPU performance, memory usage, disk transfers, file system capacity, network efficiency, AdvFS, and cluster-specific metrics.
- Performance Analysis - Provides a range of analyses that can be run individually to target specific problems or together as a general system health check.
- System and Command Management - Provides a command management capability, which lets users incorporate their own system management and other scripts into PM.
- Open Metrics Access - You can access PM V5.0 metrics through most SNMP-enabled management stations including Netview. A high level interface is also provided so that metrics can be accessed from user applications and from the command line.
- AdvFS - Provides extensive AdvFS monitoring, analysis, and tuning advice in a customizable and extensible framework. AdvFS monitoring requires installation of the AdvFS Utilities software subset, `OSFADVFSDAEMON500`, and the right license.

D.15 Porting Assistant

The `Porting_Assistant` directory contains the following software subsets:

- `PRTBASE300` - Porting Assistant V3.0-0
- `PRTMAN300` - Reference Pages

Follow the instructions in Section D.1 to install this product.

The Porting Assistant is a Motif-based tool to help you port your C, C++, and FORTRAN source code to this operating system from other UNIX and proprietary platforms including OpenVMS. The Porting Assistant does the following:

- Uncovers 32-bit dependencies
- Checks your makefile commands and options
- Helps find functions that your application needs
- Helps develop operating system-specific code segments
- Provides information on porting your application

The Porting Assistant is licensed and provided to you with the operating system Developers' Toolkit, but it requires separate installation.

The `Porting_Assistant` directory on the *Associated Products Volume 1* contains a `doc` directory, which has HTML versions of the documents

associated with this product. For detailed information about the Porting Assistant, you also can refer to its extensive online help system.

After installation, invoke the Porting Assistant from the Common Desktop Environment (CDE) or from the command line as follows:

- If you install the Software Development Tools and Utilities for CDE (OSFSDECDE500), you can invoke the Porting Assistant from an icon on the desktop.
- From the command line, enter the following:

```
# port
```

D.16 Graphical Program Analysis (GPA) Tools

The Program_Analyzers directory contains the following software subsets:

- GPABASE207 - Graphical Program Analysis Base
- GPAMVIEW207 - Memory Profiler gathers and displays information about how your application uses memory inefficiently (such as by fragmented memory allocations)
- GPAPROFHEAP207 - Profiler and Heap Analyzer finds and displays memory errors and memory leaks in your application
- GPAPVIEW207 - Process Viewer gathers and displays performance information about a remote operating system application and all the child processes it runs

Follow the instructions in Section D.1 to install this product.

The Graphical Program Analysis Tools can help you check out your application in a more efficient manner. Because of the tools' knowledge about the operating system and the Alpha architecture, you can use them to spot parts of your application that could cause poor performance. The Graphical Program Analysis Tools function as a readily accessible base of knowledge on testing, debugging, and tuning code.

The Graphical Program Analysis Tools can locate problems in your code, explain the problems using diagnostic messages, and even suggest necessary changes through reports. For example, using these tools you can:

- Get information about all processes, including child processes, running on a remote system
- Invoke utilities and commands to monitor and manage the remote system
- Record all the process information to a file for later review

- Instrument an application, run the application, and look at the memory usage data in one step or separate steps
- Find poorly tested areas in your code
- Locate and correct performance bottlenecks
- Find and fix problems with writing past the ends of memory blocks

D.17 SCSI CAM Layered Components

The `SCSI_CAM_Layered_Components` directory contains a `README.CLC_field_test` file, which tells you how to register to become a field test customer.

SCSI CAM Layered Components provide device support components for the SCSI Common Access Method (CAM) Driver environment. This includes the SCSI CAM Optical Device Driver and the SCSI CAM Medium Changer Device Driver.

- The SCSI CAM Optical Device Driver provides the driver for SCSI devices that identify themselves as a SCSI-2 optical or WORM device.
- The SCSI CAM Medium Changer Driver provides the driver for the SCSI devices that identify themselves as a SCSI-2 medium changer device.

To use an element of the SCSI CAM Layered Components products, a kernel rebuild is required to add the driver you want. These products provide device access capabilities for other corporate products (Consumer Applications) that require support of specific types of devices. The SCSI CAM Layered Components products are licensed by the Consumer Applications products.

Features of the SCSI CAM Layered Components include:

- Allows the use of SCSI-2 standard commands
- Supports SCSI-2 optical devices
- Supports SCSI-2 medium changer devices and includes user commands to manipulate medium changers
- Provides utilities to facilitate the use and administration of devices

For detailed information about this product, look in the `SCSCI_CAM_Layered_Components/doc` directory on the *Associated Products Volume 1*, which contains the *Software Product Description* associated with this product.

D.18 Retired Software Components

The TRU64_UNIX_Retired directory contains the following software subsets:

- OSRETIREDCLINET500 - Retired Basic Networking Services
- OSRETIREDNFS500 - Retired NFS™ Utilities

Follow the instructions in Section D.1 to install these software subsets. The commands, utilities, and scripts contained in these software subsets are not supported under the new version of the operating system, so use them with caution.

D.19 Visual Threads

The Visual_Threads directory contains the DVTBASE100 software subset. Follow the instructions in Section D.1 to install this product.

Visual Threads is a tool that lets you debug and analyze multithreaded applications. It can be used to automatically diagnose common problems associated with multithreading including deadlock, protection of shared data, and thread usage errors. It also can be used to monitor the thread-related performance of the application, helping you to identify bottlenecks or locking granularity problems. It is a unique debugging tool because it can be used to identify problem areas even if an application does not show any specific problem symptoms.

Visual Threads can be used with any operating system application that uses POSIX threads (Pthreads) or is written in Java. It is designed for multithreaded applications of all sizes - applications with anywhere from two threads to hundreds of threads.

Visual Threads includes the following powerful features:

- Collects detailed information about significant thread-related state changes (events)
- Automatic analysis of common threading problems based on predefined rules applied to the event stream
- Rule customization for application-specific parameters and actions
- Automatic statistics gathering, by sampling the event stream
- Categories of analysis: data protection errors (race conditions), deadlocks, programming errors, performance

D.20 Worldwide Language Support

You have the option to install worldwide language support (WLS) software during a Full Installation or after an installation using the wwinstall

script. Using the `wwinstall` script to install WLS subsets is described in the *Installation Guide – Advanced Topics*. Full Installation procedures are documented in Chapter 6. Descriptions of the WLS subsets are in Appendix C.

D.21 Advanced Server for UNIX (ASU)

The `Advanced_Server` directory contains the following software subsets:

- `ASUADM401` - Client-based Server Administration (Nexus) Tools
- `ASUADMJP40` - Client-based Server Administration (Nexus) Tools (Japanese)
- `ASUBASE401` - Base Server
- `ASUMANJP401` - Japanese Reference Pages
- `ASUMANPAGE401` - Base Reference Pages
- `ASUTRAN401` - Transports

The Advanced Server for UNIX (ASU) is an industry-standard network operating system (NOS) that is fully compatible with Microsoft networking technology. As a server for workstations on a local area network (LAN), ASU provides file and print services that enable the efficient sharing of computing resources among a community of desktop users. ASU incorporates the latest Microsoft technology to deliver powerful new network administration and enhanced security features. ASU interoperates seamlessly with systems running Windows NT® Server, Windows NT Workstation, Windows® 95, and older Windows clients.

ASU system requirements are based on Windows NT Server, Version 4.0. As a result, ASU takes advantage of the UNIX system's native ability to function simultaneously as a file, print, and applications server, while ensuring compatibility with Microsoft networking features and desktop environments. ASU provides networking capabilities that are functionally equivalent to those offered by Windows NT Server.

ASU represents the next generation of LAN Manager for UNIX Systems technology and enhances it with significant new features based on a distributed enterprise-wide networking model. ASU maintains full down-level compatibility with LAN Manager for UNIX Systems. LAN Manager users can add ASU to their existing network and migrate to the new technology at their own pace.

The `Advanced_Server/doc` directory on the *Associated Products Volume 2* CD-ROM contains the documentation library for ASU documentation. To access the ASU documentation, insert and mount the CD-ROM and use your Web browser to open the ASU Documentation Library file. For

example, if you mount the CD-ROM on /mnt, open the /mnt/Advanced_Server/doc/html/LIBRARY.HTM file.

D.22 NetWorker

The NetWorker family of products provides comprehensive protection for data across your entire organization, including backup and recovery of data and archiving. NetWorker addresses all of the storage management needs of the heterogeneous enterprise environment. You can use it to provide failover capabilities for backup, restore, archive, and Hierarchical Storage Management (HSM) services to a single system or a group of systems using a TCP/IP network connection. NetWorker is a true 64-bit implementation of Legato Systems' NetWorker product.

Follow the instructions in Section D.1 to install this product.

E

Update Installation Processing on Existing Files

This appendix describes how the Update Installation process merges existing user customizations into the new, updated versions of the files. The following files and topics are described:

- What are protected system files?
- `.new..` files
- `.proto..` files
- `.PreMRG` files
- Merge scripts
- Merging protected system files
- Successful file merges
- Unsuccessful file merges

E.1 Overview of File Preservation During an Update Installation

An Update Installation preserves all user-created files and accounts. It also attempts to preserve customizations made to system files, which are files shipped in the base operating system. To ensure that the customizations are never lost, an Update Installation process creates backup copies of the customized files before updating them. This appendix describes the files used by the update process to preserve file customizations.

E.2 Protected System Files

A protected system file is an operating system file that can be customized by the user. Each protected system file is really three files on your system: the file itself, a `.new..` file, and a `.proto..` file. To illustrate this, a protected system file that is frequently customized is the `/etc/hosts` file:

Example E–1: Protected System File: /etc/hosts

`/etc/hosts`

Current Version 4.0D or 4.0F file with your customizations — the configured file.

`/etc/.new..hosts`

Current Version 4.0D or 4.0F file as originally shipped.

`/etc/.proto..hosts`

File created from the `/etc/.new..hosts` file during the initial Full or Update Installation.

E.2.1 The .new.. Files

An Update Installation prefixes system files with the `.new..` prefix to avoid overwriting the configured system file. So, when the new version of the file is loaded, it is loaded as a `.new..` file and does not overwrite the user-customized version. An Update Installation also compares the configured file against the `.new..` file to determine whether or not you have customized the configured file.

Note

The `.new..` files play an important role in the Update Installation process. Do not modify or remove these files.

E.2.2 The .proto.. Files

A file with a `.proto..` prefix is a copy of the `.new..` file that can be modified. Modify this file only if you are providing site-wide customizations and are using Dataless Management Services (DMS). Otherwise, you should modify the configured version of this file rather than the `.proto..` version.

Note

The `.proto..` files play an important role in the Update Installation process. Do not remove these files.

The only time these files are modified is if you are using DMS. In that case, the `.proto..` files in the dataless areas are modified, not the `.proto..` files for the server's operating system. For more information on DMS, see *Sharing Software on a Local Area Network*.

E.2.3 The .PreMRG Files

The Update Installation process makes copies of all protected system files before updating the system. These copies have a `.PreMRG` prefix. This ensures that all of your customizations can be restored if the automatic merge operation fails. Using the `/etc/hosts` file from Example E–1:

- The `/etc/hosts` file is copied to `/etc/hosts.PreMRG`.
- The `/etc/.new..hosts` file is copied to `/etc/.new..hosts.PreMRG`.
- The `/etc/.proto..hosts` file is copied to `/etc/.proto..hosts.PreMRG`.

E.2.4 The .mrg.. Files

A file with a `.mrg..` prefix is a script file. This script merges any new functionality added in the new version of the operating system file with your existing configured file.

E.3 Merging Protected System Files

An updated operating system preserves all prior existing files and customizations. Preserving customizations involves merging new file modifications with existing custom modifications.

The merge script executes if both of the following conditions are true:

- You have customized a configured file, for example `/etc/hosts`.
- The new version of the operating system has modified the same file.

E.3.1 Successful Merge

After a successful merge, using the `/etc/hosts` file example, the files shown in Example E–2 are left on your system. The Update Installation process removes the `.PreMRG` files when the files merge successfully. The file `/var/adm/smlogs/it.log` contains a log of the merge process.

Example E–2: Files Left on System After Successful Merge: /etc/hosts File

`/etc/#.mrg..hosts`

Version 5.0 merge script.

`/etc/.new..hosts`

Version 5.0 file as shipped.

`/etc/.proto..hosts`

Your customized Version 4.0D or 4.0F `/etc/.proto..hosts` file with new Version 5.0 functionality added by the merge script. Modify this file only if you are using DMS.

Example E–2: Files Left on System After Successful Merge: /etc/hosts File (cont.)

`/etc/hosts`

Your customized Version 4.0D or 4.0F file with new functionality added by the merge script.

E.3.2 Unsuccessful Merge

If for any reason the update installation is unable to merge your customized Version 4.0D or 4.0F file with the new Version 5.0 file, it will create a `.FailMRG` file and leave the `.PreMRG` file. In order to ensure that your system operates correctly, the Update Installation will also copy the Version 5.0 file to the configured file so that there is a working version of the file present on the system.

Because the working, configured version of the file is a copy of the Version 5.0 file, it will not contain any of your customizations. You will need to manually add any customizations to the file after the update is complete.

Any lines that exist in the backup copy of the configured file (`.PreMRG`) and do not exist in the backup of the originally shipped Version 4.0D or 4.0F file (`.new..file.PreMRG`) are your customizations. If the merge failed, using the `/etc/hosts` example, the files shown in Example E–3 will exist on your system. The file `/var/adm/smlogs/upd_mergefail_files` contains a list of failed merge files. If you want to determine why the merge failed, you can examine the log of the merge process in the `/var/adm/smlogs/it.log` and `/var/adm/smlogs/update.log` files.

Example E–3: Files Left on the System After a Failed Merge: /etc/hosts File

`/etc/#.mrg..hosts`

Version 5.0 merge script.

`/etc/.new..hosts`

Version 5.0 file as originally shipped.

`/etc/.new..hosts.PreMRG`

Backup copy of Version 4.0D or 4.0F file as originally shipped.

`/etc/.proto..hosts`

Copy of Version 5.0 `/etc/.new..hosts` as originally shipped.

Example E–3: Files Left on the System After a Failed Merge: /etc/hosts File (cont.)

`/etc/.proto..hosts.PreMRG`

Backup copy of Version 4.0D or 4.0F file with your customizations.

`/etc/hosts`

Copy of Version 5.0 file as originally shipped.

`/etc/hosts.PreMRG`

Backup copy of Version 4.0D or 4.0F file with your customizations.

F

Installation Log Files

This appendix contains the following information:

- A sample message of the day file
- Reasons why you should review the installation log files
- A description of Full Installation log files
- A description of Update Installation log files

F.1 The Message of the Day File

A list of the installation log files created during the installation is displayed on the screen each time you log in. Example F–1 shows a sample `/etc/motd` file. The `/etc/motd` file contains the *message of the day* that is displayed each time a user logs in. The installation log files are located in the `/var/adm/smlogs` directory.

Example F–1: Sample /etc/motd File Showing Location of Log Files

```
Tru64 UNIX V5.0  (Rev. nnn); Fri Dec 17 11:44:35 EST 1999
*******************************************************************************
The following files contain a record of the Update Installation session.

        /var/adm/smlogs/it.log             - log for it(8) utility
        /var/adm/smlogs/update.log         - update installation log file
        /var/adm/smlogs/upd_custom_files   - log of unprotected customized
                                             system files found during the
                                             update installation.
        /var/adm/smlogs/upd_obsolete_files - log of obsolete system files
                                             found during the update
                                             installation.
*******************************************************************************
The installation software has successfully installed your system.
There are logfiles that contain a record of your installation.
These are:
        /var/adm/smlogs/install.cdf     - configuration description file
        /var/adm/smlogs/install.log     - general log file
        /var/adm/smlogs/install.FS.log  - file system creation logs
        /var/adm/smlogs/setld.log       - log for the setld(8) utility
        /var/adm/smlogs/fverify.log     - verification log file
```

F.2 Reviewing Installation Log Files

The installation log files contain useful information about problems that may have occurred during the installation process, and they should be examined for errors after the installation completes. All log files are located in the `/var/adm/smlogs` directory.

F.3 Full Installation Files

This section describes these Full Installation log files:

- `install.FS.log`
- `install.log`
- `it.log`
- `setld.log`
- `fverify.log`
- `install.cdf`

F.3.1 The install.FS.log File

The `install.FS.log` file contains a log of the file system creation performed during the Full Installation. Any errors that occurred between the time you confirmed the start of the Full Installation and the completion of file system creation can be found here. This file is only used by the Full Installation.

F.3.2 The install.log File

The `install.log` file contains a log of all the output that was displayed to the screen from the time the file systems were created during the Full Installation until the system rebooted for the first time. Some of the information contained in this file is the file system creation, the operating system software load, and the configuration of any files needed in order to reboot the system for the first time. If the Full Installation was performed using RIS, this file also contains a log of the load and configuration of the Worldwide Language Support subsets, if applicable. This file is only used by the Full Installation.

F.3.3 The it.log File

The `it.log` file contains a log of all the output that was displayed to the screen from the time the system was rebooted with the generic kernel until the time the system was rebooted for the final time with the newly built

tailored kernel. Some of the information contained in this file is the configuration of the operating system software and the build of the tailored kernel. If the installation was performed using CD-ROM, this file also contains the load and configuration of the Worldwide Language Support subsets, if applicable. This file is used by the Full Installation and Update Installation processes.

F.3.4 The setld.log File

The `setld.log` file contains a record of all of the software subset management actions. If there was a problem loading or removing a software subset, a log of the errors will be found here. This file is maintained by the `setld` command and information is appended to the file whenever the `setld` command is used, with the exception of the `setld -i` operation.

F.3.5 The fverify.log File

The `fverify.log` file is maintained by the `/usr/lbin/fverify` utility, and it is modified whenever a software subset is loaded. Every time a subset is loaded, the `setld` command executes the `fverify` utility to verify that all of the files in the subset were correctly loaded. If any files were not correctly installed, a record of the files can be found here along with the reason the files failed to pass verification.

F.3.6 The install.cdf File

The `install.cdf` file contains a record of the information supplied during the Full Installation from the time the installation starts until you confirm the start of the installation. The `install.cdf` file is used to perform an Installation Cloning, which is documented in the *Installation Guide – Advanced Topics*. This file is used only by the Full Installation.

F.4 Update Installation Log Files

This section describes these Update Installation log files:

- `update.log`
- `upd_custom_files`
- `upd_PreMRG_files`
- `upd_mergefail_files`
- `.new..` and `.proto..`

F.4.1 The update.log File

The update.log file contains a log of all the output that was displayed to the screen from the time the installupdate command was invoked until the system is rebooted under the new operating system for the first time. This log file is used only by the Update Installation process and should be examined to determine if there were any errors during the update.

F.4.2 The upd_custom_files File

The upd_custom_files file contains a list of all of the files that were saved to a .PreUPD extension as part of the Update Installation. Files saved to a .PreUPD extension are files that contained user customizations that could not automatically be merged with the version of the file shipped with the new operating system. The .PreUPD files can be used as references when manually merging customizations into the new files. The upd_custom_files file is created by the Update Installation and is used by the Update Installation Cleanup (/usr/sbin/updadmin) utility. You should never modify this file.

F.4.3 The upd_PreMRG_files File

The upd_PreMRG_files file contains a list of all of the files that were saved to a .PreMRG extension as part of the Update Installation. Files saved to a .PreMRG extension are files that contained user customizations that the update tried to automatically merge with the version of the file shipped with the new operating system, but could not. The .PreMRG files can be used as a reference when manually merging customizations into the new files. This file is created by the Update Installation and is used by the Update Installation Cleanup (/usr/sbin/updadmin) utility. You should never modify this file.

F.4.4 The upd_mergefail_files File

The upd_PreMRG_files file contains a list of all of the protected system files that failed to automatically merge during the Update Installation. Because the merge failed, the Update Installation saved your customized file to a .PreMRG extension and then replaced the customized file with the version shipped in the new operation system. For every file in the upd_mergefail_files file, you should manually merge the customizations from the .PreMRG file into the new file. Failure to do the merge of customizations results in the loss of important customizations

that may impact system performance. This file is created by the Update Installation process.

F.4.5 The .new.. and .proto.. Files

The Full Installation creates many files with the prefix `.new..` and `.proto...` The Update Installation process documented in Chapter 3 uses these files to automatically merge file customizations when updating the operating system. For more information about these files, refer to the *Installation Guide – Advanced Topics*.

Caution

Do not remove any files with `.new..` and `.proto..` extensions.

G

Error Messages and Troubleshooting

This appendix provides a description of the error messages you might see if there is a problem during an installation. Every attempt was made to make the error list complete, however, it is possible you may encounter errors that are not described here. Logical Storage Manager (LSM) troubleshooting information is also included.

This appendix is organized by topic rather than by error message:

- **Full Installation** error messages
  - Disk label, file system and LSM configuration error messages
  - Fixing LSM configuration errors
  - Fixing multiple `hostid` errors on existing LSM configurations
  - Restarting LSM if it fails to restart when you reboot the system
  - Configuration Description File (CDF) validation errors
  - Software subset load errors
- **Update Installation** error messages
  - Startup error messages
  - CD-ROM error messages
  - RIS error messages
  - Analysis phase error messages
- **Software Configuration** error messages

G.1 Full Installation Error Messages

The following describes the general error messages that you might encounter during a Full Installation.

The firmware revision on this system could not be detected

Some processor types do not allow the Full Installation technology to detect the current installed firmware level. See the *Alpha AXP Systems Firmware Update Release Notes Overview* for information regarding the recommended revision numbers and how to update your system firmware.

The following error occurred, causing the "ping" command to fail for [*disk_name*]:
<Specific error>

While using the text-based interface to the Full Installation, you entered the `ping` command to determine the device name associated with a physical disk by blinking the input/output light. For some reason, the `ping` command failed. Failure of the `ping` command does not mean that you cannot use this disk; it simply means the disk cannot be identified in this way.

No free partitions are remaining on this system, therefore the installation process cannot continue with this configuration. Either choose the "Default File System Layout", or choose a new "Custom File System Layout." If you cannot alter the layout, you may need to edit your disk partitions. Refer to the "Installation Guide – Advanced Topics" for more information about editing disk partitions from the UNIX shell.

During the Full Installation, the system ran out of free, unused disk partitions. Perhaps a disk has a disk label where partition `a` consumes the entire disk, and there are no other disks available. In that case, you have to repartition the disk into individual segments of the right size. If you are using the graphical user interface, invoke the Disk Configuration utility to perform this task. If you are using the text-based interface, exit to the UNIX shell and use the `disklabel` command to repartition the disk.

Some cases, however, might be more difficult to remedy. For example, if a system had two RZ25 disks (too small for the recommended disk label), and both disks have CD type labels on them (that is, partition `a` and partition `c` are the same large partition, and no other partitions are assigned), one disk could be used for the `/` file system , the other for `usr`, and there is no place for anything else. The solution in this case is to edit the disk labels.

The partition you selected for [usr] takes up the entire disk, and leaves no space for the LSM private region. Therefore, you must choose a different partition.

You selected to install and configure the Logical Storage Manager (LSM). Each disk needs an LSM private region partition, and no room was left on the disk in question. You have to repartition the disk to make a partition at least 2 MB in size to hold the LSM private region. If that is not possible, select another disk.

Unable to get a list of software subsets available for installation.

This message would occur if you have a corrupted distribution media. Contact your support representative to obtain a new set of operating system CD-ROMs. If you are performing the installation from a RIS

server, the RIS environment may have to be recreated. Contact your RIS administrator about the problem.

Unable to determine the available software due to the following error: *<Specific error>*

This message would occur if you have a corrupted distribution media. Contact your support representative to obtain a new set of operating system CD-ROMs. If you are performing the installation from a RIS server, the RIS environment may have to be recreated. Contact your RIS administrator and notify them about the problem.

G.1.1 Disk Label, File System and LSM Configuration Error Messages

If errors are encountered during the configuration of a disk label, file system, or Logical Storage Manager (LSM) during a Full Installation, you will be instructed as follows:

```
Please inspect the file /var/tmp/install.FS.log to identify the
source of the failure
```

The `/var/tmp/install.FS.log` file is written in the `/var` memory file system (MFS) and is deleted upon system reboot. Use the `more /var/tmp/install.FS.log` command to view the contents of this file.

The corrective action depends upon the error message returned from the failed command. As a general procedure, ensure that the installation target disk is connected and is operating properly. If it is, restart the installation procedure and select a different disk (if possible). Contact your support representative to diagnose the problem with the disk.

Errors encountered during the LSM configuration phase also can be the result of specific problems with an existing LSM configuration. If possible, analyze the error message returned from the failing command, check and correct the existing configuration, then restart the installation. If you need more information about fixing LSM problems, refer to the *Logical Storage Manager* guide or the related LSM command reference pages.

The following topics are covered in this section:

- Fixing LSM configuration errors
- Fixing LSM multiple `hostid` errors
- Restarting LSM if it fails to restart when you reboot the system

G.1.1.1 Fixing LSM Configuration Errors

Details on any LSM install error, including the actual error message, can be found in the `/var/tmp/install.FS.log` file. This file exists in the `/var` memory file system and will be available only until the system is rebooted. Typically, the source of the error will be the last entry in the log.

Additional information on the current state of the LSM configuration can be displayed by using the commands shown in Table G–1:

Table G–1: LSM Display Commands

Display Command	LSM Components Displayed
`voldisk list`	disk, disk media
`voldisk -s list`	expanded voldisk list output
`volprint`	volume, plex, subdisk, private region
`volprint -t`	expanded volprint output
`voldg list rootdg`	disk group, private region
`disklabel -r` *name*	partition fstype

The various components of an LSM configuration can be removed manually once the source of the problem has been identified. The commands to remove specific LSM components are shown in Table G–2:

Table G–2: LSM Remove Commands

Remove Command	LSM Components Removed
`voldisk rm` *name*	disk
`voldg rmdisk` *name*	disk media, private region
`voledit -rf rm` *name*	volume, plex, subdisk

The `voldisk rm` command removes the LSM disk and updates the partition fstype on the disklabel to `unused`. If, for some reason, the disklabel is not updated after executing this command, the fstype can be set manually to `unused` by entering the following command:

```
# disklabel -s unused /dev/disk/dsk0
```

Once the source of the problem has been removed, the installation can be restarted by entering the `restart` command or by rebooting the installation media.

If you do not need to preserve any existing LSM information, LSM can be removed completely from the system by issuing the `disklabel -z`

command against each disk on the system before starting the installation procedure. This method is suggested if you are unsure of the integrity of an existing LSM configuration.

Caution

Be aware that the original configuration cannot be restored once the existing disk labels have been removed. All existing data on the system is lost.

This information is specific to LSM Full Installations, and it is not intended to be an overview of general LSM topics. If you need more information, refer to the *Logical Storage Manager* guide or the related LSM reference pages.

G.1.1.2 Fixing Multiple hostids Error on Existing LSM Configurations

LSM requires that a single `hostid` be defined for the `rootdg` disk group. Due to various reasons, including swapping disks between LSM systems without properly exporting them from their original system and importing them into the new system, an existing LSM configuration can be left in a state where multiple `hostids` exist for the `rootdg` disk group.

The following message is displayed during a Full Installation if you attempt to install LSM on a system with an LSM configuration that has multiple `hostids`:

```
LSM could not be initialized on this system due to the
following error:
lsm:voldctl: ERROR: enable failed:
Multiple hostid's found for rootdg

o Choose "Continue" if you want the install process
  to create all file systems without LSM.  Refer
  to the Logical Storage Manager documentation for
  instructions on how to configure LSM after
  the installation.
o Choose "Exit Installation" if you would like to
  attempt recovery from the LSM failure.  You will
  be placed in single-user mode at the UNIX
  shell  with superuser privileges.  Refer to the
  Logical Storage Manager documentation for any
  additional information regarding the error.

  1) Continue
  2) Exit Installation

Enter your choice:
```

The LSM cannot be selected during a Full Installation on a system where multiple hostids are found for the rootdg disk group. This problem, which is not specific to the installation environment, cannot be resolved in an automated fashion by the Full Installation process. If you want to install LSM, you must resolve the problem manually before restarting the Full Installation.

You may have to try several different methods to fix the problem:

1. The first way to resolve the problem is to boot the existing system to determine the current state of LSM and remove the invalid hostids. On systems where multiple hostids exist, messages similar to the following are displayed when LSM is initialized during system boot:

```
starting LSM in boot mode
lsm:vold: WARNING: Disk dsk1d names group rootdg, but group ID differs
lsm:vold: WARNING: Disk dsk2d names group rootdg, but group ID differs
lsm:vold: WARNING: Disk dsk4h names group rootdg, but group ID differs
lsm:vold: WARNING: Disk dsk5h names group rootdg, but group ID differs
lsm:vold: WARNING: Disk dsk6h names group rootdg, but group ID differs
```

   In this example, the system has five LSM private regions located on partitions dsk1d, dsk2d, dsk4h, dsk5h, and dsk6h.

   Once the system is running, use the **voldisk -s list** command to view detailed information on each disk under LSM control. This information will include the hostid for each private region listed. Once the erroneous hostids have been identified, remove the private region containing these hostids and restart the Full Installation process. See Section G.1.1.1 for more information about the commands that can be used to interrogate the existing LSM configuration and how to manually remove sources of problems.

   Caution

   LSM private regions contain information that is critical to the existing LSM configuration. Removing LSM private regions should be performed with the utmost care and only should be performed by someone who understands both LSM and the details of the existing configuration. If you are unsure about performing this task, please ask your system administrator for assistance or refer to the *Logical Storage Manager* guide.

2. If the system is in a state where it cannot be booted, or if the system boots but LSM cannot be enabled because the existing LSM

configuration is corrupted, the problem will have to be rectified by attempting to physically remove the disk that contains the erroneous private region. In this case, a working knowledge of the system itself and what activities have been recently performed on it will help. There is a good chance that the erroneous private region exists on a disk that has recently been added to the system from another system. For example, an administrator might have swapped disks between systems without realizing that existing LSM information from the previous system was left on the disk.

3. If removing suspect disks fails to rectify the problem because the proper disk cannot be identified, your only recourse is to completely remove the existing LSM configuration from the system before restarting the Full Installation. This can be performed by booting the distribution media, exiting to the UNIX shell, and using the **disklabel -z** command to zero out the disk label of every disk on the system that contains an LSM private region.

   You can determine which disks contain an LSM private region by analyzing the partition fstype values from the disk label of each disk. Refer to the disklabel(8) reference page for more information regarding LSM fstype values. If you cannot determine which disks contain an LSM private region, zero out the disk label of every disk on the system. If zeroing out the disklabel of every disk on the system in not feasible, then you can cycle through a process of zeroing out the disklabel of a single suspect disk and then restarting the Full Installation process until LSM can be selected. See Section G.1.1.1 for more information about using the disklabel -z command to remove an existing LSM configuration.

G.1.1.3 Restarting LSM

If the LSM daemons vold and voliod fail to restart when your system is rebooted or the LSM configuration database is corrupted, the LSM volume on which the / file system exists will not be accessible. Under such circumstances your system cannot be brought up to multiuser mode. To repair possible problems in /etc/vol/volboot or the rootdg disk group, use LSM commands to rectify the problem.

Use this procedure to restart LSM if it fails to start during system boot:

1. Create LSM device special files:

   ```
   # volinstall
   ```

2. Start the LSM configuration daemon in disable mode:

   ```
   # vold -k -r reset -m disable -x nohostid
   ```

3. Initialize the /etc/vol/volboot file:

   # **voldctl init**

4. Put vold in the enabled mode and import all LSM diskgroups:

   # **voldctl enable**

5. Get a list of all disks known to LSM:

   # **voldisk list**

   Make sure that all disks have device special files in /dev/disk.

6. Execute the volprint command to obtain information about the LSM configuration:

   # **volprint -htA**

7. Start the LSM volumes:

   # **volume -g** *diskgroup* **start** *volume_name*

   The value of the diskgroup parameter is most likely rootdg, which represents the system disk.

8. To rectify problems in a file, the volume needs to be mounted. For example, the / file system may have to be mounted to fix a file such as /etc/vol/volboot or /etc/inittab.

   If the / file system was using AdvFS as the file system type, enter commands similar to the following to mount it:

   ```
   # mkdir -p /etc/fdmns/root_domain
   # cd /etc/fdmns/root_domain
   # ln -s /dev/vol/rootdg/rootvol rootvol
   # mount root_domain#root /mnt
   ```

   If the / file system was using UFS as the file system type, the LSM volume rootvol is mounted as follows:

   ```
   # fsck /dev/rvol/rootdg/rootvol
   # mount /dev/vol/rootdg/rootvol /mnt
   ```

Refer to the *Logical Storage Manager* guide for more information about how to correct problems encountered while enabling LSM or starting LSM volumes.

G.1.2 Configuration Description File (CDF) Validation Errors

The following message is displayed when the installation procedure encounters an error while validating an install.cdf file before beginning an installation cloning:

The Configuration Description File (CDF) validation procedure has found the following errors:
<List of errors>

This error causes the Full Installation to stop. The list of CDF validation errors will include one or more messages that discuss the errors encountered in the CDF.

The corrective action depends on the validation errors returned from the install procedure. If you are performing the installation from a RIS server, you should confirm with your RIS server administrator that your system is registered for the proper CDF. To continue with the cloned installation, the RIS server administrator must either reregister the system with the correct CDF or correct the current CDF based upon the validation error messages.

After you have corrected the problem, restart the Full Installation by doing one of the following:

- Enter `restart` in the root directory
- Reboot the system

The error message is saved in the `/var/tmp/install.log` for your reference until you reboot this system.

G.1.3 Software Subset Load Errors

The software load procedure can fail for a number of reasons, including software inventory problems resulting from a corrupted distribution media, network errors during a RIS install, and CD-ROM read errors during a CD-ROM install. To handle potential problems, the software load procedure makes two attempts to load software. If the initial attempt fails, a second attempt is made to load the specific software subsets that were not loaded during the first attempt.

The installation procedure was not able to correctly install the *<product name>* software subsets.
This may be the result of a corrupted distribution.
Another attempt will be made to install this software.

This message is displayed if one or more subsets fail during the first load attempt. The subset load procedure will then attempt to reload the failed subsets. Check the `/var/adm/smlogs/install.log` file for more information.

The installation procedure successfully installed the mandatory software subsets. One or more optional subsets did not install correctly. This may be the result of a corrupted distribution. The installation will continue.

This message is displayed if an optional subset fails to load after two attempts. The corrective action depends on the software load errors returned from the install procedure. You can find more information about the problem when the installation has completed. Use the `more` command to view the contents of the `/var/adm/smlogs/fverify.log` and `/var/adm/smlogs/setld.log` log files to review the software load errors. Once the problem had been resolved, use the `setld` utility to load the failed subsets. Refer to Chapter 9 for more information about installing optional subsets after an installation.

The installation procedure was not able to correctly install the mandatory software subsets. This may be the result of a corrupted distribution. This error is fatal, and causes the installation procedure to stop.

Additional information regarding this error can be found in the following log files:

/var/tmp/install.log and /var/tmp/fverify.log

This message is displayed if a mandatory subset fails to load after two attempts. A failed mandatory subset load is a fatal error and the installation process will not be able to continue until the problem has been resolved. Use the `more` command to view the contents of the `/var/tmp/install.log` and `/var/tmp/fverify.log` log files to review the software load errors. The files are written in the `/var` memory file system and will be available only until the installation is restarted or the system is rebooted.

G.2 Update Installation Error Messages

The following sections describe error messages that you might encounter during an Update Installation.

G.2.1 Update Installation Startup

The following error messages may display after invoking the `installupdate` command, but before the Update Installation interface (graphical or text-based) is displayed.

You must have superuser privileges to run installupdate. You must be the user root to run the update install.

The /sbin/installupdate command must be run from the root login in single-user mode. Shut down the system to single-user mode and restart the Update Installation.

***** WARNING: Incorrect system state detected. *** Please shut down system to single user mode before attempting an update installation.**

The system must be in single-user mode in order for the update to run. Single-user mode can be reached by using the shutdown command. Refer to shutdown(8) for more information.

G.2.1.1 CD-ROM Update

The errors described in this section may occur during an Update Installation from CD-ROM.

Please specify a block-special device file.

The argument to the installupdate command must be a block-special file. Block special file names in systems running operating system versions earlier than Version 5.0 begin with rz.

<mount point> is an invalid update installation mount point.

The Update Installation could not find the installation information at the specified location either because the location is incorrect or the media at that location is not the operating system media.

Cannot locate update information on /updmnt

The Update Installation script could not be found in the default location /updmnt due to invalid or incorrect media or location of media.

Update installation mount point already mounted: <*mount-point search listing*> Please unmount /updmnt manually.

The Update Installation detected that there is already something at the Update Installation mount point. Enter the following command:

```
# cd /
# umount /updmnt
```

Reenter the installupdate command.

Could not unmount: <*umount attempt error listing*> Please unmount /updmnt manually.

If for any reason you exit the Update Installation before completion, the Update Installation may be unable to unmount the distribution media properly. Enter the following command:

```
# cd /
# umount /updmnt
```

Cannot mount <*media location supplied by user*> on /updmnt. Check with the system manager of your host server.

The distribution media location given as an argument to `installupdate` is incorrect. Check the location and retry installupdate.

G.2.1.2 Remote Installation Services (RIS) Update

The errors described in this section may occur during an Update Installation from a RIS server.

Cannot find <*RIS client*> in risdb file. Check with the system manager of <*RIS server*>.

The client system is not registered on the RIS server. Register the client machine on the RIS server, then restart Update Installation.

Could not retrieve RIS area information on <*RIS_server*>. Exiting procedure...

Either the Update Installation could not start the network, or the targeted RIS area is no longer accessible. In the first case, check the client machine's network settings. In the second case, check with your RIS administrator.

Error starting <*inet route gateway*> Cannot continue with update installation.

The network daemons could not start and the distribution media was specified as a network file system (NFS) or RIS. Check to ensure that the network is accessible to the system you want to update, then restart the Update Installation.

G.2.2 Analysis Phase Error Messages

The following messages can display during interaction with the Update Installation analysis phases.

Cannot create directory /var/tmp/update/risupdinfo

The Update Installation makes local copies of the subset inventory files in the `/var/tmp/update/risupdinfo` directory to improve performance. This error may indicate that file system space is 99% or more full, and the update process could not create the directory. Perform disk space recovery procedures, such as deleting `core` files, extra kernel files, and all other unnecessary files to free up some disk space.

Cannot locate the product mapping file <RIS product directory/rp_mapping> on the RIS server *<RIS server name>*. Check with the system manager of the RIS server.

The `rp_mapping` file maps a product name to a mount point. Without this file Update Installation cannot find the product for which it is registered. This message usually indicates a corrupt RIS area.

***<Operating system version>* is currently installed on this system.**

This message indicates that you are attempting to update the operating system to the exact version of the operating system that is already installed. If you receive this message, you are given the option to continue the update or exit.

You must have one of the following products loaded on your system before you can update to *<new operating system version>*.
<List of products>
Please refer to the Installation Guide for additional information on these releases.

The Update Installation cannot update your current version of the operating system to the new version. To get to the new version, you may need to perform successive updates or perform a Full Installation.

No installable subsets for this system found.

The Update Installation could not find installable software subsets on the distribution media, which is most likely corrupted. If you are using a CD-ROM, contact your support representative for another one. If you are using a RIS server, notify the administrator who will have to create another RIS environment for the product you want to install.

Error: Unable to retrieve the /tmp/updinfo file

This file contains data used by the install scripts. Bring your system back to multiuser mode, and restart the Update Installation process.

A non-zero return status <*actual return code*> has been detected after execution of the <*user supplied script name*> program. This is fatal and causes the Update Installation procedure to stop.

If you supplied a script within an `update_preinstall` or `update_postload` file, this message indicates that the script failed with a value other than 0 (zero). Check your script, and retry the Update Installation.

Error opening file: updpblock.dat

The `updpblock.dat` file contains the blocking layered products three-letter prefixes. This error resulted from a corrupt distribution media. If you are using a CD-ROM, contact your support representative for another one. If you are using a RIS server, notify the administrator who will have to create another RIS environment for the product you want to install.

The following errors may occur if your system does not have enough disk space to complete an Update Installation:

The Update Installation cannot save your kernel option selections. The kernel will be built with all mandatory and all optional kernel components. Use the /usr/sbin/doconfig command to select the desired optional kernel components and rebuild the kernel after the Update Installation completes.

There is not enough space to save your optional component selections. Use the `doconfig` command after the installation is complete to build optional components into the kernel.

An error occurred when attempting to write to the INIT_OPS_FILE. This is most likely due to insufficient disk space in the root file system

Check the / (root) file system for `core` files, extra kernel files, and any unnecessary files that are taking up disk space and remove them to free up space. Perform any other disk space recovery steps that are appropriate for your site. When you have freed up space, restart the Update Installation.

An error occurred while trying to open the input or output files in the call to updmore.

This error message displays only from the text-based interface and indicates that either the input (list of available selections) or output (list of user selections) files could not be opened.

G.3 Software Configuration Error Messages

Software configuration occurs after system reboot and is a process common to both Full and Update Installation. The following error messages can display during software configuration.

c_install: Cannot find /sbin/it.d/data/cinst.data

The data file that contains the list of installed software subsets to be configured could not be found. This file is written by the `setld` program and indicates a possible corruption of the `setld` program or the system disk on which the software was installed, or that the system disk has run out of space. This error is fatal.

dn_fix: name database [/etc/dfsc.dat] does not exist

dn_fix: name database [/etc/dfsl.dat] does not exist

The `device file status [cluster,local]` file, which contains hardware device attributes including the mapping of old-style device names (for example, rz*) to new-style device names (for example, dsk*) could not be found. These files are created dynamically by the `dsfmgr` program, and indicates a possible corruption of the `dsfmgr` program or the system disk on which the software was installed, or that the system disk has run out of space.

dn_fix: cannot create copy of <file> for recovery purposes

The `dn_fix` program was not able to create successfully backup copies of the listed file prior to performing old-to-new device name conversions on the devices contained in this file. This may be the result of a corrupted system disk, or that the system disk has run out of space.

dn_fix: cannot create copy of <*directory*> for recovery purposes

The `dn_fix` program was not able to create successfully a backup copy of the directory prior to performing old-to-new device name conversions on the devices contained in this directory. This may be the result of a corrupted system disk, or that the system disk has run out of space.

An error was encountered when trying to convert from the old device names to the new device names in file: <*file*>
No modifications have been made to the file. If you wish to use the new device names the file will have to be converted manually.

The sed conversion script has been saved as: <*file*>.CNVTsed

The failed conversion file has been saved as: <*file*>.CNVTfail

The error which occurred was: <*error*>

The `dn_fix` program could not convert successfully all the references to old device names in the listed file to the new device names. The error that occurred is listed for reference. This error is not fatal, and the old device names will continue to be used. After the installation process completes, the conversion of the failing file should be reattempted manually.

An error was encountered when trying to convert from the old device names to the new device names in directory: <*directory*>

No modifications have been made to this directory. If you wish to use the new device names the directory will have to be converted manually.

The failed conversion file has been saved as: <*file*>.CNVTfail

The error which occurred was: <*error*>

The `dn_fix` program could not convert successfully all the references to old device names in the listed directory to the new device names. The error that occurred is listed for reference. This error is not fatal, and the old device names contained in this directory will continue to be used. After the installation process completes, the conversion of the failing directory should be reattempted manually.

The merge routines which have failed are logged in /var/adm/smlogs/dnconvert.FailCNVT. To re-execute any of these routines, change directory to <*script_location*> and re-execute all the routines in this directory.

This message is output upon any failure of a conversion script to update the old device names to the new device names. The `/var/adm/smlogs/dnconvert.FailCNVT` file contains a list of the conversion scripts that failed and that should be reattempted manually after the installation procedure completes and the source of failure identified.

The version switch from "active-version" to "new-version" could not be completed successfully. This error is not fatal, and the installation will continue. The following message was received from /usr/sbin/versw -switch:

<details of error>

The command `/usr/sbin/versw -switch`, which sets the version identifier for the newly installed version of the operating system, has failed. The text of the failure message is included. After the

installation completes and the source of failure is identified, this command should be manually reattempted.

Failed to configure one or more mailserver files.

Please verify that the 'pop' and 'imap' user accounts have been set up in either the local or NIS password database and run this command again to complete the installation phase of the mailserver setup.

This message indicates a failure in the attempt to update the modes, permissions, and inventory entries of POP and IMAP specific files. These files are shipped in the optional Additional Networking Services (OSFINET500) subset. This error is not fatal, and the following command should be reattempted after the installation process completes and you log in for the first time:

```
setld -c OSFINET500 MAILSERVERSETUP
```

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