Digital UNIX

Installation Guide

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Product Version: Digital UNIX Version 4.0B or higher

Operating System and Version:

This guide describes how to install the Digital UNIX operating system Version 4.0B or higher on all supported processors and single-board computers.

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About This Guide

This guide describes how to install the Digital UNIX® Version 4.0B operating system on all supported processors and single-board computers. Specifically, it describes how to prepare your system for installation, how to boot the system from the distribution media, and how to perform the installation procedure. It also explains how to install the Digital UNIX worldwide language support software after installing the base operating system.

In Digital UNIX Version 4.0B, you can use the update installation procedure to update from Digital UNIX Version 4.0 or 4.0A to Digital UNIX Version 4.0B. The `installupdate` program preserves your user and data files and any system setup you may have done.

The `wwinstallupdate` procedure updates the Digital UNIX operating system from Version 4.0 or 4.0A to Version 4.0B by invoking the update installation command (`/sbin/installupdate`), and then it updates the Worldwide Language Support software.

If your system is delivered to you with Factory Installed Software (FIS), the software necessary to get your system up and running has already been installed for you at one of Digital's manufacturing facilities. Follow the instructions for entering system information in the *FIS Quick Reference Card* delivered with your system, and then refer to Chapter 6 in this guide for instructions on how to configure and set up your system.

Audience

This book is intended for anyone installing the Digital UNIX base operating system software or Digital UNIX worldwide language support software. Before starting an installation, you must:

- Read the documentation supplied with your processor or single-board computer
- Read the current version of the Digital UNIX *Release Notes*
- Understand how to load and unload the installation media and know which disks are needed during the installation
- Know the names and unit numbers of your disk devices

- Have a basic understanding of the file system and commands

New and Changed Features

The following are new and changed installation features in Digital UNIX Version 4.0B:

- Enhancements to the Digital UNIX Version 4.0B full (default or custom) installation process and to the installation cloning process are provided in this release. The installation cloning feature introduced in Version 4.0 has been enhanced to allow unattended installation cloning of systems. In addition, the installation process searches for and invokes user-supplied files to enable customizations on the system to be installed. These files can be on diskette, a RIS server, or on the distribution media. For a detailed description of these enhancements, see Appendix C.
- The ability to automatically reboot systems with unattended installation capability has been added. In this release, the following systems have this capability:
  - AlphaServer 1000A
  - AlphaServer 2100
  - AlphaServer 4000/4100

  These systems automatically reboot after the software subsets are loaded during the installation process. If your system does not have unattended installation capability, the system halts and prompts you to enter commands to boot the system from the newly installed disks. The system displays the boot commands that must be entered to reboot the system.

  For more information, see Chapter 4 and Section 5.18.
- Booting instructions for the newly supported processors have been added to this document. The new processors are as follows:
  - AlphaPC164 SBCs
  - AlphaServer 300 Series
  - AlphaServer 1000A Series
  - AlphaServer 4000/4100 Series
  - Alpha VME 4/224, Alpha VME 4/288, and Alpha VME 5/nnn SBCs
  - Digital PICMG Alpha CPUs

  Refer to Chapter 4 for specific booting instructions.

- Guidelines on how to properly free disk space for an update installation have been added to this document. Refer to Chapter 2 for these guidelines.
- Additional worldwide language support subsets have been added. Refer to Appendix F for more information.

Organization

This guide is organized as follows:

Chapter 1	Describes the tasks you must complete before beginning an installation. This chapter also describes the different installation options.
Chapter 2	Describes how to perform an update installation.
Chapter 3	Describes the disk space planning you may want to consider before beginning a custom installation. It also includes information to consider if you plan to use the POLYCENTER Advanced File System (AdvFS) and Logical Storage Manager (LSM) products.
Chapter 4	Describes how to boot each supported Digital UNIX processor or single-board computer from the distribution media to invoke a full or cloned installation.
Chapter 5	Describes how to perform a full or cloned installation.
Chapter 6	Describes how to set up the system for general use after installing the Digital UNIX operating system software.
Chapter 7	Describes how to restore file systems, modify disk labels, and perform system maintenance in the UNIX shell environment.
Chapter 8	Provides information on using the `setld` command to install and remove optional software at any time after the initial installation.

Chapter 9	Describes how to install the Worldwide Language Support (WLS) software.
Chapter 10	Describes how to perform an update installation of the Worldwide Language Support (WLS) software.
Appendix A	Describes how to prepare for a full installation if the system is currently using LSM, LVM, Prestoserve, or AdvFS.
Appendix B	Describes how to load a Digital UNIX 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	Describes the enhancements to the full (default or custom) installation process and to the installation cloning process.
Appendix D	Provides descriptions of Digital UNIX base operating system software subsets.
Appendix E	Provides descriptions of Digital UNIX associated product software subsets.
Appendix F	Provides descriptions of Digital UNIX worldwide language support software subsets.
Appendix G	Provides the size of all Digital UNIX software subsets.
Appendix H	Provides default disk partitions for supported disks.
Appendix I	Describes installation error messages.
Appendix J	Provides a sample of text-based default and custom installations.

Related Documentation

The printed version of the Digital UNIX documentation set is color coded to help specific audiences quickly find the books that meet their needs. (You can order the printed documentation from Digital.) This color coding is reinforced with the use of an icon on the spines of books. The following list describes this convention:

Audience	Icon	Color Code
General users	G	Blue
System and network administrators	S	Red
Programmers	P	Purple
Device driver writers	D	Orange
Reference page users	R	Green

Some books in the documentation set 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, Glossary, and Master Index* provides information on all of the books in the Digital UNIX documentation set.

Read the related documentation in the following order:

1. The documentation for your hardware shows how to set up the processor and its additional devices, and supplies valuable troubleshooting guidelines.
2. Before beginning the installation, read the Digital UNIX Version 4.0B *Release Notes*.
3. 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. DMS lets you set up an environment where the `root` and `/usr` file systems are exported from a server onto a client.
4. Refer to *System Administration* for information about administering and maintaining your system. This guide also contains information about the POLYCENTER Advanced File System (AdvFS).
5. Refer to *Network Administration* for information about network setup and network administration.

6. Refer to *Software License Management* for information about registering and loading Product Authorization Keys (PAKs), the software licenses from Digital Equipment Corporation.

Reader's Comments

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

You can send your comments in the following ways:

- Fax: 603-881-0120 Attn: UEG Publications, ZK03-3/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:

  Digital Equipment Corporation
  UEG Publications Manager
  ZK03-3/Y32
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  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 Digital UNIX that you are using.
- If known, the type of processor that is running the Digital UNIX software.

The Digital 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 Digital technical support office. Information provided with the software media explains how to send problem reports to Digital.

Conventions

% $	A percent sign represents the C shell system prompt. A dollar sign represents the system prompt for the Bourne and Korn 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

Installation Overview and Preinstallation Tasks

This chapter includes the following information:

- Quick start information for experienced users
- A description of the two types of software distribution media
- A description of the two user interfaces
- Preinstallation tasks
- Minimum firmware revisions for all supported processors and single-board computers
- Hardware configuration utilities
- A description of the types of installation procedures: update, full, and cloned
- A description of the UNIX shell option
- A summary of the full installation process
- What to do if your system was delivered with preinstalled software
- How to install Worldwide Language Support (WLS) software

The goal of this chapter is to provide the information necessary for you to perform the user actions shown in Table 1–1.

Table 1–1: Summary of User Actions

After reading this chapter, you will ...
Perform preinstallation tasks.
Decide whether to use CD-ROM or the network for the distribution media.
Decide what type of installation you want to do.

1.1 Quick Start for Experienced Users of the Full Installation

If you are an experienced user of the Digital UNIX operating system, you should read the overview information in this chapter. The Digital UNIX Version 4.0B installation procedure has two user interfaces that you may want to read about before beginning. After reading the overview information in this chapter refer to Table 1–2 for quick start instructions.

The following statements qualify you as an experienced user:

- You previously have performed a full installation and are familiar with the decisions required to perform a full installation.
- You know whether you are using CD-ROM or RIS as the distribution media.
- You know the type of installation you want to do.
- You know the disks and partitions you want to use for the `root`, `/usr`, and `/var` file systems and for swap space.
- You know whether or not you want to install optional software subsets.

If most of the previous statements are true, refer to Table 1–2, which provides the steps to get you started quickly.

Table 1–2: Full Installation Steps for Experienced Users

If you have experience performing full installations...	Follow Instructions In:
Perform preinstallation tasks for the full installation.	Section 1.4
Shut down and halt your processor, then use the processor-specific boot commands to boot off the CD-ROM or network.	Table 4–2
Enter all information requested by the installation procedure.	Chapter 5
Log in to the newly-installed system.	Section 5.21
Set up your system for general use.	Chapter 6

If you want to perform an update installation and you are an experienced user, go directly to Chapter 2.

If you are not an experienced user, Digital recommends that you read this chapter in its entirety.

1.2 Software Distribution Media

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

- From the Digital UNIX CD–ROM labeled *Digital UNIX V4.0B Operating System Volume 1* that contains Digital UNIX Version 4.0B. The software subsets contained on this CD–ROM are described in Appendix D.
- Over a network connection to a remote installation services (RIS) server that is serving Digital UNIX Version 4.0B .

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

- If you have a copy of the Digital UNIX CD-ROM labeled *Digital UNIX V4.0B Operating System Volume 1* 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 capable of serving Digital UNIX Version 4.0B, 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 perform a RIS installation, follow the instructions in *Sharing Software on a Local Area Network* to learn how to set up a RIS server and how to register clients.

1.3 Types of User Interfaces: Graphical and Text Based

Two user interfaces are available for the Digital UNIX full installation process:

- A graphical interface
- A text-based, menu-driven interface

The type of interface presented during the full installation is determined automatically based on your hardware configuration and the amount of memory on your system. Systems with graphical consoles and a minimum of 32 MB of memory present a graphical interface to the installation. Systems with consoles that do not have graphics capabilities or have less than 32 MB of memory present a text-based interface.

While you are entering information during the installation setup phase, the graphical and text-based interfaces record your responses in a configuration description file (CDF). The installation procedure uses the information stored in the CDF to configure disk and file systems and to install the selected software subsets. After the installation, the CDF is located on the newly-installed system in `/var/adm/smlogs/install.cdf`.

The CDF can be used to **clone** another system with a similar hardware configuration. Refer to Section 1.5.4 for a description of cloned installations.

Table 1–3 lists the common characteristics of the two user interfaces.

Table 1–3: Common Characteristics of the Graphical and Text-Based Interfaces

Similarities between user interfaces include ...
All questions are asked and answered before your system is changed in any way
Free disk space is calculated and displayed automatically during software selection
Software subset dependencies are checked and resolved automatically
Online help is available
A UNIX shell is available to access UNIX commands and utilities before and during the installation setup process. The UNIX shell can also be used for disaster recovery and maintenance purposes.

1.4 Preinstallation Tasks

Table 1–4 summarizes the preinstallation tasks to complete before beginning any software installation.

Table 1–4: Summary of Preinstallation Tasks

Installation Task	Follow Instructions In:
Check the hardware for installation readiness.	Section 1.4.1
Check the Software Distribution Kit.	Section 1.4.2
If you are performing a RIS installation, ensure your system is registered as a client of the RIS server.	Section 1.4.3
Read the Digital UNIX *Release Notes*.	Section 1.4.4
Back up (save) the current version of your operating system.	Section 1.4.5
Update the system firmware.	Section 1.4.6
Run hardware configuration utilities.	Section 1.4.7
Decide the type of installation to perform (update, default, custom, or cloned).	Section 1.5

Note

If you plan to run your system as a dataless client of a DMS server, consult your DMS server administrator or *Sharing Software on a Local Area Network*. On a dataless client, the `root` and `/usr` file systems are located on a dataless server and are exported to your system. You do not need the instructions in this book to run your system as a dataless client.

The following sections describe the preinstallation tasks to complete before invoking the installation procedure.

1.4.1 Check the Hardware for Installation Readiness

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.

You need some or all of the following items to install the Digital UNIX operating system software:

- Your system must have a CD-ROM disk drive if you are installing the software from the Digital UNIX CD–ROM distribution media
- Disk for the `root` file system (required)

  You need at least one supported disk to contain the `root` and `/usr` file systems and `swap` space. You will use this disk to boot your system after the installation. If you perform a custom installation, you can allocate the `/usr` and `/var` file systems and `swap` spaces to disks other than the disk that contains the root file system. Refer to Section 3.4 for more information about supported disks.
- Data disks (optional)

  A data disk is a disk on which data and user files are stored and on which no Digital UNIX file system resides. The installation procedure does not configure these disks.
- Console terminal (required)

  The console terminal communicates with your system during the installation.
- Network capabilities if you are planning to perform the installation using the remote installation services (RIS).

1.4.1.1 Configuring ISA Devices Before the Installation

The information in this section applies only if your system has an Integrated System Architecture (ISA) bus (most AlphaStations).

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

The `isacfg` console command is available on systems that have an ISA bus. There is information about the command in the user 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 Digital 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. The following table lists the handles for optional ISA devices that you can configure for your system.

Table 1–5: Optional ISA Device Handles

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

[a] 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 Xserver to recognize the device. Section 5.18 provides the instructions to do so where applicable in the installation procedure.
[b] A kernel device driver kit is any graphics kit that is not supplied by the Digital 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 5.18 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.

1.4.1.2 Installing ATM Adapters Before the Installation

The information in this section applies only if you plan to use Asynchronous Transfer Mode (ATM) adapters.

You should install the DGLTA ATM adapter before installing Digital UNIX Version 4.0B 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 Digital UNIX, 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` program to rebuild your system kernel to enable the added ATM support.

1.4.1.3 Installing on SCSI RAID Devices

If you are installing the Digital UNIX operating system on a SCSI RAID device, only `LUN 0` can be used for the installation's target device. The RAID device's `LUN 0` must be configured before you attempt to install the software. Refer to Section 1.4.7.2 for more information about RAID devices.

1.4.2 Check the Software Distribution Kit

You should have received a Software Distribution Kit that contains, among other items, the Digital UNIX CD-ROMs. A *Part Listing* is included in the box and lists the contents of the Software Distribution Kit. At a minimum, the Software Distribution Kit contains the following CD-ROMs and documents:

- Three Digital UNIX CD–ROM optical discs:
  - The Digital UNIX base operating system software CD-ROM labeled *Digital UNIX V4.0B Operating System Volume 1*
  - The additional software products CD-ROM labeled *Digital UNIX V4.0B Associated Products Volume 1*
  - The documentation CD-ROM labeled *Digital UNIX V4.0B Documentation Volume 1*
- The firmware update CD-ROM labeled *Alpha Systems Firmware CD-ROM Version 3.8*

- The firmware release notes *Alpha AXP Systems Firmware Update Release Notes Overview*
- This guide, the *Installation Guide*
- The *Release Notes*
- The *Technical Overview*
- The *Digital UNIX Software Product Description* (SPD)

1.4.3 Check Network Connections for RIS Installations

If you have a RIS server at your site, ask the RIS server administrator whether or not you can perform a RIS installation.

You need a connection to the network (via Ethernet, Token Ring, or FDDI) and to a RIS server if you plan to perform a Remote Installation Services (RIS) installation over a local area network (LAN). Refer to your hardware installation guide for information about network connections.

If you are installing over a network connection to a RIS server, follow these steps:

1. Your machine must be registered as a client of a RIS server that is serving Digital UNIX Version 4.0B . If your RIS server administrator has set up your system for a cloned installation, ask the RIS server administrator to ensure that your system is registered to the appropriate RIS environment and configuration description file (CDF). Section 1.5.4 describes a cloned installation.
2. If your system is already running a version of Digital UNIX, ensure 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 *server* with the name of your local RIS server:

   # **/sbin/ping -c2** *server*

   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.

Your system is not able to communicate with the RIS server if you obtain the following results from the `/sbin/ping` command:

- Only your system name and IP address is displayed if the name server recognizes your system name but the network connection is not set up.
- The message `Unknown host` is displayed if your system does not recognize the RIS server name.

  If you obtain the previous results, ask the RIS server System Administrator to troubleshoot the problem.

Refer to *Sharing Software on a Local Area Network* for more information about RIS.

1.4.4 Read the Digital UNIX Release Notes

Read the Digital UNIX *Release Notes* before beginning any software installation procedure. The *Release Notes* document any last-minute changes to the software. This information might be required for a successful installation.

The *Release Notes* also provide descriptions of features that are new to the Digital UNIX Version 4.0B operating system or have changed significantly from previous releases.

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

1.4.5 Back Up the System

This step applies only if your system is already running the Digital UNIX operating system and you have critical files that you want to preserve.

Before you begin any software installation procedure, Digital recommends that you perform a full back up of your current operating system. Refer to *System Administration* for information about backing up your system.

1.4.5.1 Special Considerations for Systems Running LSM, LVM, Prestoserve, and AdvFS

If your system is currently running Digital UNIX and is using the Logical Storage Manager (LSM), the Logical Volume Manager (LVM), Prestoserve, or the Advanced File System (AdvFS), refer to Appendix A for special preinstallation backup tasks for these products.

1.4.6 Update System Firmware

Digital distributes console firmware for certain processors whenever the operating system is updated or as is required. To run Digital UNIX Version 4.0B, your system might require a firmware update. Firmware updates are located on the *Alpha Systems Firmware CD-ROM Version 3.8* compact disc that is included with your Digital UNIX Software Distribution Kit. Firmware updates for all supported processors reside on the firmware CD-ROM. The firmware revision level may be different for each processor.

The *Alpha AXP Systems Firmware Update Release Notes Overview* describes how to mount the firmware CD-ROM and how to print processor-specific firmware update instructions. To mount the firmware CD-ROM if your system is already running Digital UNIX, the kernel must be configured for the ISO 9660 Compact Disc File System (CDFS). The `CDFS` option must be present in the kernel configuration file to configure CDFS in the kernel. Refer to *System Administration* for more information.

Table 1–6 provides the minimum firmware requirements for processors running Digital UNIX Version 4.0B.

Table 1–6: Minimum Firmware Revision Levels for Alpha Systems

Alpha System	Minimum Firmware Level
AlphaPC64 SBC	Version 4.5
AlphaPC164 SBC	Version 4.5
AlphaServer 300	Correct firmware is installed.[a]
AlphaServer 400	Version 6.3
AlphaServer 1000	Version 4.7
AlphaServer 1000A	Version 4.7
AlphaServer 2000	Version 4.7
AlphaServer 2100	Version 4.7
AlphaServer 2100A	Version 4.7
AlphaServer 4000/4100	Version 3.0
AlphaServer 8200	Version 4.1
AlphaServer 8400	Version 4.1
AlphaStation 200	Version 6.3
AlphaStation 250	Version 6.3
AlphaStation 255	Version 6.3
AlphaStation 400	Version 6.3

Table 1–6: Minimum Firmware Revision Levels for Alpha Systems (cont.)

Alpha System	Minimum Firmware Level
AlphaStation 500	Version 6.3
AlphaStation 600	Version 6.3
Alpha VME 4/224	Version 1.0
Alpha VME 4/288	Version 1.0
Alpha VME 5/nnn	Version 1.0
AXPvme 64	Version 16.0
AXPvme 100	Version 16.0
AXPvme 160	Version 16.0
AXPvme 166	Version 15.0
AXPvme 230	Version 15.0
AXPpci	X4.7
DEC 2000	Version 2.2
DEC 3000	Version 6.9
DEC 4000	Version 3.9
DEC 7000	Version 4.9
DEC 10000	Version 4.9
Digital Alpha VME 2100	Version 4.3
Digital 21064A PICMG Alpha CPU	X4.7
Digital 21164A PICMG Alpha CPU	X4.7
EB64+ SBC	Version 4.5
EB66+ SBC	Version 4.5
EB164 SBC	Version 4.5

[a]This system is new and is shipped with the correct firmware already installed on the system.

1.4.6.1 Updating Firmware on AlphaPC64, AlphaPC164, EB64+, EB66+, and EB164 Single-Board Computers

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.

1.4.7 Run Hardware Configuration Utilities

As described in the following sections, depending upon the type of hardware you have, you may have to run hardware configuration update utilities before the installation.

Hardware configuration diskettes are usually shipped with a system when you first receive it. If you do not have the appropriate diskette and did not receive one in the Software Distribution Kit, contact your local Digital sales office or the vendor from which you obtained the hardware.

1.4.7.1 Minimum EISA Configuration Utility (ECU) Firmware Revision Level

Before installing Digital UNIX on a system with an Extended Integrated System Architecture (EISA) bus, you must run the EISA Configuration Utility (ECU). Follow the instructions in your hardware owner's guide.

For Digital UNIX Version 4.0B software, the supported ECU firmware revision is 1.9 or higher. If your system has an EISA bus you will receive a floppy disk that contains the ECU. This floppy disk may be included in the Digital UNIX Software Distribution Kit.

1.4.7.2 Minimum RAID Configuration Utility (RCU) Revision Level

Before installing Digital UNIX on a system employing RAID technology, you must run the RAID Configuration Utility (RCU). Follow the instructions provided in your hardware owner's guide.

For Digital UNIX Version 4.0B software, the supported RCU revision level is 3.11 or higher. The RCU is included on the *Alpha Systems Firmware CD-ROM Version 3.8*.

1.4.7.3 Updating the Advanced RISC Computing (ARC) Console

Advanced RISC Computing (ARC) is an alternate console interface that was designed to support the Windows NT operating system. Some system configuration utilities may require you to switch to the ARC console. Refer to your hardware owner's guide for more information. To run Digital UNIX Version 4.0B, you may need to update the console firmware. The ARC firmware update is included on the *Alpha Systems Firmware CD-ROM Version 3.8*.

1.4.7.4 Updating the System Reference Manual (SRM) Console

To run Digital UNIX Version 4.0B, you may need to update the SRM console firmware. The SRM firmware update is included on the *Alpha*

Systems Firmware CD-ROM Version 3.8. Refer to your hardware owner's guide for more information.

1.5 Installation Types: Update, Full, and Cloned

You can perform an update installation, a full installation which has default or custom procedures, or a cloned installation procedure to install the Digital UNIX Version 4.0B operating system.

Note

If you plan to run this system as a dataless client of a DMS server, refer to the *Sharing Software on a Local Area Network* guide for more information.

An update installation updates your operating system from Digital UNIX Version 4.0 or 4.0A to Digital UNIX Version 4.0B. If your operating system predates Digital UNIX Version 4.0 or 4.0A, you can perform successive update installations to reach Version 4.0B. Refer to Table 2–3 for instructions on how to perform successive update installations.

A full installation affects many of the system files from the previous version of Digital UNIX. File systems and swap areas created during a full installation will overwrite existing data on disks and partitions where they are installed. The full installation searches for and invokes user-supplied files to enable customizations on the system to be installed. The files can be on diskette, a RIS server, the `/var/tmp` directory on the system to be installed, or on CD-ROM.

A cloned installation refers to the process of configuring file systems and installing software on your system exactly as another similar-type system is configured. The cloned installation searches for and invokes user-supplied files to enable customizations on the system to be installed. The files can be on diskette, a RIS server, the `/var/tmp` directory on the system to be installed, or on CD-ROM.

The following sections describe these types of installations.

NOTE

See Appendix C for more information on installation cloning and user-supplied scripts.

1.5.1 Description of an Update Installation

An update installation updates the Digital UNIX base operating system from Version 4.0 or 4.0A to Digital UNIX Version 4.0B. The update installation preserves user files, data files, print and network configurations, user accounts, and any other system setup and customization you may have done. Preserving this data is an advantage over the full installation because a full installation creates new file systems and swap areas that overwrite any existing data on the disk partitions where the file systems and swap areas are to be installed.

You should not perform an update installation if you want to change file system type or change the location of file systems. An update installation does not permit changes to file systems or disk layout.

An update installation does not update optional layered products, but you can still perform an update installation if you have layered products installed. Some layered products operate properly with Digital UNIX Version 4.0B and others must be reinstalled with a version that is compatible with Digital UNIX Version 4.0B. Some layered products, such as DECnet/OSI for Digital UNIX, must be deleted before the update begins and then reinstalled after the update completes. Section 2.5 provides a complete list of the layered products that must be deleted before the update installation.

Completion time varies depending on your processor type, the number of software subsets to be updated, whether you are using CD–ROM or RIS to perform the update, and the speed of your CD-ROM drive if you are using CD-ROM. You need to respond to prompts only during the initial phase of the update. After that, the update installation runs unattended.

How do you start an update installation?
Follow the instructions in Chapter 2.

1.5.2 Description of a Default Installation

A default installation is a full installation that installs a default, mandatory set of Digital UNIX software subsets on a predetermined file system layout on a single disk. The only decision you have to make is what single disk will contain the `root` and `/usr` file systems and swap area.

The file system type for all file systems is the UNIX File System (UFS). One swapping area is configured; other swap areas can be added after the installation. Optional software subsets can be installed later by using the `setld` command. By performing a default installation, you can have your

operating system running with a minimum amount of work because a default installation uses preset defaults for file system layout, file system type, and kernel build options. Following is the file system layout for a default installation:

- 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.
- The swapping area (swap1) is on the `b` partition.

How do you start a default installation?

1. Perform the prerequisite tasks described in Section 1.4
2. Shut down your system to console mode (>>>) and boot the system off the CD-ROM or RIS distribution media as shown in Chapter 4.

1.5.3 Description of a Custom Installation

A custom installation is a full installation that lets you customize the file system layout and lets you select optional software to install. You can use one or more disks, and you have the option to configure a second swap area. You can choose the UNIX File System (UFS) or the Advanced File System (AdvFS) as the file system type for the `root`, `/usr`, and `/var` file systems. You may also choose additional kernel options to tailor your kernel for specific use.

Systems with less than 32 MB of memory do not have the option to select the Advanced File System (AdvFS) as the file system type for `root`, `/usr` or `/var`.

In addition to installing the mandatory set of Digital UNIX software subsets, the custom installation lets you select optional software subsets to customize your system. Dependencies between optional software subsets are checked and resolved.

The amount of free space remaining in the `root`, `/usr`, and `/var` file systems is displayed as you select each optional software subset to install.

The graphical user interface provides access to the Disk Configuration Utility. This utility lets you repartition disks before or after you select optional software if the partition you chose is too small for a particular file system.

How do you start a custom installation?

1. Perform the prerequisite tasks shown in Section 1.4
2. Read the disk planning information in Chapter 3 to decide which disks and partitions to use for file systems and then decide whether or not you should use the default disk partitions or customize them.
3. Shut down your system to console mode (>>>) and boot the system off the CD-ROM or RIS distribution media as described in Chapter 4 .

1.5.4 Description of a Cloned Installation

A cloned installation lets you duplicate the file system layout, file system type, and software subset selections from a system that has already been installed with Digital UNIX Version 4.0B.

When a system is installed with Digital UNIX Version 4.0B, a configuration description file (CDF) is generated that contains installation-specific configuration information based on the results of the questions answered during the installation. This file is located on the installed system in the `/var/adm/smlogs` directory under the file name `install.cdf`. The CDF contains all the configuration information required to perform an initial system installation on a client system.

Once a suitable CDF has been located and optionally modified, the administrator has minimal involvement in the installation cloning process on the client systems. A cloned installation procedure uses the same disks and partitions to create a file system layout and installs the same set of software subsets as defined in the CDF. If your system is set up to perform a cloned installation, you do not have to answer any installation questions related to disk and software selections because the answers are already stored in the CDF.

1.6 UNIX Shell Option

Both the text-based and graphical installation interfaces provide a way for you to access a UNIX shell. The primary purpose of the UNIX shell option is to provide a way to perform disk and file system maintenance before the installation and to perform disaster recovery tasks.

When you start a text-based, menu-driven installation, the UNIX shell is presented as an option from the first menu. If you are using the graphical interface, you access the UNIX shell from a button labeled `UNIX Shell`. Regardless of the interface, this option puts your system into a Bourne

shell in single-user mode with superuser privileges. To restart the installation procedure for the UNIX shell, enter `restart`.

The distribution media (CD–ROM or RIS) contains file systems that are laid out just as the software would be installed on the system and contains directly accessible `root`, `/usr`, and `/var` areas. This format makes almost every Digital UNIX command and utility available in the UNIX shell even if your operating system is not yet fully functional. In effect, the mounted distribution media is a complete Digital UNIX file system.

The UNIX shell provides a way for you 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. Digital recommends that only experienced users choose the UNIX shell option.

Refer to Chapter 7 for more information about the UNIX shell.

1.7 Summary of the Installation Procedure

Table 1–7 summarizes the procedure for the default and custom installations regardless of the interface (graphical or text-based). Review these steps to prepare yourself for the information you must enter during the actual installation procedure.

If you decided to perform an update installation, Chapter 2 contains all the information you need.

If the RIS administrator has set up your system for a cloned installation, make sure you perform the preinstallation tasks described in Section 1.4 and then boot your system from the RIS server as described in Chapter 4. Refer to Section 5.1.3 for the sequence of events during a cloned installation.

Table 1–7: Summary of the Full Installation Procedure

Installation Task	Applies to Default or Custom Installation?	Information Located In:
Complete preinstallation tasks.	Default/Custom	Section 1.4
Plan disk space and file system layout.	Custom	Chapter 3
Optionally, create user-supplied files.	Default/Custom	Appendix C
Invoke the full installation procedure by booting the system from the network or CD-ROM.	Default/Custom	Chapter 4

Table 1–7: Summary of the Full Installation Procedure (cont.)

Installation Task	Applies to Default or Custom Installation?	Information Located In:
Select the type of installation to perform.	Default/Custom	Section 5.3
Enter a host name, location and time zone, and date and time for CD-ROM installations.	Default/Custom	Section 5.4 through Section 5.7
Select a disk for the `root` file system.	Default/Custom	Section 5.8
Select the file system type for the `root` file system.	Custom	Section 5.9
Select the disk and partitions for the `/usr` and `/var` file systems.	Custom	Section 5.10 and Section 5.11
Select the file system type for `/usr` and `/var`.	Custom	Section 5.9
Select up to two swap areas.	Custom	Section 5.12
Install mandatory software subsets only.	Default	Section 5.13
Install mandatory and select optional software subsets.	Custom	Section 5.14
Enter commands to reboot the system.	Default/Custom	Section 5.18
The installation procedure configures the system and software.	Default/Custom	Section 5.19
The installation procedure builds the kernel for default installations.	Default	Section 5.20
After you select kernel options, the installation procedure builds the kernel.	Custom	Section 5.20.1
Log in for the first time as the user `root`.	Default/Custom	Section 5.21
Set up system for general use.	Default/Custom	Chapter 6

1.8 If Your System Has Factory Installed Software (FIS)

Your system may have been delivered to you with Factory Installed Software (FIS); that is, a version of Digital UNIX is already installed.

Included in the box with your system is the *Factory Installed Software Information Sheet* that describes the software products that are preinstalled for you and how the system is configured.

Connect the hardware as shown in the hardware documentation, and turn on power to the processor and monitor. After some initial system initialization messages are displayed, you are prompted to enter information such as the system's host name, `root` password, geographic location and time zone, and the current date and time. The *FIS Quick Reference Card* is also included in the box with your system and describes how to respond to the prompts for this information. After the kernel build process is complete, refer to Chapter 6 for information about setting up your system for general use.

If the FIS setup halts unexpectedly and you see the `root` system prompt (#), make a note of any error messages that appear on the screen. Then, press `Ctrl/d` to restart the configuration phase. Usually the installation continues, but you will need to correct the error when setup is complete. Refer to the appropriate Digital UNIX document or hardware document to identify and correct the error.

If the error prevents the configuration from proceeding, it may be necessary to reinstall Digital UNIX. To do this, boot your processor as shown in Chapter 4 and refer to Section 1.5 to decide whether you need to do a default or custom installation. You can also consult the RIS system administrator to determine if your system is a suitable candidate for a cloned installation. If you choose the custom installation, be aware that the system disk may already have a customized disk partition table. The customization is usually done at the factory to create disk partitions that are large enough to hold all the software originally installed on the disk.

During the text-based custom installation, you are asked whether you want to preserve the customized partitions or use the default partition table. This option is described in Section 5.8.5. If you choose not to preserve the customized partitions, you may not be able to reload all the software that was originally installed.

A FIS system is generally installed with all base operating system software subsets (those that are prefixed with `OSF`) and some associated products. If you do not need to reinstall all the original software subsets and want to install mandatory software subsets only, perform a default installation. If you want to install mandatory and optional software, perform a custom installation. Use the `setld` command if you want to install or remove software subsets after an installation.

The default and custom installation procedures are described in Chapter 5.

1.9 Installing Worldwide Language Support Software

Digital UNIX is an internationalized operating system. The worldwide language support software subsets provide support for various native languages and countries. Installing the worldwide language support software subsets enables software developers to develop internationalized software that can be used in different countries.

If you want to install the latest version of the worldwide language support software subsets, your system must already be installed with the Digital UNIX Version 4.0B base operating system. Then, follow the worldwide installation instructions in Chapter 9.

The worldwide language support software subsets are located on the CD-ROM labeled *Digital UNIX V4.0B Associated Products Volume 1*.

If you want to perform an update installation of the latest version of the worldwide language subsets, follow the worldwide update installation instructions in Chapter 10.

Descriptions of the worldwide language support software subsets are located in Appendix F.

2

Performing an Update Installation

All the information you need to perform an update installation is included in this chapter. This chapter includes the following information:

- Quick start instructions for users experienced with update installation
- Preparing for an update installation
- Invoking the update installation from CD–ROM or RIS
- Responding to the phases of the update installation
- How the update installation affects layered products
- Performing administrative tasks after the update is complete by using the `Update Administration` utility
- Updating the reference page database after the update installation

Note

If you want to update a system that has worldwide language support installed, use the update procedures shown in Chapter 10. The `wwinstallupdate` program deletes worldwide support subsets, invokes `installupdate` to update the base operating system software subsets, and then updates worldwide support subsets and merges the saved system files.

The goal of this chapter is to provide the information necessary for you to perform the user actions shown in Table 2–1.

Table 2–1: Summary of User Actions

After reading this chapter, you will ...
Perform prerequisite tasks before starting the update.
Decide whether to use CD-ROM or the network as the distribution media.
Perform prerequisite tasks based on the media you choose.
Start the update installation from CD-ROM or RIS.
Respond to prompts during the early phase of the update.

Table 2–1: Summary of User Actions (cont.)

After reading this chapter, you will ...
Use the Update Administration Utility to perform postinstallation tasks.
Run the `catman -w` command to update the `whatis` reference page database.

2.1 Quick Start for Experienced Users

If you have performed an update installation before, you probably do not have to read the detailed information in this chapter. The *Update Installation Quick Reference Card* is intended for experienced users, and you may want to consider using it as a guide when performing the update installation.

Table 2–2 provides the steps to get you started quickly.

Table 2–2: Steps for Experienced Users

If you have experience performing update installations...	Follow Instructions In:
Perform prerequisite tasks.	Section 2.5
Start the update installation from CD-ROM.	Section 2.6
Start the update installation from RIS.	Section 2.7
Manually merge files if necessary.	Section 2.10
Perform file administration tasks using the Update Administration Utility.	Section 2.15

2.2 What Is an Update Installation?

An update installation updates your Digital UNIX system from Version 4.0 or 4.0A to Digital UNIX Version 4.0B. You cannot update your system directly to Version 4.0B if the Digital UNIX release currently installed on your system predates Version 4.0 or 4.0A. If your system predates Version 4.0 or 4.0A, you can perform successive updates to reach Version 4.0B.

Table 2–3 provides the steps necessary to perform successive updates.

Table 2–3: Successive Update Paths

If you are currently using...	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 `setld -l`
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

If you require additional versions of the operating system, software kits can be ordered by calling 1–800–DIGITAL.

An update installation preserves disk partitions, file systems, file customizations, your print and network configuration, user accounts, user files, and any other system setup you may have done on a system that is running Version 4.0 or 4.0A of the Digital UNIX operating system. Preserving this data is an advantage over a full installation, because a full installation creates new file systems and swap areas that overwrite any existing data on the disk partitions where the file systems and swap areas are to be installed.

You should not perform an update installation if you want to change file system type or change the location of file systems. An update installation does not permit changes to file systems or disk layout.

Base software subsets that are already installed on your Version 4.0 or 4.0A system are updated to Version 4.0B. In addition, any mandatory base software subsets that were introduced in Version 4.0B are installed automatically. Digital UNIX base software subset names start with the prefix `OSF` and can be viewed by using the following command line:

```
# setld -i | grep ^OSF
```

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 8 for more information about using the `setld` command.

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 after the base update installation process

completes. Refer to the installation instructions provided with the layered product.

2.2.1 Completion Time for an Update Installation

Update installations from RIS complete in 90 to 120 minutes. Update installations from CD-ROM complete in 90 to 150 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 RIS), the speed of your CD-ROM drive if you are using CD-ROM, and network traffic if you are using RIS.

2.2.2 How Existing Files Are Affected During an Update Installation

This section describes the files that are affected by the update installation.

The update installation does not delete any user files (that is, files that have been created by system users that were not shipped as part of the Digital UNIX operating system). The files that the update installation affects are the following:

- Protected System Files (.new..)

  An inspection of your system will show a number of files labeled with `.new..` prefixed to the file name. These files are special to the Digital UNIX update installation. The `.new..` prefix lets a file be delivered to the system without overwriting the existing, and possibly customized, version of the file. One example of a protected file is the `/etc/hosts` file that is shipped as `/etc/.new..hosts`. The existing `/etc/hosts` file is considered the configured version of the file and typically contains customizations that are not present in the `/etc/.new..hosts` file. Only the configured version of protected system files should be customized. The `.new..` version of a file should never be customized.

  Similar to the `.new..` prefix, the `.proto..` prefix also exists for all protected system files. Every `.new..` file has a corresponding `.proto..` file. The `.proto..` files have special significance for Dataless Management Services (DMS) environments where a centralized server maintains the `root`, `/usr`, and `/var` file systems for client systems. DMS server System Administrators provide site-wide customizations in the `.proto..` files before the configured versions are used by the server's dataless clients.

  A benefit of performing an update installation is that customizations to protected system files are preserved. The mechanism for preserving customizations is the merge process. The update procedure detects whether customizations exist by comparing the existing `.new..` file against the configured version. If customizations have been made, new

functionality is merged into the configured file. In the event of a failure, the customized version of the file is saved with a `*.PreMRG` extension before the merge process.

It is important that you do not delete the `.new..` and `.proto..` versions of protected system files because they are crucial to the proper operation of the update procedure.

- Unprotected System Files

  There are other customized system files that may be on your system that are not **merge protected** by the update installation. Each file is saved to a `.PreUPD` extension and is recorded in the log file `/var/adm/smlogs/upd_custom_files`. You must manually merge your customizations into the new files when the update is complete.

  When your manual merges are complete, invoke the Update Administration utility by entering `/usr/sbin/updadmin` to perform administrative tasks on the saved file versions.

  Any changes to system files, not just the files that you deliberately modified, are found. Some system files might be changed by a process such as installing a software application. Other system files might be changed as part of the normal system operation. For example, an empty log file becomes filled with data as the system runs.

- Obsolete System Files

  Obsolete files are files that were shipped in Digital UNIX Version 4.0 or 4.0A, but are no longer part of Digital UNIX Version 4.0B. After an update installation you have an opportunity to save these obsolete files so that you can archive them or delete them from the operating system via the Update Administration Utility (`updadmin`).

2.3 Source of the Update Installation

There are two distribution methods from which to invoke an update installation:

- From the Digital UNIX CD–ROM distribution media
- Over a network connection to a Remote Installation Services (RIS) server that is serving Digital UNIX Version 4.0B

The update installation is performed from single-user mode. You must be superuser or the user `root` to bring a system down to single-user mode. How you bring the system down to single-user mode depends on the following:

- If your system is running in an environment with multiple users, issue the `shutdown` command with the following syntax:

shutdown *time* [*message to users*]

- If your system is at the UNIX Shell prompt (#) in single-user mode because you exited from the full installation procedure, halt the system to bring the system to the console mode (>>>), and then enter the `boot` command as follows:

  ```
  # halt
  >>> boot -flag s system_disk
  ```

  In the previous example, *system_disk* is the disk where your current `root` file system resides. The system disk is usually the value specified by the `bootdef_dev` console variable.

The procedure to start the update from the command line depends on whether you are using CD-ROM or RIS as the source of the update. Section 2.6 describes how to start the update from CD-ROM, and Section 2.7 describes how to start the update from RIS.

Caution

Do not use the `setld -l` command to update from Digital UNIX Version 4.0 or 4.0A to Digital UNIX Version 4.0B. The only method to update your system other than performing a full installation is to use the `/sbin/installupdate` program that is described in this chapter.

2.4 Summary of the Update Installation Procedure

The following summarizes the steps in an update installation:

1. Perform the prerequisite tasks that must be completed regardless of the distribution media you are using. These tasks include backing up your system, deleting layered products that will halt the update process, updating your system firmware, and checking disk space. These tasks are described in Section 2.5.
2. Decide whether you are updating to Digital UNIX Version 4.0B from the CD-ROM or RIS distribution media and perform prerequisite tasks depending upon what distribution media you choose. Refer to Section 2.6.1 for CD-ROM prerequisite tasks. Refer to Section 2.7.1 for RIS prerequisite tasks.
3. Start the update installation.
4. Respond to prompts during the initial phase of the update.
5. Perform postinstallation tasks:

- Check the installation logs to make sure all file merges were successful
- Manually merge customizations where necessary
- Use the Update Administration Utility to perform file administration tasks
- Install optional software subsets if desired

2.5 Preparing for an Update Installation

Whether you are performing the update installation from CD–ROM or a RIS server, you must perform the following tasks before you begin:

1. If you previously performed an update installation on your system, you should have used the Update Administration Utility to remove unnecessary files before attempting the next update installation. When you invoke the Update Administration Utility to view files, the message `deleted from system` indicates that you had used the utility to delete files after the last update installation. If you have not removed any files, please do so now. The Update Administration Utility lets you remove `.PreMRG`, `.PreUPD`, and obsolete files that may conflict with the newly loaded software subsets. Removing these files also frees up disk space. Refer to Section 2.15 for more information about using the Update Administration Utility.
2. Back up your current operating system.

   Digital recommends that you back up your 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. Should this happen, you must restore the original version of Digital UNIX that was previously installed on your system before you can attempt another update. Refer to *System Administration* for information about backing up your current system.
3. Delete certain layered products before beginning the update.

   Some layered products must be deleted before the update installation can proceed. Section 2.8.2.1 shows an example of the messages you will see if these layered products are detected during the update process. The software subsets associated with the following layered products halt the update installation and must be deleted before beginning the update:

   - DEC Open3D
   - DECnet/OSI

- DECsafe Available Server Environment (ASE)
- Distributed Computing Environment/Distributed File System (DCE/DFS)
- Kubota Workstation Software (KWS)
- Multimedia Services (MME)
- System V Environment (SVE)
- Worldwide Language Support - if you want to update a system that has worldwide language support installed, you should use the `wwinstallupdate` command. Refer to Chapter 10.

Use the `setld` command to delete the software subsets associated with these layered products. Section 2.8.2.1 describes how to delete layered products.

4. Check disk space.

   If your file systems have less space available than the amount shown in Section G.2, consider using the `setld` command to delete unnecessary software subsets before you begin the update. You should also remove all unnecessary kernel files and `core` files that are consuming space. Refer to Chapter 8 for more information about using the `setld` command.

   Use the `df` command to check your current disk usage. Refer to Section G.2 for information on the disk space requirements for the update installation of Digital UNIX Version 4.0B.

5. Update system firmware.

   To run Digital UNIX Version 4.0B, your system might require a firmware update. Firmware updates are located on the *Alpha Systems Firmware CD-ROM Version 3.8* CD-ROM that is included with your Digital UNIX software distribution kit. Update your system's firmware before beginning the update installation. Section 1.4.6 provides the minimum firmware revision for each supported processor.

After you have completed all prerequisite tasks, proceed to Section 2.6 if you are using the Digital UNIX CD–ROM to perform the update. Proceed to Section 2.7 if you are using RIS to perform the update.

2.6 Running the Update Installation from CD–ROM

Read this section if you are performing an update installation from CD–ROM media.

2.6.1 Before You Start

If you plan to update your system from CD-ROM media, you need to know the CD-ROM device name where the CD-ROM will be mounted.

If you do not know the CD-ROM device name, use the `file` command specifying the raw device to find it. (You must be root to run the `file` command.) CD-ROM devices are prefixed with the letters `RRD`. Using the `|` (`pipe`) command to filter the output of the `file` command to the `grep` command to search for `RRD` ensures that only your CD-ROM devices are output in the result of the command. Enter a command similar to the following; you must be logged in as root:

```
# file /dev/rrz*c | grep RRD
/dev/rrz4c: character special (8/4098) SCSI #0 RRD44 disk #32 (SCSI ID #4)
```

In the previous example, the CD-ROM device is `RRD44` on device `/dev/rz4c`. If you have more than one `RRD` device connected to your system, specify the device where the CD-ROM will be mounted.

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.

2.6.2 Starting the Update Installation from CD–ROM

Perform the following steps to start the update installation from CD–ROM:

Note

Before beginning the update installation, be aware that the process takes from 90 to 150 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.

1. Verify that your system is backed up so that you can recover the previous version if necessary. The *System Administration* guide documents backup procedures (using the `dump` command).
2. As superuser or `root`, boot to single-user mode or shut down your system.
   - The following example shows how to switch to superuser and then shut down the system to single-user mode:

     ```
     # su -
     password:
     ```

```
# shutdown +10 Please log out
```

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

- If your system is at the console mode prompt (>>>), you can boot to single-user mode by entering the following command:

  ```
  >>> boot -flag s system_disk
  ```

  In the previous example, *system_disk* is the value specified by the bootdef_dev console variable.

Once your system is in single-user mode, the screen looks similar to the following:

```
INIT: SINGLE-USER MODE
#
```

3. Follow this step only if you installed and are using the Logical Storage Manager (LSM); otherwise, proceed to Step 4.

   Enter the following command to activate LSM before running bcheckrc (in Step 4):

   ```
   # /sbin/lsmbstartup
   ```

4. Mount the local file systems as follows:

   ```
   # /sbin/bcheckrc
   ```

   The bcheckrc command also runs fsck to check the file system. If fsck finds a problem with the root (/) partition, the system shuts down and reboots.

5. If your CD-ROM drive requires you to put the CD-ROM in a caddy, ensure that the CD–ROM is loaded in the caddy and drive as described in Appendix B.

6. Do one of the following to start the installupdate from CD-ROM. The optional -i flag invokes an interactive kernel build where you can select kernel options from a menu and edit the configuration file to include any kernel customizations that you had in the previous kernel that your system may require.

   - Enter the /sbin/installupdate command with the following syntax:

     /sbin/installupdate [-i] *cdrom_device*

     The *cdrom_device* parameter is the device special file name of the CD-ROM drive. For example, to invoke /sbin/installupdate with an interactive kernel build from CD-ROM device rz4c, enter the following command:

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

- If you already have an instruction in your /etc/fstab file to mount the CD–ROM device, the distribution media is mounted automatically on the mount point that is specified in your existing /etc/fstab file. In that case, enter the /sbin/installupdate command with the following syntax:

  /sbin/installupdate [-i] *mount_point*

  The mount_point parameter specifies the mount point of the CD-ROM device in the /etc/fstab file. For example:

  ```
  # /sbin/installupdate -i /cdrom
  ```

  In the previous example, /cdrom is the mount point specified in the /etc/fstab file.

Caution

Pressing Ctrl/c during the update installation causes installupdate to exit. However, if you press Ctrl/c while software subsets are loading, serious operating system corruption can occur that may render the operating system unusable. In that case, you may have to restore the backed-up version of the operating system before you can attempt another update.

Proceed to Section 2.8 to continue the update installation.

2.7 Running the Update Installation from a RIS Server

Read this section if you are performing an update installation from a RIS server.

2.7.1 Before You Start

Complete these steps before you start the update installation from a RIS server:

1. Ask the RIS server administrator to ensure that your system is registered as a client of the RIS server and is able to access the Digital UNIX Version 4.0B RIS area. Refer to *Sharing Software on a Local Area Network* for more information about RIS.
2. The Internet name and address of the server may need to be in your system's /etc/hosts file in order for you to execute the showmount command. You can invoke the netconfig application to add the name and address of the server or edit the /etc/hosts file to include an entry for the server, similar to the following:

```
16.141.113.221 system9.dec.com system9
```

The hosts entry in /etc/svc.conf must allow for local resolution of host (Internet) addresses, for example: hosts=local,yp. You can invoke the svcsetup command to modify hosts to local or edit the /etc/svc.conf file. Refer to *Network Administration* if you need more information about obtaining network status. Refer to *Sharing Software on a Local Area Network* if you need more information about RIS.

3. 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. Your system is not able to communicate with the RIS server if you obtain the following results from the /sbin/ping command:

- Only your system name and IP address are displayed if the name server recognizes your system name but the network connection is not set up.
- The message Unknown host is displayed if your system does not recognize the RIS server.

4. Verify that your system is backed up so that you can recover the previous version of the operating system if necessary.

2.7.2 Starting the Update Installation from a RIS Server

Perform the following steps to start the update installation from a RIS server:

Note

Before beginning the update installation, be aware that the process takes from 90 to 150 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.

---

1. As superuser or root, boot to single-user mode or shut down your system.

   - The following example shows how to switch to superuser mode and then shuts down the system:

     ```
     # su -
     password:
     # shutdown +10 Please log out
     ```

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

   - If your system is at the console mode prompt (>>>), you can boot to single-user mode by entering the following command:

     >>> **boot -flag s** *system_disk*

     In the previous example, *system_disk* is an entry such as *DKA0*.

   When your system is in single-user mode, the screen looks similar to the following:

   ```
   INIT: SINGLE-USER MODE
   #
   ```

2. Follow this step only if you installed and are using the Logical Storage Manager (LSM); otherwise proceed to Step 3.

   Enter the following command to activate LSM before running bcheckrc (in Step 3):

   # **/sbin/lsmbstartup**

3. Mount the local file systems as follows:

   ```
   # /sbin/bcheckrc
   ```

   The bcheckrc command also runs fsck to check the file system. If fsck finds a problem with the root (/) partition, the system shuts down and reboots to multiuser mode.

4. Enter the following command to delete the table of Internet addresses to ensure that the routed and gated daemons do not start up during the update installation:

   # **route flush**

   Successful completion of the route flush command looks similar to the following:

   ```
   default      16.70.223.135   done
   16.70.143    16.70.223.198   done
   ```

5. Enter the `/sbin/installupdate` command with the following syntax:

   /sbin/installupdate [-i] *ris_server_name:*

   The optional `-i` flag invokes an interactive kernel build where you can select kernel options from a menu and edit the configuration file to include any kernel customizations that you had in the previous kernel that your system may require.

   For example, to run `/sbin/installupdate` from a RIS server named `system9` with an interactive kernel build, enter a command similar to the following:

   ```
   # /sbin/installupdate -i system9:
   ```

   The RIS server name must be appended with a colon (`:`).

   Caution

   Pressing `Ctrl/c` during the analysis phase of the update installation causes `installupdate` to exit. However, if you press `Ctrl/c` while software subsets are loading, serious operating system corruption can occur that may render the operating system unusable. In that case, you may have to restore the backed-up version of the operating system before you can attempt another update.

Proceed to Section 2.8 to continue the update installation.

2.8 What Happens During the Update Installation Process

This section describes the information and prompts that are displayed during the update installation process.

The number of software subsets installed on your system and the type of installation media used affects the time required for an update. You are required to enter information during the early phases of the update. You do not need to monitor the update under most circumstances. However, if an error occurs, messages notify you and offer options for proceeding.

The phases of the update installation include the following:

- Verifying the system state
- Checking for layered products that may halt the update installation (potential response from you)
- Checking the system status
- Checking for file type conflicts

- Checking file space requirement
- Detecting unprotected customized files
- Loading and merging software subsets
- Configuring and merging software subsets
- Building the kernel. This step may require interaction from you if you invoked `installupdate` with the `-i` option.

The following sections describe the information displayed on your screen during each phase of the update.

2.8.1 Verifying the System State

The first message displayed on your screen confirms the new version of the operating system, and the version that you are updating from. This message also reminds you that your system should be backed up so that you can recover the current version of the system if an interrupt should occur.

```
The Digital UNIX Version 4.0B (Rev. xxx) Update Installation will
update the following Digital UNIX products:

        Digital UNIX V4.0
        Digital UNIX V4.0A

Digital Equipment Corporation recommends that you perform complete
system software backups before proceeding.
```

At this point, the update procedure also checks for certain layered products that may be incompatible with update installations. If these products are found on your system, warning messages are displayed as described in Section 2.8.2. If the layered product messages are not displayed, and you are satisfied with the state of your system backup, you can proceed with the update. A prompt is displayed as follows:

```
Do you want to continue the update installation? (y/n) [n]:
```

Enter `y` to proceed with the installation or `n` if you want to exit and back up your system.

2.8.2 Checking for Layered Products

This section applies only if the update installation detects layered products that may not be compatible with Digital UNIX Version 4.0B.

If no layered products are found, proceed to Section 2.8.3 to continue the update installation.

In Digital UNIX Version 4.0B, `installupdate` checks if certain layered products are installed on your system. Layered products are products that

are installed on top of the Digital UNIX operating system. If detected, these layered products may be affected by the update as follows:

- Some layered products must be deleted before the update can proceed. Section 2.8.2.1 shows an example of the messages you will see.
- Some layered products operate correctly after an update. However, you will see a warning about these layered products to remind you to test the layered product after the update is complete. Section 2.8.2.2 shows an example of the messages you see.

2.8.2.1 Layered Products That Halt the Update Installation

If applications or layered products installed on your system prevent `installupdate` from continuing, a message similar to the following is displayed:

```
------------------------------------------------------------------
This system cannot be updated with the following layered products
installed on it.  Please remove these products from your system
before attempting an update installation:

    DECnet/OSI
    DEC Open3D
    DECsafe Available Server Environment
    Kubota Workstation Software
    Multimedia Services
    Distributed Computing Environment
    System V Environment
    Worldwide Language Support

------------------------------------------------------------------
Press <RETURN> to review message again.
```

If this message appears, the update installation cannot proceed and you must exit at the following prompt:

```
Enter 'stop' and press <Return> to stop:
```

When you enter a character and press `Return`, your system is returned to its original state, that is, the state your system was in before the update procedure.

Follow these steps to delete the layered product that is preventing the update installation from continuing:

1. Use the `setld -i` command to determine the correct software subset names to delete. In the following example, assume that `DECnet/OSI` prevented the update installation from continuing. The following example shows how to determine the software subset names associated with `DECnet/OSI` and then how to delete them:

   ```
   # setld -i | grep -i decnet | grep installed
   DNABASE410      installed      DECnet/OSI Base Components
                                    (DECnet/OSI Standard Run-time
   ```

```
                                  Environment)
DNADLI410       installed      DECnet/OSI Datalink Components
                                 (DECnet/OSI Standard Run-time
                                  Environment)
DNAMOP410       installed      DECnet/OSI MOP Utilities
                                  (Optional DECnet/OSI
                                   Components)
DNANETMAN410    installed      DECnet/OSI Network Management
                                 (DECnet/OSI Standard Run-time
                                  Environment)
```

The output of the `setld` and `grep` commands show that `DNABASE410`, `DNADLI410`, `DNAMOP410`, and `DNANETMAN410` are the installed `DECnet/OSI` software subsets that must be deleted.

2. Use the `setld -d` command to delete the software subsets:

   # **setld -d DNABASE410 DNADLI410 DNAMOP410 DNANETMAN410**

3. After software subset deletion is complete, restart the update installation:

   - Follow the procedure in Section 2.6.2 to start the update installation from a CD–ROM device.
   - Follow the procedure in Section 2.7.2 to start the update installation from a RIS server.

When the update installation is complete, use the `setld` command to reinstall the version of the layered product that is compatible with Digital UNIX Version 4.0B.

2.8.2.2 Layered Products That Do Not Halt the Update Installation

If any layered products currently installed on your system let `installupdate` continue but may require reinstallation, a message similar to the following is displayed:

```
------------------------------------------------------------------
The following layered products may require re-installation after
the update installation has completed:

     Product A
        .
        .
        .
     Product Z
------------------------------------------------------------------
Press <RETURN> to review message again.
```

You have the option to exit from the installation procedure at this point and the following prompt is displayed:

```
Do you want to continue the update installation? (y/n) [n]:
```

Enter `y` to proceed with the update installation or `n` if you want to exit the update installation and remove the layered products before restarting the update.

If you decide to proceed without removing these layered products, test the layered product when the update is finished. Digital recommends that you reinstall any layered products that are critical to the use of the updated operating system. Go to Section 2.8.3 to continue the update installation.

2.8.3 Checking the System Status

The next step in the update involves checking the system status and collecting data that is used in the update. This step takes up to 10 minutes, and you are not required to enter any data.

A `Working...` message displays approximately once every two minutes while system status is checked. These messages are similar to the following:

```
******   Checking current state of system

Depending on the system configuration, this may take
up to 10 minutes...
        Working....Fri Dec 13 12:10:27 EDT 1996
        Working....Fri Dec 13 12:11:52 EDT 1996
        Working....Fri Dec 13 12:13:59 EDT 1996
```

During this phase of the update, the update procedure does the following:

- Makes a list of installed software subsets. This list is used for selecting and loading Digital UNIX Version 4.0B software subsets.
- Runs `fitset` to ensure that there is adequate disk space for the updated software subsets.
- Checks for file type conflicts. File type conflicts are described in Section 2.8.4.
- Makes a list of files that are obsolete in Digital UNIX Version 4.0B.
- Makes a list of unprotected system files that have been customized.

If no problems are detected during the checking phase, you do not need to enter any more information beyond this point. If no conflicts are displayed, proceed to Section 2.8.7 to continue the update installation process.

2.8.4 Checking for File Type Conflicts

This section applies only if file type conflicts are found by the update installation procedure.

Digital UNIX system file types can be files, directories, symbolic links, block devices, or pipes. The update installation procedure expects to find system file types currently installed as they were shipped with the base operating system. The status of each file type is verified during the system status check. For example, if a file is shipped as type symbolic link in Digital UNIX Version 4.0 or 4.0A and you later customize it to a type

directory, when the same file ships as type symbolic link in Digital UNIX Version 4.0B, the update installation detects the difference and exits.

When file system types are modified as part of a system customization, the update installation cannot proceed. This is intended to preserve the integrity of the software product about to be installed.

Messages display when file type conflicts are found. In the following sample message, `/usr/tmp` was shipped as a symbolic link and was changed to a directory:

```
The following directories on this system conflict with assigned file
types originally shipped in the Digital UNIX operating system.  This
can be caused, for example, if a symbolic link is replaced with a
real directory.

These conflicts must be resolved before an update installation can be
performed on this system.   Additional file status information can be
found in subset inventory files located in the /usr/.smdb. directory.

For later review, this message is also logged in

        /var/adm/smlogs/update.log

The update procedure will exit and return the system to its original state

        ./usr/tmp should be Symbolic Link to ../var/tmp
```

You can review the list of file conflicts or exit as follows:

```
Press <RETURN> to review message again.
Enter any character and press <RETURN> to exit:
```

When you exit from the update procedure, the following message is displayed:

```
Returning system to Pre-Update state...done.
Exiting Update Installation.
```

You must resolve any conflicts shown in the message before you can restart the update installation. If you do not resolve the conflicts, you cannot perform an update installation.

2.8.5 Checking File Space Requirement

The update installation procedure performs file system size checks to make sure that the list of new software subsets fits on your system. In the preparation stage before the update, you should have removed all unwanted `core` files, crash dumps, and extra kernels that may be consuming space.

This section describes what happens when your system has sufficient disk space and what happens when your system has insufficient disk space. It also provides guidelines on how to recover additional free disk space.

2.8.5.1 System Has Sufficient Disk Space

If the update installation process determines that there is adequate space for all new software subsets, no user interaction is required, and the process continues by loading the software subsets as shown in Section 2.8.7.

2.8.5.2 System Has Insufficient Disk Space

If the update installation determines that there is inadequate space for the loading of new software subsets, it attempts to recover space from saved unprotected customized files (i.e., files with the `.PreUPD` extension). One of the following three instances may occur:

- If there are no unprotected customized files on the file system, then the update installation process displays a message similar to the following:

```
------------------------------------------------------------------

file system / needs 985 Kbytes more to install the software specified.

------------------------------------------------------------------

The Digital UNIX V4.0B (Rev. xxx) Update Installation has determined
that  there is not enough  disk space  to continue the installation.
You will need to remove files and/or subsets from the file systems
mentioned above and then attempt the update again.

Returning system to Pre-Update state...done.

Exiting Update Installation...
```

  The system exits from the update installation process.

  After the system exits from the update installation procedure, you will need to remove files and/or subsets from the file systems that require more space *before* attempting to run the update installation procedure again. Refer to Section 2.8.5.4 for information on how to obtain additional space.

- If the amount of space it can recover from removing saved copies of unprotected customized files is *greater than* the space it needs to load new software subsets, a message similar to the following is displayed:

```
------------------------------------------------------------------

file system /usr needs 2631 Kbytes more to install the software specified.

file system / needs 985 Kbytes more to install the software specified.

------------------------------------------------------------------

The Digital UNIX V4.0B (Rev. xxx) Update Installation has determined
that  there is not enough  disk space  to continue the installation.
The update procedure  has used  some disk space  to save unprotected
customized system files on your system to a '.PreUPD' suffix. If these
```

```
files are removed, the installation can proceed.

The unprotected customized system  files are  typically  Digital UNIX
system files  that have been  customized  by the user  or by layered
products.  These files will be overwritten once the update procedure
begins to install new subsets and are therefore saved to a '.PreUPD'
suffix to avoid any loss of data.

If you wish to backup  the unprotected customized system files,  you
can do so by choosing  'u'  from the menu below,  which will put you
into the Update Administration Utility.

If you choose to continue the update installation,  by choosing  'c'
from the menu below,  the  '.PreUPD'  files will be removed from the
system.

The current disk usage per file system for .PreUPD files is:

     File System   .PreUPD usage (Kbytes)   Space Needed (Kbytes)
     ----------    ----------------------   ---------------------
     /usr           7200                    2631
     /              1055                     985


       Digital UNIX Update Installation Main Menu
       ------------------------------------------
       (c)  Continue the update installation
       (q)  Quit the update installation
       (u)  Update Administration Utility
       (v)  View error message again

       Enter your choice:
```

Enter one of the following:

– Type c to continue the update installation.

  The update installation process removes the unprotected customized files for you automatically and continues with the update installation process.

– Type q to exit from the update installation procedure.

– Type u to invoke the Update Administration Utility.

  The Update Administration Utility lets you save the unprotected customized files to another file system and delete the files after they have been saved. After you recover the required disk space, return to the Digital UNIX Update Installation Main Menu and continue the update installation procedure.

– Type v to display the error message again.

- If the amount of space it can recover from removing saved copies of unprotected customized files is *less than* the space it needs to load new software subsets, a message similar to the following is displayed:

```
---------------------------------------------------------------

file system /usr needs 2631 Kbytes more to install the software specified.
```

```
file system / needs 985 Kbytes more to install the software specified.

-----------------------------------------------------------------

The Digital UNIX V4.0B (Rev. xxx) Update Installation has determined
that  there is not enough  disk space  to continue the installation.
The update procedure  has used  some disk space  to save unprotected
customized system files on your system to a '.PreUPD' suffix.

The unprotected customized system  files are  typically  Digital UNIX
system files  that have been  customized  by the user  or by layered
products.  These files will be overwritten once the update procedure
begins to install new subsets and are therefore saved to a '.PreUPD'
suffix to avoid any loss of data.

If you wish to backup  the unprotected customized system files,  you
can do so by choosing  'u'  from the menu below,  which will put you
into the Update Administration Utility.  This utility will allow you
to save off and/or remove these .PreUPD files from the system.

Once you remove the  .PreUPD  files you will  still need  to free up
some additional disk space,  since the current  amount of disk space
you need  is greater than the total  disk space  used by the .PreUPD
files, as indicated by the chart below.

The current disk usage per file system for .PreUPD files is:

     File System   .PreUPD usage (Kbytes)   Space Needed (Kbytes)
     ----------    ----------------------   ---------------------
     /usr           1500                    2631
     /              350                     985

       Digital UNIX Update Installation Main Menu
       ------------------------------------------
       (q)  Quit the update installation
       (u)  Update Administration Utility
       (v)  View error message again

       Enter your choice:
```

Enter one of the following:

– Type q to exit from the update installation procedure.

  After the system exits from the update installation procedure, you will need to remove files and/or subsets from the file systems that require more space *before* attempting to run the update installation procedure again. Refer to Section 2.8.5.4 for information on how to obtain additional space.

– Type u to invoke the Update Administration Utility.

  The Update Administration Utility lets you save the unprotected customized files to another file system or delete the files manually. However, you will still need to exit from the update installation procedure after you move or delete the unprotected customized files. After the system exits from the update installation procedure, recover more disk space and run the update installation procedure

again. Refer to Section 2.8.5.4 for information on how to obtain additional space.

– Type `v` to display the error message again.

2.8.5.3 Deleting Individual System Files Does Not Free Space for the Update

Deleting individual files that are part of installed base or layered product subsets will not produce additional free space because the update installation takes into account that these old files will be replaced by new versions. The disk space calculation determines how much additional space is needed to replace an old version of a file with its new version.

If the old version of a file is removed without removing the entire subset in which it resides, the update installation will still put the new version on the system. In this situation, the full size of the new file will be allocated instead of the difference between the size of the original and new versions.

For example, if `/genvmunix` was 7MB and a new version of `/genvmunix` was 8MB, update would need to reserve 1MB of free space for the new version. If `/genvmunix` was deleted before the update, the disk space calculation would then reserve the full 8MB for the new file. So, although, 7MB was freed before the update, 7MB more would be reserved during the update, which would result in no difference in the amount of additional space needed to continue the update.

2.8.5.4 How to Obtain Additional Space

To obtain additional space necessary to perform the update installation, follow these guidelines:

- Remove any noncritical optional subsets using the `setld -d` command. Deleting or moving system files without using `setld` will not give you the additional space needed.

  Refer to Appendix F, which lists the software subset sizes, to help you decide which subsets to remove.

- Delete any noncritical user-added files that are not part of the base or layered product inventory. For example, delete core files and kernels that are no longer required.

- Delete obsolete system files, `.PreUPD` files, and `.PreMRG` files. Use the `updadmin` utility to back up and delete these files.

- For AdvFS file systems, it is possible to save approximately 3 MB in root by building a mandatory only kernel, which is the default, rather than performing an interactive kernel build (i.e., do not specify the `-i` flag to the `installupdate` command). However, you must specify the

`-i` flag if there are optional kernel selections that your system depends on that cannot be satisfied by a mandatory kernel. For descriptions of the kernel selection options, see Section 5.20.1.

2.8.6 Detecting Unprotected Customized File

This section applies only if unprotected customized files are detected during the update installation.

If `installupdate` detects any unprotected customized system files as described in Section 2.2.2, an attempt is made to save them to a `.PreUPD` extension, for example, `custom_file.PreUPD`, so that you can decide what to do with them after the update is complete.

If for any reason unprotected customized files cannot be saved, the Update Administration Utility is invoked automatically and lets you view these files and save them to backup media. The file name of each unprotected customized file is also logged in the `/var/adm/smlogs/upd_custom_files` file as a reminder of the files that require recustomization.

Files that are successfully saved to the `.PreUPD` extension are listed as such in the file `/var/adm/smlogs/upd_custom_files`.

The following message is displayed if customized files are found and successfully saved:

```
Unprotected customized system files have been found on
this system and have been saved by renaming them with
'PreUPD' file name extension.  A listing of the files
and their associated subset, can be found in
/var/adm/smlogs/upd_custom_files.

After the update installation has completed, you can use
the Update  Administration  Utility  (/usr/sbin/updadmin)
to perform system administration tasks on these files.
```

The following message from the Update Administration Utility is displayed if customized files are found but could not be saved:

```
**** Unprotected Customized System File Administration ****

There are unprotected  customized  versions  of  Digital UNIX
system files currently installed  on  your  system  that are in
danger of being overwritten by new Digital UNIX
Version 4.0B(Rev. xxx) versions of the files.

These files are  typically  customized  by users for projects
```

```
they may be working on, or by layered  product software
implementation.

If you haven't already backed up your system,  save these files
to back up media at this time.  You can restore these files back
onto your system after the update installation has completed.

     Unprotected Customized System File Admin Menu
     ---------------------------------------------
     s) Save files
     d) Delete files
     v) View list of files
     x) Return to installation

     Enter your choice:
```

In the previous example, the Update Administration Utility is invoked automatically, and the menu shows the available options. The Update Administration Utility is described in Section 2.15. If you choose to continue with the update, the following message is displayed:

```
     A listing of unprotected customized system files
     found by the Update Installation has been logged
     in /var/adm/smlogs/upd_custom_files.

     After the update installation has completed, you can use
     the Update  Administration  Utility  (/usr/sbin/updadmin)
     to perform system administration tasks on these files.
```

2.8.7 Loading Software Subsets

Next, `installupdate` loads the Digital UNIX Version 4.0B software subsets that match the software subsets already loaded on your system. Aditionally, all new mandatory software subsets that were introduced in Version 4.0B are loaded automatically. Optional software subsets are loaded only if they were loaded previously. If you want to install additional optional software subsets provided in Digital UNIX Version 4.0B, you must load these by using the `setld` command when `installupdate` is complete.

Caution

Pressing `Ctrl/c` while software subsets are loading causes serious operating system corruption can occur that may render the operating system unusable. You may have to restore the backed-up version of the operating system before you can attempt another update.

While software subsets are being loaded, a series of messages similar to the following is displayed:

```
******   Updating system to Digital UNIX V4.0B (Rev.xxx)

43 subset(s) will be installed.

Loading 1 of 43 subset(s)....

Base System
   Copying from system9 (inet)
        Working....Fri Dec 13 15:21:01 EDT 1996
   Verifying

Loading 2 of 43 subset(s)....

Base System - Hardware Support
   Copying from system9 (inet)
        Working....Fri Dec 13 15:23:28 EDT 1996
   Verifying

Loading 3 of 43 subset(s)....

Compiler Back End
   Copying from system9 (inet)
        Working....Fri Dec 13 15:24:06 EDT 1996
   Verifying

   .
   .
   .

Loading 33 of 43 subset(s)....

Graphical Base System Management Utilities
   Copying from system9 (inet)
   Verifying

Loading 34 of 43 subset(s)....

Graphical System Administration Utilities
   Copying from system9 (inet)
   Verifying

Loading 35 of 43 subset(s)....

Graphical Print Configuration Application
   Copying from system9 (inet)
   Verifying

   .
   .
   .

Loading 42 of 43 subset(s)....

Motif 1.1
   Copying from system9 (inet)
   Verifying

Loading 43 of 43 subset(s)....

Ref Pages: Admin/User
   Copying from system9 (inet)
        Working....Fri Dec 13 15:49:57 EDT 1996
   Verifying
```

```
43 of 43 subset(s) installed successfully.
```

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 that has no dependencies fails to load, you can install it later by using the `setld` command after the update installation is complete.
- If an optional software subset upon which other software subsets have dependencies fails to load, you can install the software subset plus the dependent software later by using the `setld` command after the update installation is complete.
- In the event 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 Digital UNIX operating system before attempting another update installation. If the `OSFBASE410` 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.

2.8.8 Recovering from Failures During Loading of Subsets

If the update installation fails before software subsets are loaded, you can usually recover. If necessary, you can bring your system back to multiuser mode by issuing the following command:

```
# init 3
```

Error messages describe the type of error that occurred. Fix the errors reported by the messages and restart the update installation process. Refer to Section 2.6 if you are running `installupdate` from a CD–ROM, or Section 2.7 if you are running `installupdate` from a RIS server.

If the update installation fails during the loading of mandatory software subsets, you must restore your operating system back to the previous version that was installed on your system and reattempt the update installation after the failure is corrected.

2.9 Merging Software Subsets

When all software subsets are successfully loaded and verified, the protected customized system files are automatically merged with any customized files found on your system. Refer to Section 2.2.2 for a description of the protected files. A series of merge messages similar to the following may be displayed:

```
*** Merging new file ./.new..DXsession into
            existing ./.proto..DXsession


Merge completed successfully.

*** Merging new file ./etc/.new..passwd into
            existing ./etc/.proto..passwd

            adding wnn entry

Merge completed successfully.

*** Merging new file ./etc/.new..rc.config into
            existing ./etc/.proto..rc.config

            Adding DHCP hooks

Merge completed successfully.

.
.
.

*** Merging new file
            ./usr/var/adm/sendmail/.new..sendmail.cf into
            existing
            ./usr/var/adm/sendmail/.proto..sendmail.cf

            adding local.users to sendmail.cf
            adding Mlocal "F=u" flag in sendmail.cf
            correcting Mlocal "F=r" flag in sendmail.cf

Merge completed successfully.

*** Merging new file
            ./usr/share/lib/kernel_options/.new..kernel_options .db into
            existing
            ./usr/share/lib/kernel_options/.proto..kernel_options.db

            modifying Asynchronous Transfer Mode option
            deleting Local Area Transport option
            adding Point-to-Point (PPP)
            adding ACL Subsystem
            adding NTP_TIME

Merge completed successfully.
```

When all merges are complete, the following message is displayed:

```
Update Installation complete with loading of subsets.
Rebooting system with Digital UNIX V4.0B (Rev. xxx)
generic kernel for configuration phase...

Exiting Update Installation...
```

A log file, `/var/adm/smlogs/update.log`, stores the results of software subset loading and merging for your reference.

Next, the update installation configures the software subsets. Proceed to Section 2.10.

2.10 Configuring Software Subsets and Merging

If the system is set to boot to multiuser mode, configuration of the new software subsets starts automatically. If the system reboots to single-user mode, enter the following command:

```
# init 3
```

Configuration refers to the process of tailoring the software subsets, setting the host name, root password, date and time, and time zone, system tuning, and building a kernel that is required to have your hardware operate correctly with the new operating system. The software configuration display is similar to the following:

```
*** SYSTEM CONFIGURATION ***

Configuring "Base System " (OSFBASE410)

   *** Merging new file ./.new..DXsession into
               existing ./DXsession

           Merge completed successfully.

   *** Merging new file ./etc/.new..passwd into
               existing ./etc/passwd

           adding wnn entry

           Merge completed successfully.

   *** Merging new file ./etc/.new..rc.config into
               existing ./etc/rc.config

           Adding DHCP hooks

           Merge completed successfully.

   .
   .


Configuring "Base System - Hardware Support " (OSFHWBASE410)

Configuring "Compiler Back End " (OSFCMPLRS410)

Configuring "Kernel Header and Common Files " (OSFBINCOM410)

        *** Merging new file
     ./usr/share/lib/kernel_options/.new..kernel_options.db into*
                       existing
     ./usr/share/lib/kernel_options/kernel_options.db

                modifying Asynchronous Transfer Mode option
                deleting Local Area Transport option
                adding Point-to-Point (PPP)
                adding ACL Subsystem
                adding NTP_TIME

                Merge completed successfully.

   .
   .
```

```
Configuring "Hardware Kernel Objects " (OSFHWBINOBJECT410)

Configuring "Motif 1.1 " (OSFMOTIF11410)

Configuring "Ref Pages: Admin/User " (OSFMANOS410)
```

After the update installation completes, a record of the software subset configuration information is located in `/var/adm/smlogs/it.log`. Examine this log closely to check for merge failures because you will have to manually merge your customizations into these files. Manually merging means using the text editor of your choice to cut and paste customizations from the old version of a file into the new version. Refer to Section 2.14.2 for more information about manually merging files.

2.11 Building the Kernel

The kernel build begins after the configuration of software subsets is complete.

- If you invoked `/sbin/installupdate` with the `-i` (`interactive`) option, a Kernel Option Selection menu lets you select kernel options to build into the kernel. After selecting kernel options, you are prompted to edit the configuration file. The configuration file is a text file that defines the components built into the kernel. Refer to Section 5.20.1 and Section 5.20.2 for more information about selecting kernel options and editing the configuration file.
- If you did not invoke the `/sbin/installupdate` with the `-i` (`interactive`) option, the system automatically builds a kernel with default (mandatory) options for the installed software subsets and then reboots.

During the kernel build process, the system configuration file `/sys/conf/` *system_name* is automatically saved to `/sys/conf/` *system_name*`.bck`, and the following message is displayed:

```
Saving /sys/conf/KRAMER as /sys/conf/KRAMER.bck
```

In the previous example, KRAMER is the host name of the system. If you customized this file, one of the postinstallation tasks is to edit the new version, include your customizations, and rebuild a tailored kernel with the customized configuration file.

The kernel build proceeds with the following messages:

```
      The system will now automatically build a kernel
      and then reboot. This will take approximately 15
      minutes, depending on the processor type.


*** PERFORMING KERNEL BUILD ***
```

```
Working....Fri Dec 13 13:25:43 EDT 1996
Working....Fri Dec 13 13:27:44 EDT 1996
```

After the kernel builds successfully, you are prompted to log in to your system.

2.11.1 Manually Adding Special Configuration Options to the Kernel

The update installation provides a basic kernel configuration file that includes only the required options and pseudodevices needed to be compatible with the current installed version of the operating system. However, the update installation does not propagate any special configuration options (such as those required for layered products).

If your system also has devices not supplied by Digital, you must add these options or devices to the kernel configuration file. Refer to *System Administration* for kernel build instructions.

Unless you invoked the update installation with the `-i` option, which provides the option to edit the configuration file before the kernel build, you must use the `doconfig` command to rebuild a customized kernel with the special options. Refer to Section 5.20 for more information.

2.11.2 Recovering from Kernel Build Failures

The tailored kernel build can fail at the end of your update installation because of an incompatibility of a kernel layered product with Digital UNIX Version 4.0B.

In this case, the system will reboot with the generic kernel. 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 deinstall 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 `doconfig` command.

2.12 Logging In After the Update Completes

After the update installation is complete, log in to the system as the user `root`. Digital suggests logging in as `root` so you can immediately perform the postinstallation tasks shown in Section 2.14, 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 text-based terminal without graphics capabilities:

- If you have a graphics workstation, a Common Desktop Environment (CDE) login window is displayed. When you log in as the user `root` and enter the `root` password, the following displays:

  ```
  Starting the
  Common Desktop Environment
  ```

  When the desktop appears, the following windows are displayed:

  – A Help Viewer window, `Introducing the Desktop` describes basic desktop skills and how to activate online help for the desktop.

  – A popup window labeled `Action Required` provides information about reading the new `/.dtprofile` file that describes how to modify your `.login` or `.profile` files to interact correctly with the new Common Desktop Environment (CDE).

  – The CDE front panel is displayed at the bottom of your screen. The CDE front panel replaces the `Session Manager`.

  Refer to the *CDE Companion* guide for an introduction to CDE and for information about migrating from the DECwindows Motif environment to CDE.

- If you do not have a workstation with graphics capabilities, log in as the user `root` at `login` prompt and enter the `root` password at the `password` prompt.

After you successfully log in, the update installation procedure is complete; your system is fully updated to Digital UNIX Version 4.0B. Go to Section 2.14 for a description of the postinstallation tasks to perform. You can perform these postinstallation tasks only as the user `root`.

2.13 Device Special File Name Changes

Device special file names may change as a result of the update installation. After successfully completing an update installation, it is possible that if you added tape devices to your system after the initial installation, the unit numbers and device special file names may be reordered as a result of the update process.

As an example, tape device tz13 is installed with device special file names `*rmt0*`. Then, tape device tz12 is installed and assigned device special file names `*rmt1*`. After an update installation, tape device tz12 is assigned device special file names `*rmt0*`, and tape device tz13 is assigned device special file names `*rmt1*`.

2.14 Postinstallation Tasks

This section describes any tasks that must be completed after the update is complete.

2.14.1 Reviewing 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 existing log files. Review the last entries in the following files to check the latest installation and configuration data:

- 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`
- Obsolete files are located in: `/var/adm/smlogs/upd_obsolete_files`
- Customized files are located in: `/var/adm/smlogs/upd_custom_files`
- Failed merges are located in: `/var/adm/smlogs/upd_mergefail_files`

If no obsolete, customized, or failed merge files are detected during the update installation, the relevant log files do not contain any data.

Digital recommends that you examine the log files when the update is complete to ensure that all files merged successfully.

2.14.2 Manually Merging Customizations

Some protected files may not be merged correctly during the update and all unprotected files are not merged automatically. Manual merging involves editing the new versions of system files with a text editor to apply your 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 files in: `/var/adm/smlogs/upd_custom_files`. Edit the new version of each logged file to include your customizations.

- Configuration file

  Edit the system configuration file `/sys/conf/`*`system_name`* if you customized this file in the previous version of Digital UNIX. The saved version is located in `/sys/conf/`*`system_name`*`.bck`. You will then need to build a tailored kernel with the customized configuration file.

- Failed merges

  If any files failed to merge during the update, an error message is displayed on your screen. Failed merge errors are located in:

/var/adm/smlogs/upd_mergefail_files. Check the log to identify any failed merges and manually edit any files that failed to merge by adding your customizations. The original version of the files is always preserved for your reference as: *filename*.PreMRG. Refer to Section 2.15 for information on how to access the original version of a file.

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 Digital UNIX Version 4.0B distribution media. Refer to Chapter 8 for information about installing optional software subsets.

2.15 Using the Update Administration Utility After the Update Installation

When you are satisfied that all merges are correct and your system is working as expected, use the Update Administration Utility to perform management tasks (such as saving, viewing, or deleting files) on the unprotected customized, obsolete, and PreMRG files. Unprotected customized files are saved to files with .PreUPD extensions.

Apart from managing system resources effectively, using this utility provides two important safeguards:

- You can archive and delete customized files so that future update installations can reuse the file names. If you attempt to run an update without having first used this utility to administer PreUPD files from the previous update, you are prompted to overwrite the existing PreUPD files or to exit the utility.
- You can remove obsolete files that may cause problems when running the new version.

2.15.1 Invoking the Update Administration Utility

If your system has graphics capabilities, use one of the following methods to access the Update Administration Utility from the SysMan Configuration Checklist:

- To open the SysMan Configuration Checklist from the UNIX command line, as superuser or root, enter the following command:

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

- To open the SysMan Configuration Checklist 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 SysMan Configuration Checklist application icon.

If your system does not have graphics capabilities, use one of the following methods to invoke the Update Administration Utility:

- To invoke the Update Administration Utility from the UNIX command line, as superuser or root, enter the following command:

  # **/usr/sbin/updadmin**

- To access the Update Administration Utility from the Setup menu, as superuser or root, invoke the menu by entering the following command:

  # **/usr/sbin/setup**

  The options displayed on the Setup menu vary depending on the software installed on your system. Choose the Update Administration option from this menu. The Update Administration Utility can be invoked only after an update.

Regardless of the manner in which you invoked the utility, the Update Administration Utility Main menu is displayed as follows:

```
The Update Administration Utility is used to perform administration
functions on a system that has been updated by /sbin/installupdate.

Please make a selection from the following menu.

        Update Administration Utility Main Menu
        ---------------------------------------
        c) Unprotected Customized File Administration
        o) Obsolete System File Administration
        p) PreMRG File Administration
        x) Exit this utility
```

To exit from the utility and return to the operating system prompt at any time, choose the exit option as follows:

```
# Enter your choice: x
```

Choose the following options to perform file administration tasks (such as saving, viewing, or deleting files):

- Unprotected Customized File Administration

  When you choose this option, the following information is displayed:

```
******* Unprotected Customized System File Administration ********

Unprotected customized system files are typically Digital UNIX system
files that have been  customized by users for projects they may be
working on, or by layered product software implementation.

Some of these  customized  files  may no longer be compatible with
the Digital UNIX Version 4.0B operating system.
```

- Obsolete System File Administration

  When you choose this option, the following information is displayed:

```
*** Obsolete System File Administration ***

There are Digital UNIX files currently installed on your
system that are no longer shipped or supported in
Digital UNIX Version 4.0B.

Some of these Obsolete files may no longer be compatible with the
Digital UNIX Version 4.0B operating system.  You may want to
back up these files and then delete them from your system to regain
disk space.  For your reference, the Obsolete files are listed in
/var/adm/smlogs/upd_obsolete_files.
```

- PreMRG File Administration

  Premerge (PreMRG) files are copies of protected system files as they existed before any merge was attempted during the update installation. When you choose this option, the following information is displayed:

```
*************  PreMRG System File Administration  ***************

There are .PreMRG files left over on your system from an update
installation. PreMRG files are copies of system files as they
existed prior to updating your system.  They are left on the
system after an update installation for reference purposes only.

If any system file customization merges were not successful,
you can reference the .PreMRG file to include those
customizations in the post merged file now residing on the system.

In most cases, PreMRG files can be deleted from the system.
```

If you choose any of the three main menu options, a submenu is displayed. This submenu displays options to view, save, or delete the unprotected, obsolete, or PreMRG files.

The following examples show only Unprotected Customized File Administration. The administration process and the submenu options are exactly the same for Obsolete System File Administration and PreMRG File Administration.

To choose an option from any menu, enter the character displayed before each option and press the Return key. For example:

```
# Enter your choice: c Return
```

2.15.2 File Administration Menu Options

If you choose any of the three Administration options from the main menu, the File Admin Menu is displayed as follows:

```
Unprotected Customized System File Admin Menu
---------------------------------------------
s) Save files
d) Delete files
```

```
      v) View list of files
      x) Return to previous menu
```

The type of the submenu depends on the option you chose from the Main menu. Enter `x` to return to the Main menu. The other options in this submenu are described in the following sections.

2.15.3 Save Files Option

This option lets you decide where to save the files that are found during the update installation. This option is useful for managing disk space.

If you choose this option, another menu is displayed as follows:

```
      Select a method of archiving your files:
       ---------------------------------------
      d) Save files to directory on disk
      i) Save files to tar image on disk
      t) Save files to tape media device

Enter your choice from the menu above, or
press <RETURN> to go back to the previous menu:
```

- If you want to save the files to a tape device, enter `t` and press Return. You are prompted to enter the name of a backup device, as follows:

  ```
  Enter the name of the tape backup device (for example: /dev/nrmt0h)
  that you want to use to back up customized files, or press <RETURN>
  to go back to the previous menu:
  ```

  Enter the device name as follows:

  ```
  ....previous menu: /dev/nrmt0h
  ```

  The save utility verifies the device and saves the files as follows:

  ```
  Inspecting /dev/nrmt0h...

  Saving customized files to /dev/nrmt0h...
  done.
  ```

- If you want to save files to a directory, enter `d`. The following message is displayed:

  ```
  Enter the directory that you want to use to back up obsolete
  files, or press <RETURN> to go back to the previous
  menu:
  ```

  If the pathname that you specify does not already exist, you are asked to confirm if the directory or file should be created (in this example the `/obsolete` was specified and does not exist):

  ```
  There is no /obsolete directory on this system.

  Do you want to create one? (y/n) [y]: y
  Saving obsolete files to /obsolete

  Finished saving obsolete files.
  ```

The files are now saved. You can return to the `File Admin Menu` to choose either another option or exit to the Update Administration Utility Main menu.

2.15.4 Delete Files Option

This option lets you delete all the files (obsolete, PreMRG, or unprotected customized) that are found and created during the update installation. Use this option if you have either backed up the files to a storage device or if you no longer need them and you want to recover the disk space.

If you choose this option, the following prompt is displayed:

```
Please confirm your intent to delete customized system files from the
system. (y/n) [n]: y
```

If you confirm the deletion, a message is displayed as follows:

```
Removing customized files...

Finished deleting customized files.
```

When the deletion is complete, the `File Admin Menu` is displayed again.

2.15.5 View List of Files Option

This option is used to display a list of the customized files that are found during the update installation. It can be used to verify what files were found, before you decide whether you want to save or delete the files.

If you choose this option, the list of files is displayed screen by screen and you can press Return to display each screen. At the end of the list you can display the complete list again or return to the `File Admin Menu`. A sample of the output follows:

```
./etc/zoneinfo/Australia/South.PreUPD
./sbin/named.PreUPD
./usr/sbin/screend.PreUPD

Enter 'r' to review files again, or press RETURN
to go back to the previous menu:
```

2.15.6 Messages and Archive Options

There are several messages and options that the Update Administration Utility displays only under certain conditions. These messages are explained as follows:

- If you choose an option to process certain files and the list of files has already been removed from the system, one or more of the following messages is displayed:

```
No customized file list exists.
No obsolete file list exists.
No PreMRG file list exists.
```

- If you attempt to save files to a directory that does not exist, you are prompted to confirm that you want this new directory to be created.

```
There is no <name> directory on this system.
Do you want to create one? (y/n) [y]:
```

- If the program cannot create the directory that you specified, the following message is displayed:

```
Cannot create <directory name>.
```

- If you choose an option relating to `.PreMRG` files, the following message warns you that the utility will search every file system that is UNIX File System (UFS) mounted:

```
Checking system for .PreMRG files.  Depending on the number
of file systems mounted, this may take a few minutes...
```

- If you choose an option to save files to a tar image, the following message gives you a further option to compress your tar file and save storage space.

```
Compressing the tar image will result in less disk space used.
Do you want to compress the tar image? (y/n) [y]:
```

- If the save program was unable to compress the tar file, the following warning message is displayed:

```
Unable to compress <tar file>
```

- If you chose an option to delete files that are not backed up, you are given an option to select another menu item and save the files first.

```
Back up of <file type> files not detected.

If you have not backed up the <file type> files yet, please
do so at this time by answering 'no' to the question below
and selecting the 's' option from the previous menu.

Please confirm your intent to delete obsolete system files
from the system. (y/n) [n]:
```

- If you are attempting to save files that are saved, the following message is displayed:

```
You have already saved the <file type> files.
Do you want to save them again? (y/n) [n]:
```

- If you specify a device for a save operation, and the save program cannot access that device, the following message is displayed:

```
Cannot locate a special device named <device name>
```

- If the device that you specified was available, but the save program was not able to write to that device, the following message is displayed:

```
Cannot write to <device name>
```

- If you specify an existing `tar` file name, you are given the option to append saved files to the existing file:

  ```
  A file named <file name> already exists on this system.
  If this is a tar archive file you can append additional files
  to it.  Otherwise, answer 'n' to the question below.

  Do you want to try appending to it? (y/n) [n]:
  ```

3

Planning Disk Space for a Custom Installation

This chapter applies only to custom installations.

The custom installation procedure lets you select the disks and disk partitions on which to install the required Digital UNIX `root` (`/`), `/usr`, and `/var` file systems and `swap` areas.

This chapter contains information to help you determine whether you can use the default partition table and default file system layout or if you should customize the partition table and file system layout.

Before beginning disk planning exercises, you should know what the file systems will be used for and understand the concepts associated with allocating a file system to a disk partition.

The goal of this chapter is to provide the information necessary for you to perform the user actions shown in Table 3–1.

Table 3–1: Summary of User Actions

After reading this chapter, you will ...
Decide whether you should use the default disk partitions and default file system layout.
Determine whether or not you need to customize the disk partition table and file system layout.
Decide which disks and partitions you want to select during the custom installation.

3.1 Commonly Used Terms

The following terms are used throughout this chapter:

- **custom partition table** – is any partition table that differs from the default partition table. Disks preinstalled with Digital UNIX typically use a custom partition table as does any other disk whose partition has been modified. Customizing a partition table lets you divide or partition the disk in a fashion best suited to your needs. See **partition table**.

- **default file system layout** – the default file system layout in Digital UNIX consists of separate `root` (`/`) and `/usr` file systems and a single swap area, `swap1`. Furthermore, they are all installed on the same disk in the `a`, `g`, and `b` partitions, respectively. See **file system layout**.
- **default partition table** – the default disk partition specification as obtained from the `/etc/disktab` file or, in the absence of an entry in that file, the disk driver itself. The default disk partition table varies with disk type because it depends upon the size of the disk itself. A default disk partition is designed to fit the default file system layout, therefore, consider using the default partition table when using the default file system layout. Otherwise, there is no particular reason to use this partition table. See **partition table**.
- **disk label** – a disk label contains information about the disk such as the disk type, physical parameters, and partition sizes. Without a disk label, a disk is not bootable.
- **file system** – is a hierarchical structure consisting of directories and files. Each hierarchy starts with the `/` (`root`) directory. There is a one-to-one correspondence between file systems and partitions. For example, the `a` partition of the disk that contains the `root` file system contains all the files and directories in the `root` file system.
- **file system layout** – is the location of the basic Digital UNIX file systems and swap areas: `/` (`root`), `/usr`, `/var`, `swap1`, and `swap2` on the disk.
- **partition** – logical divisions (groups of sectors) of a disk that are labeled `a` through `h`. Each partition may differ in size and can overlap other partitions. The `c` partition usually represents the entire disk. Partitions are sometimes known as *slices*.
- **partition table** – a component of a disk label that specifies how a physical disk is divided or partitioned into what appears to be several virtual disks. Disks in Digital UNIX support up to eight partitions per disk. Each partition is identified by a letter from `a` through `h`.
- **system disk** – the disk containing the `root` file system is known as the system disk.

3.2 Using the Default Disk Partitions and the Default File System Layout

As shown in Appendix H, every supported disk has a preset default partition table. With the exception of the RZ55 disk type, the default partition table and default file system layout is designed so that the entire Digital UNIX base operating system can fit on the disk when the `root` (`/`)

and /usr file systems and swap space are installed on the same disk. The default file system layout is:

- The root file system is on the a partition.
- The /usr file system is on the g partition and var is a directory under /usr.
- The swap area is on the b partition.

The design of the default file system layout along with the default disk partition sizes allows the entire Digital UNIX operating system to fit on a supported disk. Therefore, you do not have to perform any disk planning exercises if you are comfortable using the default disk partition sizes and default file system layout because all disk and partition selection decisions have already been made for you. However, if you plan to install the POLYCENTER Advanced File System (AdvFS), the Logical Storage Manager (LSM), or both, you should consider expanding the size of the root partition. If both AdvFS and LSM are installed using a default file system layout, the root partition will be almost full after an installation.

Also remember that the custom installation procedure calculates the amount of free space remaining in the root, /usr, and /var file systems as you select optional software subsets. This information helps you decide whether the disk partitions you chose are large enough to hold the software subsets you want to install. This file system status is useful during the installation procedure because you can go back and change your disk and partition selections if the partitions are running out of space.

During a text-based custom installation, if a customized disk partition table exists on the disk chosen for the root file system, you have the option to use either the default disk partitions or the existing customized partitions. If neither the default nor existing partitions are suitable, you can exit the installation process to invoke the UNIX shell and use the disklabel command to modify disk partitions.

3.3 When to Perform Disk Planning Exercises

You should perform disk planning exercises if you plan to:

- Install the associated products located on the CD-ROM labeled *Digital UNIX V4.0B Associated Products Volume 1*
- Use the system as a remote installation services (RIS) server or dataless management services (DMS) server
- Use the POLYCENTER Advanced File System (AdvFS), Logical Storage Manager (LSM), or both

If your plans include any of the previous, it is suggested you read through the disk planning information in this chapter.

Throughout this chapter you are encouraged to complete worksheets to calculate the size of a file system. These worksheets will help you:

- Identify available disks
- Plan the swap space
- Plan the `var` area as a directory under the `/usr` file system or as a separate file system
- Plan the `/usr` file system
- Decide whether to use the default partition table, an existing customized partition table (if there is one), or change the partition table if necessary

It will be helpful to keep in mind the following equations:

- One block equals $^1/_2$ kilobyte (kB) or 512 bytes
- One megabyte (MB) equals 1024 kB (1,048,576 bytes), or 2048 blocks

If you need to determine the size in MB of the default disk partitions for a disk, divide the size in blocks by 2048. Appendix H shows disk partition sizes in megabytes; as shown by the `disklabel` command, a disk label shows partition sizes in blocks.

The file system planning information in Section 3.4, Section 3.7, Section 3.8, and Section 3.9 will help you complete the file system summary worksheet in Section 3.10. If you perform the planning exercises and fill in the requested information, this worksheet provides the file system layout information that is required during a custom installation.

3.4 Choosing the Disk for the root File System

There are two requirements for the disk that contains the `root` file system:

1. The disk you choose for the `root` file system must be one of the supported disks shown in Table 3–2.
2. The `root` file system is always located on partition `a` of the disk you choose. Partition `a` must be at least 98,304 blocks (48 MB) and must start at block 0 (`zero`), the beginning of the disk. Digital recommends selecting a disk where the size of partition `a` is 64 MB (which is the default size on most supported disks).

   However, if using AdvFS or LSM, 64 MB will be insufficient for future growth, because these subsets have substantial root file system content (approximately 3 MB each). You may not be able to perform an update installation to the next release of the Digital UNIX operating system, if you use a 64 MB partition when selecting either AdvFS or LSM. Use the disk configuration worksheet in Section 3.5.1 to identify how much space you should allocate for the root file system.

Table 3–2: Supported Disks for root File System

Software Device Name	Disk Type
ra[a]	RA60, RA71, RA72, RA73, RA81, RA82, RA90, RA92
re[b]	SWXCR10, SWXCR40, HSZ10, HSZ40
rz[c]	RZ25, RZ25F, RZ25L, RZ25M, RZ26, RZ26F, RZ26L, RZ26N, RZ28, RZ28B, RZ28D, RZ28L, RZ28M, RZ29B, RZ35, RZ55, RZ56, RZ57, RZ58, RZ73, RZ74

[a]Software device names prefixed with ra identify Digital Storage Architecture (DSA) disk drives.
[b]Software device names prefixed with re identify SCSI disks employing RAID technology.
[c]Software device names prefixed with rz identify Small Computer System Interface (SCSI) disk drives.

Refer to the Digital UNIX *Software Product Description* (SPD) for a list of all supported disks on all processors. A printed copy of the SPD is included in the Digital UNIX Software Distribution Kit. Files containing the SPD are located on the CD-ROM labeled *Digital UNIX V4.0B Operating System Volume 1* in the directories /DOCUMENTATION/POSTSCRIPT or /DOCUMENTATION/TEXT.

The unit number for the disk that contains the root file system must be in the range 0 to 255 for ra type devices, in the range 0 to 47 for re type devices (SCSI disks employing RAID technology), and in the range 0 to 511 for rz type devices. The installation procedure automatically displays the device name (with unit numbers) for each disk connected to your system.

The installation procedure prevents you from installing the Digital UNIX operating system on a disk that is too small. Refer to Section 5.8.1 for restrictions about putting the root file system on RZ55 and RZ24L disks. The RZ25 disk is not large enough to hold all mandatory and optional software subsets.

3.5 Recording Disk Partition Sizes

The purpose of this section is for you to review the disks connected to your system, select the disks you want to use during the installation, and then record information about those disks on the worksheet shown in Table 3–3.

- If you are installing Digital UNIX for the first time (possibly on a brand new AlphaServer or AlphaStation), do the following:

  1. At the console mode prompt (>>>), enter the console command show device to determine the disks on your system.
  2. Review the entries under the DEVTYPE column; disks are identified by the word DISK. Disk types are displayed under the DEVNAM

column where you will see entries such as RZ26, RZ26L, RZ73, RZ58, and so forth.

3. Use your system's hardware documentation and the disk partition information in Appendix H to determine the device name and the size of each disk partition.
4. Decide which disks you will use, and record the device names and partition sizes on the worksheet shown in Table 3–3.

- If you are installing Digital UNIX on a system that is already running a version of Digital UNIX, the disks may have a customized disk partition table. To check the disk layout, you have to examine the existing disk label. A disk label contains information about the disk such as the disk type, physical parameters, and partition sizes. Without a disk label, a disk is not bootable. To check the disk label on an already installed system, do the following:

  1. Follow the instructions in Section 3.5.2 to review an existing disk label.
  2. Record the disk label information on the worksheet shown in Table 3–3.

3.5.1 Completing the Disk Configuration Worksheet

The disk configuration worksheet provides space for five disks, which is the maximum number of disks that can be used and configured during an installation. Your system may have many more disks, but even if you choose a separate disk for the `root`, `/usr`, and `/var` file systems and a separate disk for the `swap1` and `swap2` areas, a total of five disks are used. You can configure and use the other disks connected to your system after the installation. Refer to the Digital UNIX *Software Product Description* (SPD) for the number of disks that can be configured on each type of system.

Table 3–3: Disk Configuration Worksheet

Disk Number	Device Name	Partition	Size (MB)
1	_____	a	_____
		b	_____
		c	_____
		d	_____
		e	_____
		f	_____

Table 3–3: Disk Configuration Worksheet (cont.)

Disk Number	Device Name	Partition	Size (MB)
		g	_____
		h	_____
2	_____	a	_____
		b	_____
		c	_____
		d	_____
		e	_____
		f	_____
		g	_____
		h	_____
3	_____	a	_____
		b	_____
		c	_____
		d	_____
		e	_____
		f	_____
		g	_____
		h	_____
4	_____	a	_____
		b	_____
		c	_____
		d	_____
		e	_____
		f	_____
		g	_____
		h	_____
5	_____	a	_____
		b	_____
		c	_____
		d	_____

Table 3–3: Disk Configuration Worksheet (cont.)

Disk Number	Device Name	Partition	Size (MB)
		e	_____
		f	_____
		g	_____
		h	_____

3.5.2 Reviewing Existing Disk Labels to Determine Disk Layout

If you are installing Version 4.0B on a system that is already running Digital UNIX, use the `disklabel` command to look at the existing disk partition layout and sizes. A disk label looks similar to the following:

```
type: SCSI
disk: RZ26L
label:
flags:
bytes/sector: 512
sectors/track: 57
tracks/cylinder: 14
sectors/cylinder: 798
cylinders: 2570
sectors/unit: 2050860
rpm: 3600
interleave: 1
trackskew: 0
cylinderskew: 0
headswitch: 0  # milliseconds
track-to-track seek: 0 # milliseconds
drivedata: 0

8 partitions:
#     size   offset   fstype  [fsize bsize  cpg]
a:  131072        0   4.2BSD    1024  8192  16  # (Cyl.    0 - 164*)
b:  262144   131072     swap                     # (Cyl.  164*- 492*)
c: 2050860        0   unused    1024  8192      # (Cyl.    0 - 2569)
d:  552548   393216   unused    1024  8192      # (Cyl.  492*- 1185*)
e:  552548   945764   unused    1024  8192      # (Cyl. 1185*- 1877*)
f:  552548  1498312   unused    1024  8192      # (Cyl. 1877*- 2569)
g:  819200   393216   4.2BSD    1024  8192  16  # (Cyl.  492*- 1519*)
h:  838444  1212416   unused    1024  8192      # (Cyl. 1519*- 2569)
```

The procedure to display a disk label differs upon the following:

- If your system is already running a version of Digital UNIX, as superuser or `root`, enter the `disklabel` command using the following syntax:

  disklabel -r *disk*

  Enter a command similar to the following to read the disk label for disk `rz0`:

```
# disklabel -r rz0
```

- If you have already started a text-based installation procedure from the Digital UNIX Version 4.0B CD-ROM or from a RIS server, choose option 3 from the first menu to access the UNIX Shell option. If you are past the first menu, enter the `history` command to go back to the first menu. Then, invoke the `disklabel` command from the UNIX Shell. Refer to Section 3.5.3 for more information about running `disklabel` from the UNIX Shell.
- If you have already started a graphical custom installation procedure from the Digital UNIX Version 4.0B CD-ROM or from a RIS server, view the current disk partition information by clicking on the `Partition Disks...` pushbutton to open the `Disk Configuration` application.

3.5.3 Using the disklabel Command in the UNIX Shell to View Disk Labels

If you are invoking the `disklabel` command from the UNIX Shell, you must make the device special file for the device. This example shows how to make the device special file for a SCSI device, `rz1`:

```
# cd /dev
# ./MAKEDEV rz1
# disklabel -r rz1
```

When you execute the `disklabel` command, the existing disk partition layout is read and displayed. If you want to display the default disk label for `rz1` (or any other device), enter the following command:

```
# disklabel -p rz1
```

Refer to Section 7.8 for more information about using the `disklabel` command in the UNIX Shell environment to customize disk partitions.

3.6 File System Overhead

When calculating the available disk space for the `root`, `/usr`, and `/var` file systems, the installation procedure uses the following approximations for file system overhead based on the file system type selected for a particular file system:

- UNIX File System (UFS): 4%
- Advanced File System (AdvFS): 5%

That is, 4% of a file system (for UFS) and 5% of a file system (for AdvFS) is allocated for file system housekeeping and is not available to the partition for holding software. Additionally, UFS file systems are created with a default 10% `minfree` value, the minimum free space threshold, which

holds back 10% of a UFS file system from non-root users. Privileged users still have access to this free space. Refer to the newfs(8) and tunefs(8) reference pages for a description of the minfree value.

In addition to the space set aside for file system overhead, additional space is reserved for kernel build considerations as follows:

- root file system: 13 MB
- /usr file system: 20 MB

This allows room for the kernel to be built in /usr and subsequently copied to the root file system.

During an installation, the free space shown during software subset selection includes these overhead requirements; you do not have to calculate this yourself.

If you plan to use the POLYCENTER Advanced File System (AdvFS) as the file system type and you install the optional AdvFS Utilities, which are available on a separate CD-ROM distribution and require a special license, modifying file system space is simplified. After the installation, the AdvFS utilities let you add or remove volumes from the AdvFS file systems with no changes to the directory structure and with no user interruption. There is no need to overallocate file system space for AdvFS file systems.

With the exception of the root file system, AdvFS file system size can be modified at any time (with the addvol command). Increases or decreases to file system size are transparent to the user.

3.7 Planning the /usr File System

The /usr directory contains the majority of the operating system files, including libraries, executable programs, and documentation. The directory structure contains directories such as /usr/sys, /usr/adm, and /usr/bin. These directories contain required system files and UNIX command binary files that require a considerable amount of space in the /usr file system.

During the installation procedure, you allocate the /usr file system either by accepting the default partition or by specifying another partition. If you choose the default allocation, the installation procedure uses the g partition of the disk that contains the root file system.

To determine the size of the /usr file system, consider the following:

- Software subsets you plan to install on /usr
- The number of accounts (users) and the amount of space needed by each user if their home directories are in /usr. Digital recommends that a separate file system or file systems be used for user accounts.

- Size of the /var area if it is on the same partition as /usr
- File system overhead as described in Section 3.6

Over time, you probably will add files to the /usr file system. Because of this, the file system can run out of space. Be sure to allow for future growth on the /usr file system.

If you plan to use the POLYCENTER Advanced File System (AdvFS) as the file system type and install the AdvFS Utilities (available with a separate license), you do not need to greatly overallocate space for the /usr file system. AdvFS file system space can be dynamically increased without changing directory structures and without system interruption. Refer to *System Administration* for more information about the AdvFS file system.

Section 3.7.1 to Section 3.8.7 briefly describe how these items affect the size of the /usr file system. As you work through each section, complete the worksheet in Table 3–4.

3.7.1 Software Subsets Within the /usr File System

The /usr file system must be large enough to accommodate the software subsets that will reside within it. A software subset is a collection of executable files and data files needed to perform a specific function or to provide a particular class of services; for example, you need the System Accounting Utilities software subset to perform system accounting.

Appendix D contains software subset descriptions along with the dependent software subsets and kernel configuration file options related to each software subset. Appendix G contains a table of software subset sizes.

The mandatory software subsets are always installed. The optional software subsets are not required for the operating system to be fully functional; you can choose none, some, or all of the optional software subsets, depending on your requirements and available disk space.

You may want to consider allocating space for other associated or layered products that are available for Digital UNIX. When planning space requirements for /usr, allow additional space if you will be adding products in the future. Refer to the specific layered product's *Release Notes* for the exact block size of the application.

Determine which subsets you will install, add their sizes together, and include any additional space that will be required for large applications in the near future. Enter the total on the first line of Table 3–4.

3.7.2 Space for Users' Accounts and Files

The custom installation does not provide an area for user accounts and files; you need to set up this area after the installation.

However, you should consider the amount of space needed for user files when planning your system. If you plan to place users' home directories on `/usr`, you should reserve at least 10 MB of disk space for each user on the system. For example, if there are 10 users, you should reserve a minimum of 100 MB of disk space.

Note

Digital recommends creating a separate file system (on another disk) for users' home directories and mounting the new file system perhaps under the `/usr` file system. Mounting users' home directories in another file system ensures that the directories will not be overwritten during future full installations.

If you intend to set quotas on the user area, multiply the quota for each user by the number of users to determine the amount of user space. Refer to *System Administration* for information on disk quotas.

Enter the amount of space needed for the users directory on the second line of Table 3–4.

3.7.3 Completing the /usr Worksheet

Add the values in column 3 of Table 3–4 to determine the total space requirements for the `/usr` file system.

Table 3–4: /usr Worksheet

Item	Obtain Number from ...	Space Required in /usr
Size of software subsets	Appendix G	_____
Size of the user area	Section 3.7.2	_____
Size of the `var` area (if in `/usr`)	Table 3–5	_____
	Total space required in /usr	_____

Refer to Table 3–3 to identify partitions that are large enough for the `/usr` file system.

In the following table, record the disk number (for example 3), device name (for example, rz0), and partition where you plan to allocate the /usr file system:

Disk Number	Device Name	Partition
_____	_____	_____

3.8 Planning the /var Area

The /var area contains volatile, machine-specific directories and directories such as tmp and adm.

You can allocate the /var area either as a file system on its own partition or in a directory under the /usr file system. Depending on system use, the /var area can potentially use large amounts of space in the /usr/var directory. If system use is heavy, you might want to create a separate /var file system.

If you choose the default file system layout, the installation procedure places the var area as a directory in the /usr directory.

To determine the size of the var area, consider the following:

- Crash dump space
- Error logger files
- System accounting files
- Size of the /var/adm/ris directory, if your system is to be used as a Remote Installation Services (RIS) server
- Size of the /var/adm/dms directory if your system is to be used as a Dataless Management Services (DMS) server
- Space required for mail, print, and uucp spooling

As you read through each of the following sections, complete the worksheet in Table 3–5.

If you plan to use the POLYCENTER Advanced File System (AdvFS) as the file system type for /var along with the AdvFS Utilities (available with a separate license), you do not need to greatly overallocate space for the /var file system. AdvFS file system space can be dynamically increased without changing directory structures and without system interruption. Refer to *System Administration* for more information about AdvFS.

3.8.1 Crash Dump Space

Two disk areas are used when the system produces a crash dump.

As described in Section 3.9, the first area is located in the swap partition and is used to hold the crash dump until the system is rebooted. This area must be large enough to hold a single crash dump.

The second area is where the savecore utility copies the crash dump and a copy of the kernel, /vmunix, when the system is rebooted. This area is located in the /var/adm/crash directory. The disk partition that contains /var/adm/crash must be at least large enough to hold one crash dump and one copy of /vmunix which is 7 to 10 MB in size, but can be made as large as resources permit if you want to retain multiple crash dumps.

The crash dump partition must be as large as the size of physical memory on systems configured for full dumps, and can be somewhat smaller on systems configured for partial dumps.

If you want to retain multiple crash dumps, estimate the size of this partition by multiplying the total size required for a single crash dump and a copy of /vmunix by *n*, where *n* is the number of crash dumps to retain.

The *Kernel Debugging* guide contains a chapter devoted to managing crash dumps and crash dump files. This chapter includes information about how crash dumps are written, choosing partial or full dumps, deciding how much space to reserve for both crash dumps and crash dump files, and much more.

To determine the size and to record the location of the crash dump space, provide the following information:

1. The memory size in MB for your system is _____.

   If you do not know the amount of memory on your system, do one of the following:

   - As superuser or root, enter the following command:

     ```
     # uerf | grep -i memory
     ```

   - If your system is at the console mode prompt (>>>), enter the following command:

     ```
     >>> show mem
     ```

2. You need _____ memory to accommodate your crash dump partition. Refer to Table 3–3 to identify the partitions that are large enough for the crash dump space.
3. Enter the amount of space needed for the /var/adm/crash directory on the first line of Table 3–5.

3.8.2 Error Logger and syslog Files

The var area requires room to accommodate the log files produced by both syslog and the binary error logger. These log files are a record of system events and errors in ASCII text (syslog) and binary formats.

The syslog utility collects information regarding such system activities as mail, system startup, shutdown, rebooting, root account logins, time daemon, printer subsystem, and syslog itself. Summary information on hardware errors is also logged. The amount of data logged is related to system activity and the number of users.

The binary error logger records information on hardware errors and system startup.

If you are creating a new system, estimate your total requirements at about 500 kB per week. There is no limit to how large the /var/adm/binary.errlog and the /var/adm/syslog files can grow, so they might eventually fill their partition. If you plan to back up or remove these log files once a month, you need to plan your total requirements at about 2 MB.

Enter the amount of space needed for the error logger on the second line of Table 3–5.

3.8.3 System Accounting Files

The /var/adm directory in the var area contains data files generated by administrative programs such as acct and wtmp. The data that these programs generate can vary widely from system to system and over time. For example, if you create a /var/adm/acct file, it can grow by 50 kB a day for a large system and by 5 kB a day for a workstation.

As a general guideline for system accounting, you should allot 10 kB per day for workstations and 100 kB per day for larger systems. If you back up or remove the system accounting file once a month, you should plan for accounting files that occupy about 300 kB for workstations and 3 MB for large systems. Refer to *System Administration* for more information on the space requirements for system accounting.

Enter the amount of space needed for system accounting on the third line in Table 3–5 that is located in Section 3.8.6.

3.8.4 Size of the /var/adm/ris Directory

The information in this section applies only if you are setting up the system to be a Remote Installation Services (RIS) server.

If you are planning to set up your system as a RIS server, you can transfer software subsets from the distribution media to the /var/adm/ris directory in the var area.

You must reserve enough space in the /var/adm/ris directory in the var area for the software you want to install in each RIS environment. Refer to Appendix D for a description of each software subset and the names of other subsets or kernel configuration file options related to its operation. Refer to Appendix G for the subset sizes.

Fill in the fourth line on the worksheet in Table 3–5 with the amount of space needed for the /var/adm/ris directory in the var area. If you plan to mount a separate partition on the /var/adm/ris directory after the installation, enter a 0 (zero) for item 4 in Table 3–5 that is located in Section 3.8.6.

Refer to *Sharing Software on a Local Area Network* for more information about RIS and setting up the network kit.

3.8.5 Size of the /var/adm/dms Directory

The information in this section applies only if you are setting up this system to be a Dataless Management Services (DMS) server.

If you want the system to serve a dataless environment, you should decide whether you want /var on a separate file system or whether you want to reserve a partition to mount under /var/adm/dms.

In a dataless management environment, the dataless server's environment file systems are located in /var/adm/dms/dms*n* .alpha. Each environment must have at least the Digital UNIX mandatory subsets installed as well as other optional software subsets. Space must be reserved for associated or layered products plus an additional 10% for file system administration tasks and file system information. Refer to Appendix G for software subset sizes. For more information about the size requirements of a dataless environment, refer to *Sharing Software on a Local Area Network*. A worksheet in that guide is provided to help you calculate the amount of space required for a single /var/adm/dms file system.

Fill in the fifth line on the worksheet in Table 3–5 with the amount of space needed for the /var/adm/dms environments in the var area. If you plan to mount a separate partition on the /var/adm/dms area after the installation, enter a 0 (zero) for item 5 in Table 3–5 which is located in Section 3.8.6.

3.8.6 Completing the var Worksheet

Add the values in column 3 of Table 3–5 to determine the space requirements for the `var` area.

Table 3–5: var Worksheet

Item	Obtain Number from...	Space Required in var
Size of the `/var/adm/crash` directory	Section 3.8.1	_____
Error logger	Section 3.8.2	_____
System accounting	Section 3.8.3	_____
Size of the `/var/adm/ris` directory	Section 3.8.4	_____
Size of the `/var/adm/dms` directory	Section 3.8.5	_____
	Total space required in var	_____

3.8.7 Placing the var Area in the /usr File System

If you plan to place the `var` area on the same partition as `/usr`, you must add the total size of the `var` area from the worksheet in Table 3–5 to the total of `/usr`.

If appropriate for your system, enter the amount of space needed for `/var` on the third line of Table 3–4.

3.9 Planning the Swap Space

Virtual memory is implemented in the Digital UNIX operating system by transparently moving pages back and forth between physical memory and swap space. The amount of virtual address space that can be created is limited only by the amount of swap space. This section discusses some of the factors to consider when configuring swap space on your system. *System Tuning and Performance Management* provides additional information about optimizing the use of swap space.

The custom installation procedure lets you configure two swap areas: a primary swap partition named `swap1` and an optional swap partition named `swap2`. Additional swap partitions can be configured after the

installation is complete by using the procedures described in *System Administration*.

During a custom installation, you are asked to choose which disk partition to use for `swap1`. The default choice is partition `b` of the system disk.

Note

Digital recommends a minimum of 128 MB of swap space. On supported disks, the default size of the `b` partition is 128 MB.

To optimize the use of your swap space, spread out your swap space across multiple devices and use the fastest disks for swap devices. To ensure the best performance, place swap areas on different disks instead of placing multiple swap areas on the same disk. The amount of swap space you allocate also depends on the virtual memory requirements of the applications you plan to install.

If you want to calculate the true amount of swap space your system needs, an effective strategy to determine how much disk space to set aside for swapping is to compare the aggregate modifiable virtual address space needs of the processes that you plan to run with the size of your system's physical memory. Modifiable virtual address space holds data elements and structures that are modified during process execution, such as heap space, stack space, and data space. If you expect the aggregate need for modifiable virtual address space to be greater than your system's physical memory, consider allocating at least as much swap space as the size of your system's physical memory.

Although you cannot choose swap strategy modes during the installation procedure, there are two strategies for swap allocation: *immediate* and *over-commitment*. By default, the swap strategy mode used for Digital UNIX systems is *immediate* mode which means that swap space is allocated when modifiable virtual address space is created. This mode requires more swap space than *over-commitment* mode because it guarantees that there will be enough swap space if every modifiable virtual page is modified. Refer to *System Administration* for more information about swap allocation strategies and how to switch from one swap allocation mode to the other after the installation.

Also keep in mind that by default, crash dumps are temporarily stored on the swap partition. This area is used to hold the crash dump until the system is rebooted and must be large enough to hold a single crash dump. This area is referred to as the crash dump partition. In the event of a system crash, the kernel writes the contents of physical memory to the

swap partition. The amount of information written, and hence the size of the crash dump, depends on several factors:

- If the system is configured to produce full dumps as described in the *System Administration* guide, the size of the crash dump will be the same as the size of the system's physical memory.
- If the system is configured to produce partial dumps, the crash dump might be considerably smaller.

The factor that determines the size of a partial crash dump is the amount of physical memory in use at the time of the crash by various kernel data structures that define the state of the system. The more tasks and threads that are active, the more kernel data structures that will be in use, and the larger the resulting partial crash dump.

Be prepared to add more swap space later if the system issues warning messages that indicate that swap space is approaching exhaustion. On systems where the balance between modifiable virtual address space usage and available physical memory is more even, less swap space is required.

Refer to the worksheet in Table 3–3 to identify partitions that are large enough for use as swap partitions. Record the location of the swap space in the following table:

Swap Space	Size in MB	Device Name	Partition
swap1	_____	_____	_____
swap2	_____	_____	_____

3.10 Finalizing the File System Layout

After you determine how much space each file system needs, determine whether you can accept the default disk partition table. If you need to customize the disk partition table, do one of the following:

- If you are using the text-based interface, choose the UNIX Shell option from the installation menu to use the `disklabel` command to modify the disk partitions. Section 3.5.3 describes how to use the `disklabel` command in the UNIX Shell. Refer to Appendix H for information on the default disk partition layout and sizes. When you are finished modifying the default disk partitions, enter the `restart` command to start the installation procedure again. Once in installation setup, be sure not to select a default installation because doing so overwrites your customized disk partitions.
- If you are using the graphical user interface to perform a custom installation, in the `Installation Setup` window, click on `Partition`

Disks... to access the Disk Configuration application to reconfigure only those disks that will be used during the installation process. The utility can also be launched from the SysMan Configuration Checklist to reconfigure disks that were not used during the installation procedure.

The following guidelines apply if you modify the partition table for the disk that contains the root file system:

- The root file system is always located on partition a. Partition a must be a minimum of 98,304 blocks (48 MB). However, Digital recommends at least 131,000 blocks (64 MB) if you are not using AdvFS and/or LSM, and more if you are using these products.
- Partition a must start at block 0 (zero), the beginning of the disk.

If the modified partition does not meet these requirements, the custom installation requires that you choose the default partition table or select a different disk.

Enter the values that you determined in the previous sections in Table 3–6. This table will provide you with the complete file system layout and space requirements for your system.

Table 3–6: File System Worksheet

Items	Obtain From...	Approximate Size	Device Name	Partition
root	Section 3.4	_____	_____	_____
/usr	Table 3–4	_____	_____	_____
swap1	Section 3.9	_____	_____	_____
swap2	Section 3.9	_____	_____	_____
/var (if applicable, otherwise add to /usr)	Table 3–5	_____	_____	_____

After completing the worksheet, verify the disk partition table. If you are installing a system for the first time, refer to Table 3–3 and Appendix H for the default partition table for your disk or disks.

Compare the disk partition table with the total var and /usr values in Table 3–6. If the space required consumes more than 75 percent of the available disk space, not including the file system overhead, consider expanding the partition. Also, if your system has insufficient disk space (that is, the space required consumes more than 75 percent of the available disk space), you may not be able to perform update installations on your

system later. After determining your disk space needs, use either the `disklabel` command (if you are using the text-based installation interface) or use the `Disk Configuration` application (if you are using the graphical installation interface) to modify the default partition table before beginning the installation.

4

Processor-Specific Boot Instructions for Full Installations

To invoke a full default, custom, or cloned installation of the Digital UNIX operating system software, you boot your processor or single-board computer from the installation media – either CD-ROM or over a network connection to a RIS server.

This chapter provides processor-specific boot commands to boot from the Digital UNIX CD-ROM or over a network connection to a RIS server.

Note

Unlike full installations, you do not boot from the distribution media to perform a Digital UNIX update installation. Update installations are performed from single-user mode at the command line. Refer to Chapter 2 for information about performing update installations.

In addition, this release provides an automatic reboot feature for systems that have unattended installation capability. See Table 4–3 for a list of the systems that support this feature.

The goal of this chapter is to provide the information necessary for you to perform the user actions shown in Table 4–1.

Table 4–1: Summary of User Actions

After reading this chapter, you will ...	As shown in ...
Shut down and halt your processor.	Section 4.1
Locate your processor in the table and use the appropriate boot commands to boot your system off the CD-ROM or network to invoke the full installation procedure.	Table 4–2

If you are using a CD–ROM optical disc to boot your system, Section B.1 and Section B.2 describe how to load the CD–ROM into a caddy and disc drive.

If you are booting your system over the network, you are initiating an installation from a remote server. To boot over the network, your processor or single-board computer must be registered as a client on a Remote Installation Services (RIS) server.

4.1 Shutting Down and Booting the Processor

To prepare the hardware for the installation booting process, do the following:

1. If your system is already running a version of Digital UNIX, you must shut down and halt the processor using a command similar to the following:

   ```
   # shutdown -h +30 Please log out
   ```

   In the previous example, the system is shut down and halted in 30 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.

   If you are adding peripheral devices to your system at this time, go to Step 2.

   If you are not connecting additional peripheral devices to your system, go to Step 3.

2. If you are adding additional peripheral devices, turn off your system. Then, connect the peripheral devices while your system is turned off.

   - Turn on power to the console terminal and all additional peripheral devices; otherwise, the peripheral devices are not automatically configured by your system.

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

   - Turn on power to the processor. The console subsystem prints various startup and diagnostic messages and ends with the console mode prompt (>>>).

3. Before invoking the full installation, make sure your system's firmware has been updated. Firmware update instructions are described in Section 1.4.6.

4. Boot your system from the console mode prompt (>>>). The boot command you enter depends on the processor and the type of software distribution you are using: CD–ROM or network. The DEC 7000 Series and DEC 10000 Series processors can be booted only from CD–ROM.

Note

Be sure to review your console firmware update documentation and perform the firmware update at the appropriate time. If you added peripherals, you may need to run configuration utilities, such as the EISA Configuration Utility (ECU) and RAID Configuration Utility (RCU), as well.

Locate your processor in Table 4–2 and follow the booting instructions in the corresponding section. After you have booted your processor, proceed to Chapter 5 to continue the default, custom, or cloned installation process.

Table 4–2: Location of Processor-Specific Boot Instructions

Alpha System	Follow Booting Instructions In:
AlphaServer 300 Series and AlphaServer 400 Series	Section 4.3
AlphaServer 1000 Series and AlphaServer 1000A Series	Section 4.4
AlphaServer 2000 Series	Section 4.5
AlphaServer 2100 Series, AlphaServer 2100A Series, AlphaServer 4000/4100 Series, and Digital Alpha VME 2100	Section 4.6
AlphaServer 8200 Series and AlphaServer 8400 Series	Section 4.7
AlphaStation 200 Series, AlphaStation 250 Series, AlphaStation 255 Series, and AlphaStation 400 Series	Section 4.8
AlphaStation 500 Series	Section 4.9
AlphaStation 600 Series	Section 4.9
AXPvme and Alpha VME Single-Board Computers (SBCs)	Section 4.10
AXPpci SBCs and Digital PICMG Alpha CPUs	Section 4.11
AlphaPC64, AlphaPC164, EB64+, EB66+, and EB164 SBCs	Section 4.12
DEC 2000 Series	Section 4.13
DEC 3000 Series	Section 4.14

Table 4–2: Location of Processor-Specific Boot Instructions (cont.)

Alpha System	Follow Booting Instructions In:
DEC 4000 Series	Section 4.15
DEC 7000 and DEC 10000 Series	Section 4.16
Processors and SBCs supported in hardware releases later than Digital UNIX Version 4.0B	The *Hardware Release Notes*

Note

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. This guide provides information about boot options such as booting a generic kernel (`genvmunix`) or booting an alternate custom kernel.

Some systems are rebooted automatically during the installation process. This automatic reboot feature is new in this release and is supported on systems with unattended installation capability. Table 4–3 lists the systems that support unattended installation.

Table 4–3: Systems that Support Unattended Installation

Systems with Unattended Installation Capability
AlphaServer 1000A Series
AlphaServer 2100 Series
AlphaServer 4000/4100 Series

4.2 Fiber Distributed Data Interface (FDDI) Boot Instructions

Table 4–4 shows the required boot devices for booting over the network if your system uses FDDI. Follow the instructions in your hardware owner's guide to update the FDDI firmware before booting over the network.

Table 4–4: FDDI Boot Devices By Bus Type

Bus Type	Boot Device
EISA (Extended Integrated System Architecture)	`fra0`[a]
PCI (Peripheral Component Interconnect)	`fwa0`[a]
Turbochannel	`"#/ez0"`[b]
XMI (Extended Memory Interface)	`fxa0`[a]

[a]Before you boot over the network, your system must be registered with the RIS server and you need to know the hardware address. To determine the hardware address, at the console mode prompt (>>>), enter the `show dev` command.
[b]In the boot command, replace the number sign (#)with the slot number for your FDDI card. To determine the slot number, look at the slot where your FDDI card is installed and then find the number for that slot.

Before you boot over the network, your system must be registered with the RIS server and you will need to know your FDDI address. To determine your FDDI address, enter the following command:

```
# t tc# cnfg
```

Replace the number sign (#) with the slot number of your FDDI card.

4.3 AlphaServer 300 and AlphaServer 400 Processors

The following sections describe how to boot an AlphaServer 300 or AlphaServer 400 processor from a CD–ROM optical disc and from the network.

4.3.1 Setting the Console Flags

Before starting the boot procedure on an AlphaServer 300 or AlphaServer 400 processor, complete the following steps:

1. Enter the following command to clear the `boot_osflags` variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

NOTE

If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the `auto_action` variable to `halt`. This halts the system at the console prompt each time the system is turned on, when the system crashes, or when you press the `Halt` button.

   ```
   >>> set auto_action halt
   ```

4.3.2 Booting from the CD–ROM Optical Disc Kit

If your CD–ROM optical disc is not already in a caddy, follow the instructions in Appendix B.

Follow this procedure to boot the system:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

   ```
   >>> show dev
   ```

   A device information table similar to the following is displayed:

   ```
   dka0.0.0.6.0          DKA0                    RZ25L 0003
   dka100.1.0.6.0        DKA100                   RZ26 T386
   dka400.4.0.6.0        DKA400                  RRD43 2893
   dva0.0.0.0.1          DVA0
   ewa0.0.0.11.0         EWA0          08-00-2B-E2-74-32
   pka0.7.0.6.0          PKA0              SCSI Bus ID 7
   ```

   The second column shows the numbers assigned to each drive:

   - The letters DK refer to a SCSI disk or CD–ROM device.

- The third letter (A, B, C, D, or E) refers to the SCSI bus designation. Refer to your hardware owner's guide for more details.
- The number refers to the drive number.

In the third column, look for the line with the CD-ROM device string RRD. In the previous example, the CD-ROM device is RRD43. The device boot string for your system appears in that same line. The device boot string begins with the letters DKA.

3. Enter the init command with the following syntax:

```
>>> init
```

4. Enter the boot command with the following syntax to boot from a CD–ROM:

boot *device*

For example, to boot the system from CD–ROM drive number 1, enter the following command:

```
>>> boot dka400
```

Output similar to the following is displayed:

```
(boot dka400.4.0.6.0)
block 0 of dka400.4.0.6.0 is a valid boot block
reading 16 blocks from dka400.4.0.6.0
bootstrap code read in
base = 11e000, imagestart = 0, imagebytes = 2000
initializing HWRPB at 2000
initializing page table at 110000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

OSF boot - Wed Jul  5 17:18:57 EDT 1995
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.3.3 Booting from the Network

To boot your system over the network, make sure it is registered as a client on a RIS server. Refer to *Sharing Software on a Local Area Network* for information about registering a client.

The device parameter is the network device from which you want to boot. The AlphaServer 300 and AlphaServer 400 processors support two network adapters: ewa0 and ena0.

4.3.3.1 Booting from a Digital UNIX Server

Use the following command syntax to boot your system over the network:

set *device*_protocols bootp
set *device*_inet_init bootp

For example, if the device you are booting from with the `bootp` protocol is `ewa0`, enter the following commands:

```
>>> set ewa0_protocols bootp
>>> set ewa0_inet_init bootp
>>> boot ewa0
```

Some system information is displayed by the installation software followed by the memory and hardware configurations.

If your initial network boot fails, enter `init` at the console prompt. If you encounter other problems during the RIS installation, refer to *Sharing Software on a Local Area Network* for more information.

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.4 AlphaServer 1000 and AlphaServer 1000A Series Processors

This section provides instructions for booting AlphaServer 1000 and AlphaServer 1000A series processors.

4.4.1 The bus_probe_algorithm Environment Variable

The `bus_probe_algorithm` console environment variable must be set to `new`. To verify that the `bus_probe_algorithm` environment variable is set to `new`, enter the following console firmware command:

```
>>> show bus_probe_algorithm
```

If the environment variable is set to `old`, set the variable to `new` and initialize the console as shown in the following example:

```
>>> set bus_probe_algorithm new
>>> init
```

4.4.2 Setting the Console Flags

Before starting the boot procedure on an AlphaServer 1000 or AlphaServer 1000A processor, complete the following steps:

1. Enter the following command to clear the `boot_osflags` variable to ensure that the kernel takes correct action upon boot:

```
>>> set boot_osflags ""
```

NOTE

If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the `auto_action` variable to `halt`. This halts the system at the console prompt each time it is turned on, when it crashes, or when you press the Halt button.

   ```
   >>> set auto_action halt
   ```

3. Set the `boot_file` variable. This ensures that an alternate boot file is not set.

   ```
   >>> set boot_file
   ```

4.4.3 Booting from the CD-ROM Optical Disc Kit

Follow these steps to boot AlphaServer 1000 or AlphaServer 1000A series processors from a CD–ROM optical disc:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

   ```
   >>> show device
   ```

   Output similar to the following is displayed by the `show device` command:

```
dka400.4.0.6.0          DKA400      RRD43  2893
dva0.0.0.0.1            DVA0
ewa0.0.0.13.0           EWA0        08-00-2B-3E-B6-C8
pka0.7.0.6.0            PKA0        SCSI Bus ID 7
```

The second column shows the numbers assigned to each drive:

- The letters DK refer to a SCSI disk or CD–ROM device.
- The third letter (A, B, C, D, or E) refers to the SCSI bus designation. Refer to your hardware owner's guide for more details.
- The number refers to the drive number.

In the third column, look for the line with the CD–ROM device string RRD. In the previous example, the CD–ROM device is RRD43. The device boot string for your system appears in that same line. The device boot string begins with the letters DKA.

3. Enter the boot command and the appropriate boot device string for your system. For example:

```
>>> boot dka400
```

For more information about the show device and boot commands, see the hardware documentation that comes with your system.

4.4.4 Booting from the Network

To boot an AlphaServer 1000 or AlphaServer 1000A series processor over the network, make sure it is registered as a client of a RIS server. Refer to the *Sharing Software on a Local Area Network* guide for information on registering a client.

To boot from a Digital UNIX Server, see Section 4.4.4.1.

4.4.4.1 Booting from a Digital UNIX Server

Use the show device command to determine which network adapter (such as ewa or era) is in use:

```
>>> show device
```

Output similar to the following is displayed by the show device command:

```
dka400.4.0.6.0 DKA400 RRD43  2893
dva0.0.0.0.1 DVA0
ewa0.0.0.13.0 EWA0 08-00-2B-3E-B6-C8
pka0.7.0.6.0 PKA0 SCSI Bus ID 7
```

Use the following command syntax to boot your system over the network:

set *device*_inet_init bootp
set *device*_protocols bootp

For example, if the device you are booting from with the bootp protocol is ewa0, enter the following commands:

```
>>> set ewa0_inet_init bootp
>>> set ewa0_protocols bootp
>>> boot -fi "" ewa0
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.5 AlphaServer 2000 Series Processors

The following sections describe how to boot AlphaServer 2000 Series processors from a CD–ROM optical disc and from the network.

4.5.1 The bus_probe_algorithm Environment Variable

The `bus_probe_algorithm` console environment variable must be set to `new`. To verify that the `bus_probe_algorithm` environment variable is set to `new`, enter the following console firmware command:

```
>>> show bus_probe_algorithm
```

If the environment variable is set to `old`, set the variable to `new` and initialize the console as shown in the following example:

```
>>> set bus_probe_algorithm new
>>> init
```

4.5.2 Setting the Console Flags

Before starting the boot procedure, complete the following steps:

1. Enter the following command to clear the `boot_osflags` variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

   NOTE

   If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the `auto_action` variable to `halt`. This halts the system at the console prompt each time the system is turned on, when the system crashes, or when you press the Halt button.

```
>>> set auto_action halt
```

4.5.3 Booting from the CD–ROM Optical Disc Kit

If your CD–ROM optical disc is not already in a caddy, follow the instructions in Appendix B.

Follow this procedure to boot the system:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

```
>>> show dev
```

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
ewb0.0.0.7.0              EWB0             08-00-2B-2C-CE-DF
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
```

The second column shows the numbers assigned to each drive:

- The letters DK refer to a SCSI disk or CD–ROM device.
- The letters MK refer to a SCSI magnetic tape device.
- The third letter (A, B, C, D, or E) refers to the SCSI or DSA bus designation. Refer to your hardware owner's guide for more details.
- The number refers to the drive number.

In the third column, look for the line with the CD–ROM device string RRD. In the previous example, the CD–ROM device is RRD43. The device boot string for your system appears in that same line. The device boot string begins with the letters DKE.

3. Enter the init command with the following syntax:

```
>>> init
```

4. Enter the boot command with the following syntax to boot from a CD–ROM:

   boot *device*

   For example, to boot the system from CD–ROM drive number 1, 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

OSF boot - Mon Aug 5 15:49:49 EDT 1993
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.5.4 Booting from the Network

To boot your system over the network, make sure it is registered as a client on a RIS server. Refer to *Sharing Software on a Local Area Network* for information on registering a client.

The device parameter is the network device from which you want to boot. AlphaServer 2000 Series processors support two network adapters: ewa0 and ewb0.

4.5.4.1 Booting from a Digital UNIX Server

Use the following command syntax to boot your system over the network:

set *device* _protocols bootp
set *device* _inet_init bootp

For example, if the device you are booting from with the bootp protocol is ewa0, enter the following commands:

```
>>> set ewa0_protocols bootp
>>> set ewa0_inet_init bootp
>>> boot ewa0
```

Some system information is displayed by the installation software followed by the memory and hardware configurations.

If your initial network boot fails, enter init at the console prompt. If you encounter other problems during the RIS install, refer to *Sharing Software on a Local Area Network*.

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.5.5 Prestoserve Option

These instructions apply to AlphaServer 2000 Series processors equipped with the Prestoserve option.

4.5.5.1 The prcache Command

AlphaServer 2000 Series system consoles provide the prcache command to support the Prestoserve option (NVRAM). Refer to your hardware owner's guide for a description of this command.

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.6 AlphaServer 2100 Series, AlphaServer 2100A Series, AlphaServer 4000/4100 Series, and Digital Alpha VME 2100 Series Processors

The following sections describe how to boot AlphaServer 2100 Series, AlphaServer 2100A Series, AlphaServer 4000/4100 Series, and Digital Alpha VME 2100 Series processors from a CD–ROM optical disc and from the network.

4.6.1 The bus_probe_algorithm Environment Variable

The bus_probe_algorithm console environment variable must be set to new. To verify that the bus_probe_algorithm environment variable is set to new, enter the following console firmware command:

```
>>> show bus_probe_algorithm
```

If the environment variable is set to old, set the variable to new and initialize the console as shown in the following example:

```
>>> set bus_probe_algorithm new
>>> init
```

4.6.2 Setting the Console Flags

Before starting the boot procedure, complete the following steps:

1. Enter the following command to clear the boot_osflags variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

   NOTE

   If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

   Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the auto_action variable to halt. This halts the system at the console prompt each time the system is turned on, when the system crashes, or when you press the Halt button.

   ```
   >>> set auto_action halt
   ```

4.6.3 Booting from the CD–ROM Optical Disc Kit

If your CD–ROM optical disc is not already in a caddy, follow the instructions in Appendix B.

Follow this procedure to boot the system:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.

2. Enter the following command to determine the unit number of the drive for your device:

```
>>> show dev
```

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
ewb0.0.0.7.0              EWB0             08-00-2B-2C-CE-DF
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
```

The second column shows the numbers assigned to each drive:

- The letters DK refer to a SCSI disk or CD–ROM device.
- The letters MK refer to a SCSI magnetic tape device.
- The third letter (A, B, C, D, or E) refers to the SCSI or DSA bus designation. Refer to your hardware owner's guide for more details.
- The number refers to the drive number.

In the third column, look for the line with the CD–ROM device string RRD. In the previous example, the CD–ROM device is RRD43. The device boot string for your system appears in that same line. The device boot string begins with the letters DKE.

3. Enter the `init` command with the following syntax:

```
>>> init
```

4. Enter the `boot` command with the following syntax to boot from a CD–ROM:

boot *device*

For example, to boot the system from CD–ROM drive number 1, 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

OSF boot - Fri Dec 13 15:49:49 EDT 1996
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.6.4 Booting from the Network

To boot your system over the network, make sure it is registered as a client on a RIS server. Refer to *Sharing Software on a Local Area Network* for information on registering a client.

The `device` parameter is the network device from which you want to boot. The AlphaServer 2100 Series, AlphaServer 2100A Series, AlphaServer 4000/4100 Series, and Digital Alpha VME 2100 Series processors support two network adapters: `ewa0` and `ewb0`.

4.6.4.1 Booting from a Digital UNIX Server

Use the following command syntax to boot your system over the network:

set *device*_protocols bootp
set *device*_inet_init bootp

For example, if the device you are booting from with the `bootp` protocol is `ewa0`, enter the following commands:

```
>>> set ewa0_protocols bootp
>>> set ewa0_inet_init bootp
>>> boot ewa0
```

For the AlphaServer 4000/4100 Series processor only, enter the following command to supercede the `boot_ osflags` setting:

```
>>> boot -fl an ewa0
```

To stop the autoreboot feature on the AlphaServer 4000/4100 Series processor, enter the following command:

```
>>> boot -fl anh ewa0
```

Some system information is displayed by the installation software followed by the memory and hardware configurations.

If your initial network boot fails, enter `init` at the console prompt. If you encounter other problems during the RIS installation, refer to *Sharing Software on a Local Area Network*.

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.6.5 Prestoserve Option

These instructions apply to AlphaServer 2100 Series, AlphaServer 2100A Series, AlphaServer 4000/4100 and Digital Alpha VME 2100 Series processors equipped with the Prestoserve option.

4.6.5.1 The prcache Command

The AlphaServer 2100 Series, AlphaServer 2100A Series, AlphaServer 4000/4100, and Digital Alpha VME 2100 Series system consoles provide the `prcache` command to support the Prestoserve option (NVRAM). Refer to hardware documentation for a description of this command.

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.7 AlphaServer 8200 and AlphaServer 8400 Series Processors

The following sections describe how to boot AlphaServer 8200 and AlphaServer 8400 processors from a CD–ROM optical disc.

4.7.1 Setting the Console Flags

Before starting the boot procedure, complete the following steps:

1. Enter the following command to clear the `boot_osflags` variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

   NOTE

   If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the auto_action variable to halt. This halts the system at the console prompt each time the system is turned on, when the system crashes, or when you press the Halt button.

```
>>> set auto_action halt
```

3. Set the boot_reset variable to on. This must be done if you need to reboot the generic kernel (genvmunix) at any time to reconfigure your system for additional peripherals.

```
>>> set boot_reset on
```

4.7.2 Booting from the CD–ROM Optical Disc Kit

If your CD–ROM optical disc is not already in a caddy, follow the instructions in Appendix B.

Use the following procedure to boot the system:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

```
>>> show dev
```

A display appears showing information about the devices on your system. For example:

```
dka0.0.0.5.0       DKA0                        RZ73
dkb4.4.1.14.0      DKB400                     RRD43
```

The numbers in the second column are the unit numbers assigned to each drive on your system:

- The letters DK refer to a SCSI CD–ROM or disk device.
- The third letter (A, B, C, D, or E) refers to the SCSI bus designation. Refer to your hardware owner's guide for more details.
- The numbers refer to the drive number.

In the third column, look for the line with the CD–ROM device string RRD. In the previous example, the CD–ROM device is RRD43. The device boot string for your system appears in that same line. The device boot string begins with the letters DKB.

3. Enter the boot command with the following syntax to boot from a CD–ROM:

   boot *device-number*

   For example, to boot the system from CD–ROM drive number 4, enter:

```
>>> boot dkb400
```

   Output similar to the following is displayed:

```
Initializing...

F  E  D  C  B  A  9  8  7  6  5  4  3  2  1  0  NODE #
      A  M  M  .  .  .  .  .  P  TYP
      o  +  +  .  .  .  .  .  +  ST1
      .  .  .  .  .  .  .  .  B  BPD
      o  +  +  .  .  .  .  .  +  ST2
      .  .  .  .  .  .  .  .  B  BPD
      +  +  +  .  .  .  .  .  +  ST3
      .  .  .  .  .  .  .  .  B  BPD

+  .  +  .  +  . +  .  .  +  .  .  .  .     C0 XMI +

  .  A0  B0  . . . . .   LV
  . 256  64  . . . . .   320Mb

Firmware Rev = V2.3  SROM Rev = V2.0  SYS SN = GA12345678

Booting...
Connecting to boot device dkb400
   .
   .
   .
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.7.3 Booting from the Network

To boot your system over the network, make sure it is registered as a client on a RIS server. Refer to *Sharing Software on a Local Area Network* for information on registering a client.

The device parameter is the network device from which you want to boot. The AlphaServer 8200 and AlphaServer 8400 Series processors support two network adapters: ewa0 and ewb0.

4.7.3.1 Booting from a Digital UNIX Server

Use the following command syntax to boot your system over the network:

set *device*_protocols bootp
set *device*_inet_init bootp

For example, if the device you are booting from with the bootp protocol is ewa0, enter the following commands:

```
>>> show net
>>> set ewa0_protocols bootp
>>> set ewa0_inet_init bootp
>>> boot -fl an ewa0
```

Some system information is displayed by the installation software followed by the memory and hardware configurations.

If your initial network boot fails, enter `init` at the console prompt. If you encounter other problems during the RIS installation, refer to *Sharing Software on a Local Area Network*.

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.8 AlphaStation 200 Series, AlphaStation 250 Series, AlphaStation 255 Series, and AlphaStation 400 Series Processors

The following sections describe how to boot AlphaStation 200 Series, AlphaStation 250 Series, AlphaStation 255 Series, and AlphaStation 400 Series processors from a CD–ROM optical disc and from the network.

4.8.1 Setting the Console Flags

Before starting the boot procedure on an AlphaStation 200 Series processor, an AlphaStation 250 Series processor, an AlphaStation 255 Series processor, or an AlphaStation 400 Series processor, complete the following steps:

1. Enter the following command to clear the `boot_osflags` variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

   NOTE

   If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the auto_action variable to halt. This halts the system at the console prompt each time the system is turned on, when the system crashes, or when you press the Halt button.

   ```
   >>> set auto_action halt
   ```

4.8.2 Booting from the CD–ROM Optical Disc Kit

If your CD–ROM optical disc is not already in a caddy, follow the instructions in Appendix B.

Follow this procedure to boot the system:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

   ```
   >>> show dev
   ```

   A device information table similar to the following is displayed:

   ```
   dka0.0.0.6.0              DKA0                    RZ25L 0003
   dka100.1.0.6.0            DKA100                   RZ26 T386
   dka400.4.0.6.0            DKA400                  RRD43 2893
   dva0.0.0.0.1              DVA0
   ewa0.0.0.11.0             EWA0         08-00-2B-E2-74-32
   pka0.7.0.6.0              PKA0             SCSI Bus ID 7
   ```

   The second column shows the numbers assigned to each drive:

   - The letters DK refer to a SCSI disk or CD–ROM device.
   - The third letter (A, B, C, D, or E) refers to the SCSI bus designation. Refer to your hardware owner's guide for more details.
   - The number refers to the drive number.

   In the third column, look for the line with the CD–ROM device string RRD. In the previous example, the CD–ROM device is RRD43. The device boot string for your system appears in that same line. The device boot string begins with the letters DKA.

3. Enter the init command with the following syntax:

   ```
   >>> init
   ```

4. Enter the boot command with the following syntax to boot from a CD–ROM:

boot *device*

For example, to boot the system from CD–ROM drive number 1, enter the following command:

```
>>> boot dka400
```

Output similar to the following is displayed:

```
(boot dka400.4.0.6.0)
block 0 of dka400.4.0.6.0 is a valid boot block
reading 16 blocks from dka400.4.0.6.0
bootstrap code read in
base = 11e000, imagestart = 0, imagebytes = 2000
initializing HWRPB at 2000
initializing page table at 110000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

OSF boot - Wed Jul  5 17:18:57 EDT 1995
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.8.3 Booting from the Network

To boot your system over the network, make sure it is registered as a client on a RIS server. Refer to *Sharing Software on a Local Area Network* for information about registering a client.

The device parameter is the network device from which you want to boot. The AlphaStation 200 Series, AlphaStation 250 Series, AlphaStation 255 Series, and AlphaStation 400 Series processors support two network adapters: `ewa0` and `ena0`.

4.8.3.1 Booting from a Digital UNIX Server

Use the following command syntax to boot your system over the network:

set *device*_protocols bootp
set *device*_inet_init bootp

For example, if the device you are booting from with the `bootp` protocol is `ewa0`, enter the following commands:

```
>>> set ewa0_protocols bootp
>>> set ewa0_inet_init bootp
>>> boot ewa0
```

Some system information is displayed by the installation software followed by the memory and hardware configurations.

If your initial network boot fails, enter `init` at the console prompt. If you encounter other problems during the RIS installation, refer to *Sharing Software on a Local Area Network* for more information.

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.9 AlphaStation 500 and AlphaStation 600 Series Processors

This section provides instructions for booting AlphaStation 500 and AlphaStation 600 processors.

4.9.1 Setting the Console Flags

Before starting the boot procedure on AlphaStation 500 and AlphaStation 600 processors, complete the following steps:

1. Enter the following command to clear the `boot_osflags` variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

   NOTE

   If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

   Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the `auto_action` variable to `halt`. This halts the system at the console prompt each time it is turned on, when it crashes, or when you press the Halt button.

   ```
   >>> set auto_action halt
   ```

3. Set the `boot_file` variable. This ensures that an alternate boot file is not set.

```
>>> set boot_file
```

4.9.2 Booting from the CD-ROM Optical Disc Kit

Follow these steps to boot AlphaStation 500 and AlphaStation 600 processors from a CD–ROM optical disc:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

   ```
   >>> show device
   ```

   Output similar to the following is displayed by the `show device` command:

   ```
   dka400.4.0.6.0          DKA400      RRD43  2893
   dva0.0.0.0.1            DVA0
   ewa0.0.0.13.0           EWA0        08-00-2B-3E-B6-C8
   pka0.7.0.6.0            PKA0        SCSI Bus ID 7
   ```

   The second column shows the numbers assigned to each drive:

   - The letters DK refer to a SCSI disk or CD–ROM device.
   - The third letter (A, B, C, D, or E) refers to the SCSI bus designation. Refer to your hardware owner's guide for more details.
   - The number refers to the drive number.

   In the third column, look for the line with the CD–ROM device string `RRD`. In the previous example, the CD–ROM device is `RRD43`. The device boot string for your system appears in that same line. The device boot string begins with the letters `DKA`.
3. Enter the `boot` command and the appropriate boot device string for your system. For example:

   ```
   >>> boot dka400
   ```

For more information about the `show device` and `boot` commands, see the hardware documentation that comes with your system.

4.9.3 Booting from the Network

To boot an AlphaStation 500 and AlphaStation 600 processors over the network, make sure it is registered as a client on a RIS server. Refer to the *Sharing Software on a Local Area Network* guide for information on registering a client.

To boot from a Digital UNIX Server, see Section 4.9.3.1.

4.9.3.1 Booting from a Digital UNIX Server

Use the `show device` command to determine which network adapter (such as `ewa` or `era`) is in use:

```
>>> show device
```

Output similar to the following is displayed by the `show device` command:

```
dka400.4.0.6.0 DKA400 RRD43  2893
dva0.0.0.0.1 DVA0
ewa0.0.0.13.0 EWA0 08-00-2B-3E-B6-C8
pka0.7.0.6.0 PKA0 SCSI Bus ID 7
```

Use the following command syntax to boot your system over the network:

set *device*_inet_init bootp
set *device*_protocols bootp

For example, if the device you are booting from with the `bootp` protocol is `ewa0`, enter the following commands:

```
>>> set ewa0_inet_init bootp
>>> set ewa0_protocols bootp
>>> boot -fi "" ewa0
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.10 AXPvme 64, AXPvme 100, AXPvme 160, AXPvme 166, AXPvme 230, Alpha VME 4/224, Alpha VME 4/288, and Alpha VME 5/nnn Single-Board Computers (SBCs)

This section provides instructions for booting AXPvme 64, AXPvme 100, AXPvme 160, AXPvme 166, AXPvme 230, Alpha VME 4/224, Alpha VME 4/288, and AlphaVME 5/nnn single-board computers. You must update your system's firmware before installing Digital UNIX Version 4.0B. Refer to Section 1.4.6 for more information about updating firmware.

4.10.1 Setting the Console Flags

Before starting the boot procedure, complete the following steps:

1. Enter the following command to clear the `boot_osflags` variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

NOTE

If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the `auto_action` variable to `halt`. This halts the SBC at the console prompt each time the SBC is turned on, when the SBC crashes, or when you press the Halt button.

   ```
   >>> set auto_action halt
   ```

3. Set the `boot_file` variable. This ensures that an alternate boot file is not set.

   ```
   >>> set boot_file
   ```

4.10.2 Booting from the CD-ROM Optical Disc Kit

Follow these steps to boot the AXPvme 64, AXPvme 100, AXPvme 160, AXPvme 166, AXPvme 230, Alpha VME 4/224, Alpha VME 4/288, and Alpha VME 5/nnn single-board computers from a CD–ROM optical disc:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

   ```
   >>> show device
   ```

   Output similar to the following is displayed by the `show device` command:

   ```
   dka200.2.0.2.0       DKA200      RZ26  T392
   dka400.4.0.2.0       DKA400      RRD42 4.5d
   ewa0.0.0.1.0         EWA0        08-00-2B-39-88-3A
   pka0.7.0.2.0         PKA0        SCSI Bus ID 7
   ```

   The second column shows the numbers assigned to each drive:

- The letters DK refer to a SCSI disk or CD–ROM device.
- The third letter (A, B, C, D, or E) refers to the SCSI bus designation. Refer to your hardware owner's guide for more details.
- The number refers to the drive number.

In the third column, look for the line with the CD–ROM device string RRD. In the previous example, the CD–ROM device is RRD42. The device boot string for your system appears in that same line. The device boot string begins with the letters DKA.

3. Enter the boot command and the appropriate boot device string for your system. For example:

```
>>> boot dka400
```

For more information about the show device and boot commands, see the hardware documentation that comes with your system.

4.10.3 Booting from the Network

To boot your SBC over the network, make sure it is registered as a client on a RIS server. Refer to *Sharing Software on a Local Area Network* for information on registering a client.

4.10.3.1 Booting from a Digital UNIX Server

Use the show device command to determine which network adapter is in use. The network adapter will have a value such as ewa0 or era0.

```
>>> show device
```

Output similar to the following is displayed by the show device command:

```
dka200.2.0.2.0       DKA200      RZ26  T392
dka400.4.0.2.0       DKA400      RRD42 4.5d
ewa0.0.0.1.0         EWA0        08-00-2B-39-88-3A
pka0.7.0.2.0         PKA0        SCSI Bus ID 7
```

Use the following command syntax to boot your system over the network:

set *device*_inet_init bootp
set *device*_protocols bootp

For example, if the device you are booting from with the bootp protocol is ewa0, enter the following commands:

```
>>> set ewa0_inet_init bootp
>>> set ewa0_protocols bootp
>>> boot ewa0
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.11 AXPpci 33 Single Board Computer (SBC) and Digital PICMG Alpha CPUs

This section provides instructions for booting an AXPpci 33 single-board computer or Digital PICMG Alpha CPUs (also known as Digital DMCC EBM4x and EBM2n Series SBCs).

4.11.1 Setting the Console Flags

Before starting the boot procedure on an AXPpci 33 single-board computer or Digital PICMG Alpha CPU, complete the following steps:

1. Enter the following command to clear the `boot_osflags` variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

   NOTE

   If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

   Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the `auto_action` variable to `halt`. This halts the SBC at the console prompt each time it is turned on, when it crashes, or when you press the Halt button.

   ```
   >>> set auto_action halt
   ```

3. Set the `boot_file` variable. This ensures that an alternate boot file is not set.

   ```
   >>> set boot_file
   ```

4.11.2 Booting from the CD-ROM Optical Disc Kit

Follow these steps to boot the AXPpci 33 single-board computer or Digital PICMG Alpha CPU from a CD–ROM optical disc:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

   ```
   >>> show device
   ```

   Output similar to the following is displayed by the `show device` command:

   ```
   dka200.2.0.2.0       DKA200      RZ26  T392
   dka400.4.0.2.0       DKA400      RRD42 4.5d
   ewa0.0.0.1.0         EWA0        08-00-2B-39-88-3A
   pka0.7.0.2.0         PKA0        SCSI Bus ID 7
   ```

   The second column shows the numbers assigned to each drive:

   - The letters DK refer to a SCSI disk or CD–ROM device.
   - The third letter (A, B, C, D, or E) refers to the SCSI bus designation. Refer to your hardware owner's guide for more details.
   - The number refers to the drive number.

   In the third column, look for the line with the CD–ROM device string `RRD`. In the previous example, the CD–ROM device is `RRD42`. The device boot string for your system appears in that same line. The device boot string begins with the letters `DKA`.
3. Enter the `boot` command and the appropriate boot device string for your system. For example:

   ```
   >>> boot dka400
   ```

For more information about the `show device` and `boot` commands, see the hardware documentation that comes with your system.

4.11.3 Booting from the Network

To boot your AXPpci 33 SBC or Digital PICMG Alpha CPU over the network, make sure it is registered as a client on a RIS server. Refer to *Sharing Software on a Local Area Network* for information on registering a client. Set your device protocols to boot from a Digital UNIX server.

4.11.3.1 Booting from a Digital UNIX Server

Use the `show device` command to determine which network adapter is in use. The network adapter will have a value such as `ewa0` or `era0`.

```
>>> show device
```

Output similar to the following is displayed by the `show device` command:

```
dka200.2.0.2.0       DKA200      RZ26  T392
dka400.4.0.2.0       DKA400      RRD42 4.5d
ewa0.0.0.1.0         EWA0        08-00-2B-39-88-3A
pka0.7.0.2.0         PKA0        SCSI Bus ID 7
```

Use the following command syntax to boot your system over the network:

set *device*_inet_init bootp
set *device*_protocols bootp

For example, if the device you are booting from with the bootp protocol is `ewa0`, enter the following commands:

```
>>> set ewa0_inet_init bootp
>>> set ewa0_protocols bootp
>>> boot ewa0
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.11.4 Booting Considerations

Debugging information printed during the system boot phase may cause the internal ring message buffer to be overwritten. This results in not all messages being saved in the `/usr/var/adm/syslog.dated` directory.

4.11.5 Booting from a PCI Tulip or ISA LeMAC Ethernet Card

To boot over the DE435 (PCI TULIP) Ethernet card using `bootp` protocol, enter the following sequence of commands after you have configured your boot server:

```
>>> set ewa0_inet_init bootp
>>> set ewa0_protocols bootp
>>> boot ewa0
```

Similarly, when using DE205 (ISA LeMAC) Ethernet card, enter the following sequence of commands:

```
>>> set ena0_inet_init bootp
>>> set ena0_protocols bootp
>>> boot ena0
```

4.12 AlphaPC64, AlphaPC164, EB64+, EB66+, and EB164 Single-Board Computers

This section provides instructions for booting AlphaPC64, AlphaPC164, EB64+, EB66+, and EB164 single-board computers (SBCs).

4.12.1 Setting the Console Flags

Before starting the boot procedure on AlphaPC64, AlphaPC164, EB64+, EB66+, and EB164 SBCs, complete the following steps:

1. Enter the following command to clear the `boot_osflags` variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

   NOTE

   If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

   Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the `auto_action` variable to `halt`. This halts the SBC at the console prompt each time it is turned on, when it crashes, or when you press the Halt button.

   ```
   >>> set auto_action halt
   ```

3. Set the `boot_file` variable. This ensures that an alternate boot file is not set.

   ```
   >>> set boot_file
   ```

4.12.2 Booting from the CD-ROM Optical Disc Kit

Follow these steps to boot AlphaPC64, AlphaPC164, EB64+, EB66+, and EB164 single-board computers from a CD–ROM optical disc:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

   ```
   >>> show device
   ```

Output similar to the following is displayed by the show device command:

```
dka400.4.0.6.0          DKA400      RRD43  2893
dva0.0.0.0.1            DVA0
ewa0.0.0.13.0           EWA0        08-00-2B-3E-B6-C8
pka0.7.0.6.0            PKA0        SCSI Bus ID 7
```

The second column shows the numbers assigned to each drive:

- The letters DK refer to a SCSI disk or CD–ROM device.
- The third letter (A, B, C, D, or E) refers to the SCSI bus designation. Refer to your hardware owner's guide for more details.
- The number refers to the drive number.

In the third column, look for the line with the CD–ROM device string RRD. In the previous example, the CD–ROM device is RRD43. The device boot string for your system appears in that same line. The device boot string begins with the letters DKA.

3. Enter the boot command and the appropriate boot device string for your system. For example:

```
>>> boot dka400
```

For more information about the show device and boot commands, see the hardware documentation that comes with your system.

4.12.3 Booting from the Network

To boot your AlphaPC64, AlphaPC164, EB64+, EB66+, and EB164 SBC over the network, make sure it is registered as a client on a RIS server. Refer to *Sharing Software on a Local Area Network* for information on registering a client. Set your device protocols to boot from a Digital UNIX server.

4.12.3.1 Booting from a Digital UNIX Server

Use the show device command to determine which network adapter is in use. The network adapter will have a value such as ewa0 or era0.

```
>>> show device
```

Output similar to the following is displayed by the show device command:

```
dka200.2.0.2.0      DKA200      RZ26  T392
dka400.4.0.2.0      DKA400      RRD42 4.5d
ewa0.0.0.1.0        EWA0        08-00-2B-39-88-3A
pka0.7.0.2.0        PKA0        SCSI Bus ID 7
```

Use the following command syntax to boot your system over the network:

set *device*_inet_init bootp
set *device*_protocols bootp

For example, if the device you are booting from with the bootp protocol is ewa0, enter the following commands:

```
>>> set ewa0_inet_init bootp
>>> set ewa0_protocols bootp
>>> boot ewa0
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.13 DEC 2000 Series Processors

The following sections describe how to boot the DEC 2000 processor from a CD–ROM optical disc and from the network.

4.13.1 Setting the Console Flags

Before starting the boot procedure, enter the following commands. Each command is echoed by the system when you press Return:

1. Enter the following command to clear the boot_osflags variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

   NOTE

   If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

   Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the auto_action variable to halt. This halts the system at the console prompt each time the system is turned on, when the system crashes, or when you press the Halt button.

```
>>> set auto_action halt
```

3. Set the keyboard variable to match the keyboard type on the system.

```
>>> set keyboard <type>
```

Use the `help set` command to list the available keyboard types.

4.13.2 Booting from the CD–ROM Optical Disc Kit

Place the CD–ROM optical disc into a caddy as described in Appendix B.

Use this procedure to boot the system:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

```
>>> show dev
```

The following information is displayed about the devices on your system:

```
BOOTDEV      ADDR      DEVTYPE    RM/FX    DEVNAM    REV   NUMBYTES
-------      ----      -------    -----    ------    ---   --------
EZ0A         08-00-2B-38-A1-92
FD0          PC Floppy DISK       RM
SCSI Devices..
DKA200       A/2/0     DISK       FX       RZ25      0700   426.25MB
DKA400       A/4/0     RODISK     RM       RRD43     4.5d   .......
DKA500       A/5/0     DISK       FX       RZ25L     0006   535.65MB
DKA600       A/6/0     DISK       FX       RZ28      435E   2.10GB
HOST         A/7/0     PROC                AHA1742A  G.2
```

The numbers under BOOTDEV represent the unit number assigned to each drive on your system:

- The letters DK refer to a SCSI disk device.
- The third letter (A or B) refers to the SCSI bus designation. Refer to your hardware owner's guide for more details.
- The number refers to the drive number.

In the DEVNAM column, look for the line with the CD–ROM device string `RRD`. In the previous display from the `show dev` command, the CD–ROM device is `RRD43`. The device boot string for your system appears in that same line under the BOOTDEV column as `DKA400`.

3. Enter the `boot` command with the following syntax to boot from a CD–ROM.

boot *device*

For example, to boot the system from CD–ROM drive number 4, enter the following command:

```
>>> b dka400
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.13.3 Booting from the Network

Booting from the network is not supported for the DEC 2000 processors.

4.14 DEC 3000 Series Processors

The following sections describe how to boot the DEC 3000 series processor from a CD–ROM optical disc and from the network.

4.14.1 Setting the Console Flags

Before starting the boot procedure, enter the following commands. Each command is echoed by the system when you press Return:

1. Enter the following command to clear the `boot_osflags` variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

   NOTE

   If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

   Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the `auto_action` variable to `halt`. This halts the system at the console prompt each time the system is turned on, when the system crashes, or when you press the Halt button.

```
>>> set auto_action halt
```

3. Set the boot_reset variable to on. This ensures that all devices are initialized prior to booting.

   ```
   >>> set boot_reset on
   ```

4. Set the scsi_reset variable to 4. This ensures that all devices have adequate time to initialize during the boot sequence.

   ```
   >>> set scsi_reset 4
   ```

4.14.2 Booting from the CD–ROM Optical Disc Kit

Place the CD–ROM optical disc into a caddy as described in Appendix B.

Use the following procedure to boot the system:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

   ```
   >>> show dev
   ```

   The output of the show dev command displays information about the devices on your system:

   ```
   BOOTDEV     ADDR   DEVTYPE NUMBYTES RM/FX WP  DEVNAM REV
   -------     ----   ------- -------- ----- --  ------ ---
   DKA0        A/0/0  DISK    426.25MB  FX       RZ25   0700
   DKA200      A/2/0  DISK    426.25MB  FX       RZ25   0700
   DKA400      A/4/0  DISK     .....    RM   WP  RRD42  4.3d
   MKA500      A/5/0  TAPE             RM       TZK10  01B4
   ..HostID..  A/6    INIT
   ..HostID..  B/6    INITR
   MKB500      B/5/0  TAPE             RM       TLZ04
   ```

   The numbers under BOOTDEV represent the unit number assigned to each drive on your system:

   - The letters DK refer to a SCSI disk device.
   - The letters MK refer to a SCSI magnetic tape device.
   - The third letter (A or B) refers to the SCSI bus designation. Refer to your hardware owner's guide for more details.
   - The number refers to the drive number.
   - HostID represents the SCSI id of the host adapter. In the previous example, A/6 INIT represents INITiator on bus A, id 6.

   In the DEVNAM column, look for the line with the CD–ROM device string RRD. In the previous display from the show dev command, the

CD–ROM device is RRD42. The device boot string for your system appears in that same line under the BOOTDEV column as DKA400.

3. Enter the boot command with the following syntax to boot from a CD–ROM.

   boot *device*

   For example, to boot the system from CD–ROM drive number 4, enter the following command:

   ```
   >>> b dka400
   ```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.14.3 Booting from the Network

To boot your system from the network, make sure it is registered as a client on a RIS server. Refer to *Sharing Software on a Local Area Network* for information on registering a client.

4.14.3.1 Booting from a Digital UNIX Server

When booting from a Digital UNIX server, the system uses the bootp protocol. Enter the following command to boot your system over the network:

```
>>> boot ez0
```

Some system information is displayed by the installation software followed by the memory and hardware configurations.

If your initial network boot fails, enter init at the console prompt. If you encounter other problems during the RIS install, refer to *Sharing Software on a Local Area Network*.

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.14.4 Booting from the 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
Digital Equipment Corporation
VPP PAL X5.37-82000101/OSF PAL X1.28-82000201 -
Built on 13-DEC-1996 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:

```
>>> b "1/dka400"
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.14.5 Booting from an FDDI Network Interface

Booting over an FDDI network interface is supported for DEFTA and CRE-DEFTA devices.

To boot from an FDDI network interface device, find the device names as described in Section 4.14.4. For example, a DEFTA device appears as `PMAF-FA` when you use the `show conf` command. Identify the slot number and enter the following commands to boot from a Digital UNIX server using the `bootp` protocol:

```
>>> b "1/ez0"
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.15 DEC 4000 Series Processors

The following sections describe how to boot the DEC 4000 processor from a CD–ROM optical disc and from the network.

4.15.1 Setting the Console Flags

Before starting the boot procedure, complete the following steps:

1. Enter the following command to clear the `boot_osflags` variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

   NOTE

   If your system has unattended installation capability, the system will automatically reboot from the newly installed disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

2. Set the `auto_action` variable to `halt`. This halts the system at the console prompt each time the system is turned on, when the system crashes, or when you press the Halt button.

```
>>> set auto_action halt
```

4.15.2 Booting from the CD–ROM Optical Disc Kit

If your CD–ROM optical disc is not already in a caddy, follow the instructions in Appendix B.

Use the following procedure to boot the system:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

```
>>> show dev
```

A device information table similar to the following is displayed:

```
dka0.0.0.0.0              DKA0                          RZ73
dkb0.0.0.1.0              DKB0                          RZ73
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                       RRD42
mka500.0.0.0.0            MKA500                        TLZ04
mke0.0.0.4.0              MKE0                          TZ85
eza0.0.0.6.0              EZA0             08-00-2B-2C-CE-DE
ezb0.0.0.7.0              EZB0             08-00-2B-2C-CE-DF
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
```

The second column shows the numbers assigned to each drive:

- The letters DK refer to a SCSI disk or CD–ROM device.
- The letters MK refer to a SCSI magnetic tape device.
- The third letter (A, B, C, D, or E) refers to the SCSI or DSA bus designation. Refer to your hardware owner's guide for more details.
- The number refers to the drive number.

In the third column, look for the line with the CD–ROM device string RRD. In the previous display from the show dev command, the CD–ROM device is RRD42. The device boot string for your system appears in that same line. The device boot string begins with the letters DKE.

3. Enter the init command with the following syntax:

```
>>> init
```

4. Enter the boot command with the following syntax to boot from a CD–ROM:

   boot *device*

   For example, to boot the system from CD–ROM drive number 1, 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

OSF boot - Wed Jul  5 15:49:49 EDT 1995
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.15.3 Booting from the Network

To boot your system over the network, make sure it is registered as a client on a RIS server. Refer to *Sharing Software on a Local Area Network* for information on registering a client.

The device parameter is the network device from which you want to boot. The DEC 4000 processor supports two network adapters: eza0 and ezb0.

Set your device protocols to boot from a Digital UNIX server.

4.15.3.1 Booting from a Digital UNIX Server

Use the following command syntax to boot your system over the network:

set *device*_protocols bootp

For example, if the device you are booting from with the `bootp` protocol is `eza0`, enter the following commands:

```
>>> set eza0_protocols bootp
>>> boot eza0
```

Some system information is displayed by the installation software followed by the memory and hardware configurations.

If your initial network boot fails, enter `init` at the console prompt. If you encounter other problems during the RIS installation, refer to *Sharing Software on a Local Area Network*.

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.15.4 Prestoserve Option

The following instructions apply to DEC 4000 systems equipped with the Prestoserve option.

4.15.4.1 The prcache Command

The DEC 4000 system console provides the `prcache` command to support the Prestoserve option (NVRAM). Refer to the hardware documentation for a description of this command.

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.16 DEC 7000 and DEC 10000 Series Processors

The following sections describe how to boot the DEC 7000 processor and DEC 10000 processor from a CD–ROM optical disc.

4.16.1 Setting the Console Flags

Before starting the boot procedure, complete the following steps:

1. Enter the following command to clear the `boot_osflags` variable to ensure that the kernel takes correct action upon boot:

   ```
   >>> set boot_osflags ""
   ```

   NOTE

   If your system has unattended installation capability, the system will automatically reboot from the newly installed

disks after the software subsets are loaded during the installation process. However, if you want to halt the system immediately after the software subsets are loaded (that is, you do not want to perform an automatic reboot), enter the following command:

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

Remember to use this command only if your system has unattended installation capability. See Table 4–3 for a list of the systems that support this capability.

---

2. Set the `auto_action` variable to `halt`. This halts the system at the console prompt each time the system is turned on, when the system crashes, or when you press the Halt button.

   ```
   >>> set auto_action halt
   ```

3. Set the `boot_reset` variable to `on`. This must be done if you need to reboot the generic kernel (`genvmunix`) at any time to reconfigure your system for additional peripherals.

   ```
   >>> set boot_reset on
   ```

4.16.2 Booting from the CD–ROM Optical Disc Kit

If your CD–ROM optical disc is not already in a caddy, follow the instructions in Appendix B.

Use the following procedure to boot the system:

1. Insert the CD–ROM optical disc labeled *Digital UNIX V4.0B Operating System Volume 1*.
2. Enter the following command to determine the unit number of the drive for your device:

   ```
   >>> show dev
   ```

   Output similar to the following is displayed:

   ```
   dka0.0.0.5.0      DKA0                    RZ73
   dkb4.4.1.14.0     DKB400                  RRD43
   ```

   The numbers in the second column are the unit numbers assigned to each drive on your system:

   - The letters DK refer to a SCSI CD–ROM or disk device.
   - The third letter (A, B, C, D, or E) refers to the SCSI bus designation. Refer to your hardware owner's guide for more details.

- The numbers refer to the drive number.

In the third column, look for the line with the CD–ROM device string RRD. In the previous display from the show dev command, the CD–ROM device is RRD43. The device boot string for your system appears in that same line. The device boot string begins with the letters DKB.

3. Enter the boot command with the following syntax to boot from a CD–ROM:

boot *device-number*

For example, to boot the system from CD–ROM drive number 4, enter:

```
>>> boot dkb400
```

Output similar to the following is displayed:

```
Initializing...

F  E  D  C  B  A  9  8  7  6  5  4  3  2  1  0  NODE #
      A  M  M  .  .  .  .  .  P  TYP
      o  +  +  .  .  .  .  .  +  ST1
      .  .  .  .  .  .  .  .  B  BPD
      o  +  +  .  .  .  .  .  +  ST2
      .  .  .  .  .  .  .  .  B  BPD
      +  +  +  .  .  .  .  .  +  ST3
      .  .  .  .  .  .  .  .  B  BPD

+  .  +  .  +  . +  .  .  +  .  .  .  .     C0 XMI +

  .  A0  B0  . . . . .   LV
  . 256  64  . . . .  .  320Mb

Firmware Rev = V2.3  SROM Rev = V2.0  SYS SN = GA12345678

Booting...
Connecting to boot device dkb400
   .
   .
   .
```

You have completed booting your system. Continue the installation procedure with Chapter 5.

4.16.3 Booting from the Network

Booting from the network is not supported for the DEC 7000 and DEC 10000 processors.

5

Performing Default, Custom, and Cloned Installations

This chapter describes the information you supply for a default or custom installation and how to respond to prompts if you are performing a cloned installation.

NOTE

This release provides enhancements to the full (default or custom) installation process and to the installation cloning process. Now, administrators can modify the configuration description file (CDF) to achieve an unattended installation cloning process. In addition, the installation process searches for and invokes user-supplied files to enable customizations on the system to be installed. Refer to Appendix C for more information.

The goal of this chapter is to provide the information necessary for you to perform the user actions shown in Table 5–1.

Table 5–1: Summary of User Actions

By reading this chapter, you will ...
Respond to prompts for a cloned installation or use the text-based or graphical interface to enter all information required by the full installation procedure.
Enter boot commands when requested by the installation procedure.
Select kernel options for custom installations.
Log in to the newly-installed system as the user `root`.

Remember that neither the cloned, default, nor custom installation preserves user or data files, so make sure your current operating system has been backed up. If errors occur that prevent a successful installation of Version 4.0B, you may need to restore the previous version of the operating system.

Before beginning the installation, ensure that you have performed all prerequisite tasks as described in Section 1.4.

5.1 What You See After Booting the System

What you see after you boot your system from the distribution media depends on the following:

- If you are performing a default or custom installation, refer to Section 5.1.1 if your system console has graphics capabilities or refer to Section 5.1.2 if your system console does not have graphics capabilities.
- If you are performing a cloned installation, refer to Section 5.1.3.

5.1.1 If Your System Has Graphics Capabilities

If your system console has graphics capability and 32 MB or more of memory to support a graphic installation, the X Server is started and an `Installation Setup` window displays.

5.1.1.1 Unique Features of the Graphical User Interface

This section describes the unique features of the graphical user interface:

- Click on the fields in the `Installation Setup` window to enter your responses to the installation procedure.
- With the exception of the `Root Password` and `Date` and `Time` fields, you can enter the information on the `Installation Setup` window in any sequence. When you specify a password in the `Root Password` field, you are required to validate the password by entering it again. When you enter either a date or a time, you are required to enter the other as well.
- The graphical user interface contains extensive online help. To display the online help, click on the `Help` push button.
- For ease of use, you can click on the `Setup Done` button as soon as the `Installation Setup` window displays because default responses have been provided in all fields where an entry is required. Keep in mind that if you do this, only the mandatory software subsets are installed and the installation will occur on the default disk that is chosen by the installation procedure.
- If you do not provide certain essential site-specific information (such as `root` password, your system's host name, the date and time, and location and time zone), you will be prompted to enter that information during the configuration phase of the installation process.
- If you are performing a custom installation, you can select to install all software subsets at once by clicking on the `Add All` pushbutton in the `Software Selection` window.

- You can access the `Disk Configuration` application directly from the `Installation Setup` window to view or modify disk partitions.

5.1.2 If Your System Does Not Have Graphics Capabilities

If your system console does not have graphics capability or has less than 32 MB of memory, the following text-based installation procedure is displayed:

```
       Welcome to the Digital UNIX Installation Procedure

This procedure installs Digital 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

There are two types of installations:

o  The Default Installation installs a mandatory set of
   software subsets on a predetermined file system layout.

o  The Custom Installation installs a mandatory set of
   software subsets plus optional software subsets that you
   select.  You can customize the file system layout.

The UNIX Shell option puts your system in single-user mode with
superuser privileges.  This option is provided for experienced
UNIX system administrators who want to perform file system or
disk maintenance tasks before the installation.

The Installation Guide contains more information about installing
Digital UNIX.

1) Default Installation
2) Custom Installation
3) UNIX Shell

Enter your choice:
```

You may want to refer to Section J.1 and Section J.2 in Appendix J to review sample text-based installations before you actually start your own text-based installation. Reviewing these sample installations gives you an idea of what to expect. You can also use these sample installations to follow the progress of your own system installation.

5.1.2.1 Unique Features of the Text-Based Interface

This section describes the unique features of the text-based interface:

- The text-based interface presents a series of questions that you must answer before any disk configuration or software installation begins. Until you answer all questions and start the installation, your system is not changed in any way.

- At any time during the question and answer session, you can enter the word `history` to go back and change your answers.
- Online help is available for every question by entering the word `help` or a `?` (`question mark`) at the corresponding prompt.

Section 5.2 summarizes the information you must enter.

5.1.3 If You are Performing a Cloned Installation

When the system to be installed is booted either from the distribution media or from a RIS server, the system checks to see if a Configuration Description File (CDF) is available for a cloned installation. If a CDF is found and the `prompt` variable in the CDF is either not set or set to `yes`, then the system displays the following:

```
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]:
```

- If you decide not to use the CDF for a cloned installation and enter `n`, an interactive installation procedure begins. What you see next depends on whether or not the system console has graphics capabilities. Refer to Section 5.1.1 or Section 5.1.2 as appropriate.
- If you enter `y`, the CDF is read in, either from the local media or from the RIS server, and is validated for use on your system. Validation includes ensuring that the disk name and disk type specified in the CDF exists on your system. Refer to Section 5.1.3.1 and Section 5.1.3.2 for more information about CDF validation.

If the `prompt` variable in the CDF is set to `no`, then the system will use the CDF without prompting the user. The system displays the following:

```
A Configuration Description File, was specified for use during the
installation of this system.
The Configuration Description File will be used by the installation to
provide the information related to file system layout and software
selection.
```

For information on the `prompt` variable and other variables in a CDF, see Appendix C.

5.1.3.1 Successful CDF Validation

If CDF validation is successful, the installation procedure continues as shown in Section 5.16. 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, geographic location and time zone, 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, geographic location, and time zone are all provided by fields in the CDF. If the CDF variable `timeset` is blank or is set to `no`, the system will request the date and time be entered during the installation. If `timeset` is set to `yes`, then the system will set the system time automatically as specified by the system clock.

Later in the installation process, you will be required to boot from the newly installed disks, as shown in Section 5.18 and to enter a `root` password as shown in Section 5.5 (if a password is not already contained in the CDF).

5.1.3.2 CDF Validation Failures

This section describes the types of CDF validation failures that may occur. If you encounter CDF validation failures during a RIS installation, you should verify with your RIS system administrator that your system is registered to the correct CDF. If you encounter CDF validation failures during an installation using a diskette or CD-ROM, you should verify that you have the proper CDF for the type of system being installed.

- If CDF validation fails because the disk name specified in the CDF does not match a disk name attached to your system, the following message displays:

```
*** Validating CDF prior to starting installation...
*** Validation Error:

The disk name "rz8" was not found on this system when
attempting to validate the following filesystem(s): root usr
```

- If CDF validation fails because the CDF file includes a disk type for a specific device but the device on your system has a different disk type, the following message displays:

```
*** Validating CDF prior to starting installation...
*** Validation Error:

The rz25 disk type specified in the Configuration Description
File does not match the name/type found on this system for the
following device(s): rz3/rz26l
```

The previous validation errors are saved in the `/var/tmp/install.log` file for your reference until you reboot the system.

You may restart the cloned installation procedure by doing one of the following:

- Enter `restart` at the `root` (#) system prompt
- Reboot the system from the RIS server

5.2 Summary of User Input

Regardless of the user interface (graphical or text-based), you should be prepared to provide the information shown in Table 5–2 for default and custom installations.

Table 5–2: User Input Required for Installation Procedure

User Input	Default Installation	Custom Installation
Installation Type	X	X
Host name[a]	X	X
Root password[b]	X	X
Root password verification[b]	X	X
Date[a]	X	X
Time[a]	X	X
Location[a]	X	X
Time zone[a]	X	X
Disk for root file system	X	X
File system type for root file system		X
Disk and partition for /usr file system		X
File system type for /usr		X
Disk and partition for first swap area		X
Disk and partition for optional second swap area		X
Disk and partition for /var file system		X
File system type for /var		X
Optional software subsets to install		X

Table 5–2: User Input Required for Installation Procedure (cont.)

User Input	Default Installation	Custom Installation
Boot commands[c]	X	X
Kernel options		X
Log in as the user `root`	X	X

[a]This site-specific information is obtained from the RIS server during Remote Installation Services (RIS) installations and cannot be edited. Enter this information only if you are using the CD–ROM as the distribution source of the software. If you do not make an entry in these fields, you are prompted for this information during the installation configuration phase.
[b]If you do not specify a root password, you are prompted for one during the installation configuration phase.
[c]The boot commands you have to enter are supplied by the installation procedure. When appropriate, enter the boot command sequence exactly as shown on your screen. However, if your system has unattended installation capability, your system will reboot automatically and, therefore, will not prompt you to enter the boot commands.

Section 5.3 through Section 5.20 provide additional reference information for each piece of information required by the installation procedure.

5.3 Choosing the Installation Type

Table 5–3 compares the features of the default and custom installation types to help you decide which installation type best suits your needs.

Table 5–3: Comparison of the Default and Custom Installations

Default Installation	Custom Installation
The `root` and `/usr` file systems and swap space will be on the same disk; `/var` is a directory under `/usr`.	The `root`, `/usr`, and `/var` file systems and swap space can be on any disk and each can be put on separate disks.
Always uses the default partition table.	Option to use the default or custom partition table.
Uses the default file system layout: `root` is on the `a` partition; `/usr` is on the `g` partition, and swap space is on the `b` partition.	Except for the `root` file system, which is always on the `a` partition, uses any disk partition on any disk for file systems and swap space.
UFS (UNIX file system) is the file system type for all file systems.	Choice between UFS or the Advanced File System (AdvFS) as the file system type.[a]
Configures one swap area.	Option to configure two swap areas.
Automatically installs mandatory software subsets only.	Installs mandatory software subsets automatically and then offers the option to install additional software subsets.

[a]You can choose the file system type for a custom installation, but for systems with less than 32 MB of memory, you do not have the option to use AdvFS as the file system type.

Table 5–3: Comparison of the Default and Custom Installations (cont.)

You should perform a custom installation if any one of the statements shown in Table 5–4 is true.

Table 5–4: Criteria for Deciding to Perform a Custom Installation

Choose the custom installation if you want to...
Keep or modify the existing customized disk partition table.
Allocate two swap areas.
Use either the Advanced File System (AdvFS) or the UNIX File System (UFS) as the file system type for `root`, `/usr`, or `/var`.[a]
Customize the file system layout by choosing the disk and the disk partitions on which the `root`, `/usr`, and `/var` file systems and `swap` area will reside.
Create a separate file system for `/var`.
Customize the software on your system by installing additional optional software subsets.
Customize kernel options.
Use the system as a dataless management services (DMS) server.[b]
Use the system as a remote installation services (RIS) server.[c]

[a]You can choose the file system type for a custom installation, but for systems with less than 32 MB of memory, you do not have the option to use AdvFS as the file system type.
[b]If you are installing a system that you plan to use as a dataless management services (DMS) server, you must perform a custom installation because you need more than just the mandatory software subsets on a DMS server. Instead of creating a link from `/var` to a mount point, you may want to create a separate file system for `/var` because the file systems needed for the dataless areas are located in the `/var/adm/dms` directory. Refer to *Sharing Software on a Local Area Network* for information about setting up disk partitions for DMS servers, software requirements for DMS servers, and installing software on DMS clients.
[c]If you plan to install software on a remote installation services (RIS) server, you must perform a custom installation because you need more than just the mandatory software subsets on a RIS server. Instead of creating a link from `/var` to a mount point, you may want to create a separate file system for `/var` because the file systems needed for RIS areas are located in the `/var/adm/ris` directory. Refer to *Sharing Software on a Local Area Network* for information about setting up RIS servers.

You should perform a default installation if all of the statements shown in Table 5–5 are true.

Table 5–5: Criteria for Deciding to Perform a Default Installation

Choose the default installation if you want to ...
Use only one disk to contain the `root` and `/usr` file systems and swap space.
Make the `var` area a directory under `/usr`.
Make no decisions about which disk partitions are used for the `root` and `/usr` file systems.

Table 5–5: Criteria for Deciding to Perform a Default Installation (cont.)

Choose the default installation if you want to ...
Use the UNIX file system (UFS) as the file system type for the `root` and `/usr` file systems.
Use the default partition table.[a]
Allocate one swap area.
Install only the mandatory software subsets; optional software can be installed after the default installation completes.
Get your Digital UNIX operating system up and running with limited decision-making. The default installation may be more appropriate for users with no previous UNIX experience.

[a]The size of the default disk partitions were designed so that a default installation fits on the disk. The default disk layout is: `root` is on partition `a`, `/usr` is on partition `g`, the `var` area is a directory under `/usr`, and the `swap` area is on partition `b`. If you perform a default installation, you cannot preserve existing custom partition tables or disk labels. Custom partition tables are partition tables that have been changed to sizes other than the default values. If a customized partition table exists, it will be overwritten.

If you are planning to install additional layered products later or may use this system as a DMS or RIS server, the default installation will not suit your needs.

The default installation is recommended for systems with limited disk space and less than 32 MB of memory.

5.3.1 Navigating Through the Installation Setup Window

Table 5–6 describes how to navigate through the `Installation Setup` window for custom installations:

Table 5–6: Quick Navigation Through the Custom Installation Setup Window

For custom installations...
Make an entry in the text entry fields in the `Installation Setup` window.
Optionally click on `Partition Disks...` if you want to use the Disk Configuration Utility to resize disk partitions.
Optionally click on `Select Software...` to display the software selection window. When you are finished selecting optional software, click on `OK` to return to the `Installation Setup` window.
Click on `Setup Done`.
Click on `OK` to verify that you are ready to begin the installation procedure.

Table 5–7 describes how to navigate through the Installation Setup window for default installations:

Table 5–7: Quick Navigation Through the Default Installation Setup Window

For default installations...
Make an entry in the text entry fields on the Installation Setup window.
Optionally click on View Software to view the mandatory software that will be installed. You cannot change (add or delete) the software subsets on this list during default installations. Click on OK to return to the Installation Setup window.
Click on Setup Done.
Click on OK to verify that you are ready to begin the installation procedure.

5.4 Specifying a Host Name

If the host name was not obtained from the server (during a RIS installation), you must give your system a name. The host name is used to identify your system on the network. The following lists the guidelines for host names:

- Host names may contain from 2 to 63 alphanumeric upper or lower case characters (a-z, A-Z, 0-9).
- The first character in a host name must be a letter.
- Hyphens (-) are permitted in host names. Periods (.) are permitted only if you are entering the fully qualified domain name. Fully qualified host names can contain a maximum of 254 characters.

Following are examples of correct and incorrect host names:

Correct:	mysystem	mysystem.com	abc-university.edu
Incorrect:	my_system	1996.com	binary

Note

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

You may want to consult your site system administrator before choosing your host name because site-specific restrictions (such as maximum length) may have been defined. You also do not want to choose a host name that is

already being used by another system. If your system is already running a previous version of Digital UNIX and is connected to a network, you should keep the same host name because changing it would impact how your system is recognized on the network.

If you do not supply a host name, you are prompted for one during the installation configuration phase.

5.5 Specifying a Root Password

Every operating system has a superuser who has 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 can make any changes to the operating system. The `root` user is said to have *superuser privileges*. For that reason, the `root` user (or `root` account), needs a special password.

Passwords should contain a combination of upper and lower case letters and a minimum of six to a maximum of 16 characters. The Digital UNIX operating system verifies only the first eight characters. Digital suggests using 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.

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

- Words found in any dictionary (in any language)
- Personal information about you or your family such as names, addresses, birthdays, social security numbers, telephone numbers, names of pets
- Any combination of words in the dictionary and personal information

Do not choose a password that can be easily 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 following are examples of correct and incorrect root passwords:

Correct:	`U8one2too`	`wht%IZ-dne`	`DL_wrks@9`	`9Pnt.99%`
Incorrect:	`lowercase`	`nonumbers`	`Spot`	`7-6-58`

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

If you do not supply a `root` password, you will be prompted for one during the installation configuration phase.

5.6 Entering the Date and Time

If the date and time was not obtained from the server (during a RIS installation), you must enter the current date and time. If you enter either the date or the time, you must enter the other.

If you do not supply a date and time, you are prompted to enter the date and time during the installation configuration phase.

The date is entered in the format `mm-dd-yy` where `mm` represents the month, `dd` represents the day of the month, and `yy` represents the year. For example, the digits entered in the order `12 13 96` represent December 13, 1996. The text-based interface requires that a hyphen (`-`) separate each set of digits, for example, `12-13-96`.

Enter the time in digits using the 24-hour clock in the format `hh:mm`; the `hh` represents the current hour, for example, `14` represents 2 o'clock in the afternoon; the `mm` represents the minutes, for example, `06` represents the sixth minute of the hour.

If you do not specify the time, messages displayed during the installation procedure are shown in Greenwich Mean Time.

If you do not specify a date and time for CD-ROM installations, the date and time recorded by the installation procedure might be later or earlier than the date and time for your time zone because the procedure has no way to determine date and time until the configuration phase when you will be required to enter a date and time. Although the absolute time displayed in the installation is incorrect, relative time elapsed is accurate. Therefore, you can still use time-stamping to determine how long the installation is taking.

5.7 Entering the Location and Time Zone

If the location was not obtained from the server (during a RIS installation), a menu lists the locations that are available. The location is used to set the time zone. If the location has more than one time zone, for example the United States, you must specify a time zone for the location. You should select the location that best describes your geographic location. If you do not select a location during a text-based installation, the default is Greenwich Mean Time (GMT). Table 5–8 describes the acronyms that appear in the location menu:

Table 5–8: Definitions of Location Acronyms

Location Acronym	Description
CET	Central European Time
EET	Eastern European Time
Factory	Specifies No Time Zone
GB-Eire	Great Britain/Ireland
GMT	Greenwich Mean Time
MET	Middle European Time
NZ	New Zealand
NZ-CHAT	New Zealand, Chatham Islands
PRC	Peoples Republic of China
ROC	Republic of China
ROK	Republic of Korea
SystemV	Specific to System V operating systems
UCT	Greenwich Mean Time
US	United States
UTC	Greenwich Mean Time
Universal	Greenwich Mean Time
W-SU	Western Soviet Union[a]
WET	Western European Time
Zulu	Coordinated Universal Time

[a]The W-SU time zone follows MET time zone rules. W-SU is provided only for backward compatibility and the MET time zone should be used instead.

If you do not supply a geographic location and time zone, you are prompted for this information during the installation configuration phase.

5.8 Choosing the Disk for the Root File System

The installation procedure requires that you specify a disk to contain the `root` file system. If you are performing a default installation, this is the only decision you have to make.

There are two requirements for the disk that contains the `root` file system:

1. The disk you choose for the `root` file system must be one of the supported disks shown in Table 3–2.

2. The root file system is always located on partition a of the disk you choose. Partition a must be at least 98,304 blocks (48 MB) and must start at block 0 (zero), the beginning of the disk. Digital recommends selecting a disk where the size of partition a is at least 64 MB (131,000 blocks). Refer to Chapter 3 for root file system considerations.

The following information is displayed for each disk connected and available to your system:

- Device name, for example, rz0
- Disk type, for example, RZ26
- Disk number, for example, 0
- Controller type to which the disk is connected, for example, SCSI
- Controller number to which the disk is connected, for example, 0

The unit number for the disk that contains the root file system must be in the range 0 to 255 for ra type devices, in the range 0 to 47 for re type devices (SCSI disks employing RAID technology), and in the range 0 to 511 for rz type devices. This information is pertinent if your system has, for example, more than 511 rz disks because the disks with unit numbers greater than 511 will not be displayed for selection during the installation. The installation procedure automatically displays the device name (with unit numbers) for each disk connected to your system.

5.8.1 Disk Size Restrictions

If you are using the text-based installation interface, disks that do not have partitions large enough to hold the root and /usr file systems and the swap1 area on the same disk are marked with an asterisk to the left of the Disk Type column. As an example, RZ55 and RZ24L disks have a partitions large enough to contain the root file system, but neither disk has a g (or other) partition large enough for the /usr file system. Neither disk type is able to hold all file systems and another disk is required.

This is not a problem during custom installations because you have the opportunity to select different disks and partitions. If you are performing a custom installation, you can, for example, use RZ55 and RZ24L disks to hold the root file system and allocate the /usr (and other) file system to other disks and disk partitions on your system. The default installation uses only default partitions and puts all file systems on a single disk. Therefore, disk types such as the RZ55 and RZ24L cannot be used for a default installation.

If you are performing a default installation with the text-based interface, and you try to install Digital UNIX Version 4.0B on a disk that is too small, you will see a message similar to the following:

```
The disk you selected is too small for a Default installation.
You may switch to a Custom installation to distribute the software
on multiple disks, or you may select a larger disk to continue the
Default installation.

1) Switch to Custom installation
2) Select a different disk

Enter your choice:
```

If you select option 1, you can use the custom installation procedure to allocate partitions on other disks for the `/usr` and other file systems or spread the software across multiple disks. Review Chapter 1 and read Chapter 3 before you continue with the custom installation.

Option 2 lets you choose a different disk. You must choose a disk large enough to contain `root` file system, `/usr` file system, and `swap1` area to continue the default installation or the same message is repeated. If your system has another disk and it is not marked with an asterisk, you can choose this option and continue with the installation. Refer to Appendix G and Appendix H to ensure that the disk you choose has enough space.

5.8.2 Disk Label Handling

The disk selected to contain the `root` file system always has a new disk label written to it, regardless of whether one already exists or not. This ensures that a valid bootstrap exists on the disk. Without one, the disk is not bootable.

Before writing a new disk label, the disk is checked for a preexisting disk label. If none is found, which is typical for a disk that has never been used for Digital UNIX before, a disk label is written using the default partition information.

The following describes how disk labels are handled by the installation procedure:

- During a default installation, if the disk chosen for `root` already had a default disk label, the disk label is preserved, new boot blocks are written, and the disk label is restored. If the disk chosen for `root` had a customized disk label, a default disk label is applied, and the partitions used for `root`, `/usr`, and `var` and any previously used partitions that overlap may be overwritten.
- During a custom text-based installation, if no disk label exists, a disk label containing the default partition information is used. If a disk label does exist, its partition information is compared to the default partition information. If the disk labels differ, you can choose either the customized or the default.

- During a custom graphical installation, if no disk label exists, a disk label containing the default partition information is used. A warning displays if an existing disk label does not match the default partition table and the default file system layout was used. You then have the option to invoke the `Disk Configuration` application to change the partition table.

If an existing disk label is selected, it is saved and rewritten to the disk with a valid bootstrap. The new disk label is identical to the previous disk label. If the default disk label is selected, a disk label containing the default partition information is used.

5.8.3 Preserving Data on an Existing Disk

During a custom installation, you can choose the disk partitions on which the `root`, `/usr`, and `/var`, file systems and `swap` areas will be installed. If the chosen partitions contain data or user files, the data is lost (overwritten). 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, offset, or both modified causes the data to be lost. However, if the partitions containing the data are undisturbed, their contents will be untouched.

Assuming that the partitions to be preserved were undisturbed during the installation, the partitions can be used on the newly-installed system. If the partition contained a file system, it should be capable of being mounted and accessed. If the partition you are preserving were using the Advanced File System (AdvFS), make sure you select AdvFS as the file system type.

5.8.4 ULTRIX Partition Tables

This section applies only if you chose the custom installation.

If the disk you choose to contain the root file system was previously used on an ULTRIX system, it will be formatted with ULTRIX partition tables. You will see a message similar to the following:

```
ULTRIX compatible partition data found.
This data may be different than the standard
partition layout information in /etc/disktab.

ULTRIX partition table layout is:
partition     bottom        top       size    overlap
    a             0      40959      40960    c,h
    b          40960     163839     122880    c
    c             0     832526     832527    a,b,d,e,f,g,h
    d        163840     386735     222896    c,g
    e        386736     609631     222896    c,g
    f        609632     832526     222895    c,g
```

```
    g         163840     832526     668687    c,d,e,f
    h              0          0          0    a,c

Use the ULTRIX-style partition data? [y]:
```

If you enter `y` to use the ULTRIX layout, a Digital UNIX disk label is created for the disk. This label will correspond to the existing ULTRIX partition table. If you enter `n`, the default partitions for Digital UNIX are created.

5.8.5 Using the Default or Existing Disk Partition Table

During a custom installation, the graphical user interface detects a customized partition table when `root`, `/usr`, and `var` are on the same disk. When you click on the `Select Software...` pushbutton, a dialog box notifies you that the existing, customized disk partition table does not match the default partition table.

- If you want to view or change the existing partition table, click on `Cancel` to dismiss the dialog box and then click on `Partition Disks...`.
- If you want to use the customized disk partition table and proceed directly to software selection, click on `OK` to dismiss the dialog box and display the software selection window.

If you are using the text-based user interface to perform a custom installation and your system has nonstandard disk partitions on the disk that contains the `root` file system, you are prompted to keep the nonstandard partitions or replace them with the disk's default partitions.

If you have carefully planned your partition layout and you want to keep the partitions you have on the disk, choose the existing partition table. If neither the default nor existing partition tables are suitable, exit the installation procedure and use either the `Disk Configuration` application or the `disklabel` command to modify the partitions on the disk.

The following information is shown for each disk partition:

- Partition - provides the name of the partition (the letters `a` through `h`).
- Start - the block number at which the partition begins.
- Size - the total number of 512-byte blocks in the partition. One block equals $^1/_2$ kilobyte (kB) or 512 bytes. One megabyte (MB) equals 1024 kB (1,048,576 bytes), or 2048 blocks. If you need to determine the size in MB, divide the size in blocks by 2048.
- End - the block number at which the partition ends.

- Overlaps - displays the other partitions with which the partition overlaps.

If the disk you chose has a customized partition table, the display is similar to the following:

```
The rz3 disk has a non-default partition table.

           Partition   Start   Size      End     Overlaps
 Default        a         0  131072    131071   c
                b     131072  262144    393215   c
                c          0 2050860   2050859   a b d e f g h
                d     393216  552548    945763   c g
                e     945764  552548   1498311   c g h
                f    1498312  552548   2050859   c h
                g     393216  819200   1212415   c d e
                h    1212416  838444   2050859   c e f
 Existing       a          0  263340    263339   c
                b     263340 1787520   2050859   c d e f g h
                c          0 2050860   2050859   a b d e f g h
                d     393216  552548    945763   b c g h
                e     945764  552548   1498311   b c g h
                f    1498312  552548   2050859   b c h
                g     393216  819200   1212415   b c d e h
                h     263340 1787520   2050859   b c d e f g

Choose which partition table to use.
1) Default table
2) Existing table

Enter your choice:
```

5.9 Description of File System Types: UFS and AdvFS

This section describes the two file system types, UFS and AdvFS, that are available for custom installations. This information may help you decide whether or not to perform a custom installation because the default installation does not give you the option to choose file system type.

The custom installation lets you choose between the UNIX file system (UFS) or the Advanced File System (AdvFS) as the file system type for the `root`, `/usr`, and `/var` file systems.

Unless you choose otherwise, UFS is the default file system on Digital UNIX systems. On systems with less than 32 MB of memory, you do not have the option to use AdvFS as the file system type; the UNIX file system (UFS) is chosen automatically.

UFS has a more rigid hierarchy than AdvFS. In a UFS file system, each disk (or disk partition) contains one separate file system. The UFS file system is characterized by a hierarchical structure, the ability to create and delete files, dynamic growth of files, the protection of file data, and the treatment of peripheral devices.

UFS is compatible with the Berkeley 4.3 Tahoe release. UFS allows a pathname component to be 255 bytes, with the fully qualified pathname

length restriction of 1023 bytes. The Digital UNIX implementation of UFS supports a maximum file size equivalent to the largest supported file system (128 GB).

Refer to the *System Administration* guide for more information about UFS.

The POLYCENTER Advanced File System (AdvFS) is a journaled local file system that provides higher availability and greater flexibility than traditional UNIX file systems. Using transaction journaling, AdvFS recovers file domains in seconds rather than minutes after an unexpected restart such as a power failure. AdvFS journaling also provides increased file system integrity. AdvFS provides greater flexibility by allowing filesets (file systems) to share a single storage pool and enabling hard and soft fileset quotas in addition to user and group quotas. AdvFS supports a maximum file size of 128 GB.

Refer to the *System Administration* guide or the *POLYCENTER Advanced File System and Utilities for Digital UNIX, Guide to File System Administration* for more information about AdvFS. Contact your Digital representative about obtaining POLYCENTER documentation.

5.10 Choosing the Location and File System Type for /usr

This section applies only if you are performing a custom installation.

If you chose not to use the default file system layout, you must choose a disk and partition on which the `/usr` file system will reside. You have the option to choose between UFS or AdvFS as the file system type for the `/usr` file system.

You can go back and change the disk and partition for `/usr` if the partition is too small to hold the optional software you select later on in the installation procedure.

If you need more information about the contents of the `/usr` file system, refer to Section 3.7.

5.11 Choosing the Location of the var Area

This section applies only if you are performing a custom installation.

You can place the `var` area either as a directory under the `/usr` file system or create a separate `var` file system.

If the system you are installing is a Dataless Management Services (DMS) server, you should allocate a separate file system for `/var` because all dataless environments reside in `/var/adm/dms` on the server. Putting `var`

under /usr could mean that your system will run out of disk space when you create dataless environments. Refer to *Sharing Software on a Local Area Network* for more information about allocating the var area and calculating disk space for DMS environments and RIS servers.

If you plan to set up your system as a RIS server, you should allocate a separate file system for /var because all RIS environment information is stored in the /var/adm/ris directory. In addition, if the RIS user chooses to extract the data for the RIS area from the distribution media rather than symbolically linking to the area, this data will also be stored in /var/adm/ris. Refer to *Sharing Software on a Local Area Network* for more information about allocating the var area and calculating disk space requirements for RIS servers.

If you decide to create a separate file system for /var, you can choose between UFS or AdvFS as the file system type for var.

If you need more information about the contents of the /var file system, refer to Section 3.8.

5.12 Choosing the Location of Swap Space

You must select the disk and partition on which you want to allocate the primary swap space. On systems with more than one disk, it is recommended that you allocate the primary swap partition on a disk other than the disk that contains the root file system. Digital recommends a minimum of 128 MB of swap space. If your swap partition selections do not amount to 128 MB, a warning message is displayed as a reminder that you should allocate more swap space.

Although you cannot choose the swap strategy modes during the installation procedure, there are two strategies for swap allocation: *immediate* and *over-commitment*. The swap strategy mode for Digital UNIX systems with greater than 32 MB of memory is *immediate* mode which means that swap space is allocated when modifiable virtual address space is created. This mode requires more swap space than *over-commitment* mode because it guarantees that there will be enough swap space if every modifiable virtual page is modified.

On systems with less than 32 MB of memory, the swap strategy mode is *deferred* or *over-commitment* (also known as lazy swap). This means that swap space is not allocated until the system needs to write a modified virtual page to swap space. To optimize performance on systems with limited capacity, swap space is not allocated until a process needs it, not when a process starts up.

Refer to *System Administration* for more information about swap allocation strategies and how to switch from one swap allocation mode to the other after the installation.

If you need more information about planning swap space, refer to Section 3.9.

5.12.1 Allocating a Second Swap Area

This section applies only if you are performing a custom installation.

You have the option to allocate a second swap area during a custom installation.

To optimize the performance of your swap space, spread out your swap space across multiple devices and use the fastest disks for swap devices. To ensure the best performance, place each swap area on a separate disk instead of placing multiple swap areas on the same disk.

5.13 Installing Mandatory Software Subsets

The following software subsets are the minimum required for the Digital UNIX Version 4.0B operating system. A default installation automatically installs only these software subsets; a custom installation installs these software subsets plus the optional software subsets you select. Some of the software subsets designated as mandatory depend on your system's hardware. For example, there are four supported keyboard types; only the software subset supporting the keyboard type connected to your system is mandatory.

```
Base System
Base System - Hardware Support
Base System Management Applications and Utilities
Basic Networking Configuration Applications
Basic Networking Services
Compiler Back End
Hardware Kernel Header and Common Files
Hardware Kernel Modules
Kernel Header and Common Files
Keyboard Support
NFS(tm) Configuration Application
NFS(tm) Utilities
Standard Kernel Modules
Tcl Commands
```

Depending on your system's graphics options, either `DECwindows 75dpi Fonts` or `DECwindows 100dpi Fonts` is mandatory. The mandatory `X Server` software subset depends on whether your system has a TurboChannel bus, QVision graphics adapter, or PCI bus. If you system has graphic capability, the following windowing and graphical applications software subsets are installed as mandatory automatically:

```
Adobe Fonts
Basic X Environment
CDE Desktop Environment
CDE Mail Interface
CDE Minimum Runtime Environment
DECwindows Fonts
Graphical Base System Management Utilities
Graphical Print Configuration Application
Graphical System Administration Utilities
Netscape Navigator Gold V3.0
Old X Environment
Tk Toolkit Commands
X Fonts
X Servers Base
X Servers
```

If Asynchronous Mode Transfer (ATM) hardware is detected during the installation process, the following software subsets are also installed as mandatory:

```
ATM Commands
ATM Kernel Header and Common Files
ATM Kernel Objects
ATM Kernel Modules
```

The following POLYCENTER AdvFS software subsets are usually optional. They become mandatory during a custom installation if AdvFS is chosen as the file system type for `root`, `/usr`, or `/var`:

```
POLYCTR advfs
POLYCTR advfs Kernel Modules
```

Refer to Appendix D for descriptions of the mandatory software subsets.

The amount of free space remaining in the `root`, `/usr`, and `/var` file systems is displayed to indicate if the disk partitions you chose for those file systems are large enough to hold the mandatory software subsets. Space remaining is shown in gigabytes (GB), megabytes (MB), or kilobytes (kB):

- If you click on `View Software...` for default installations or `Select Software...` for custom installations, the graphical user interface shows the amount of free space remaining in the `File System Status` fields at the bottom of the software selection window.
- The text-based interface shows space remaining in a display similar to the following:

  ```
  Free space remaining (root/usr/var): 18.4MB/176MB/192MB
  ```

The installation procedure will prevent you from selecting a disk that is too small to hold the mandatory software subsets. However, if you feel that the disks will not have enough free space remaining after the installation of the mandatory software subsets, go back and select another larger disk. You can also go back and perform a custom installation where you can customize the file system layout.

5.14 Selecting Optional Software Subsets

This section applies only if you are performing a custom installation because you cannot select optional software during a default installation. Default installations only let you view the mandatory software that will be installed automatically.

When you select optional software subsets, the amount of free space remaining in the `root`, `/usr`, and `/var` file systems is displayed to indicate if the disk partitions you chose are large enough to hold the software you are selecting. Space remaining is shown in gigabytes (GB), megabytes (MB), or kilobytes (kB).

- The graphical user interface shows the amount of space remaining in the `File System Status` fields at the bottom of the `Software Selection Window`. The amount of space remaining is displayed and updated as you select each optional software subset.
- The text-based interface shows space remaining in a display similar to the following:

  ```
  Free space remaining (root/usr/var): 18.4MB/176MB/192MB
  ```

  The figures are updated after pressing the Return key as each optional software subset is selected.

If you select a software subset that has a dependency with another subset that is not yet selected, the other subset is selected automatically.

- The graphical interface displays a dialog box alerting you of dependent software; clicking on `OK` automatically selects the other software for installation.
- The text-based interface automatically installs software subset dependencies. When you select a software subset with a dependency, a message similar to the following displays:

  ```
  The chosen subset(s) require one or more additional subset(s)
  which will be loaded automatically:
    * Doc. Preparation Tools  (OSFDCMT410)
  ```

Some optional software subsets are hardware specific; that is they are optional because you do not have the hardware or graphics capabilities which they support. The `Windowing Environment` category, which provides support for numerous keyboard types, is an example of this situation. Therefore, during text-based installations, it is not necessary to select `ALL mandatory and all optional subsets`, or during a graphical installation to click on `Add All` because you will install hardware-specific software that your system does not need.

Section J.2.1 in Appendix J provides a list of the optional software subsets that are available to install regardless of the interface you are using. Refer to Appendix D for descriptions of the optional software subsets.

5.14.1 Selecting Optional Software Using the Text-Based Interface

When making software subset selections with the text-based interface, separate multiple selections with a space and enter consecutive ranges with a hyphen between the beginning and ending range of numbers. There may be more optional software subsets than can fit on one screen. You may enter your selections screen by screen or all at once at the end of the list.

If you want to change your selections, press the `Return` key until you reach the end of the software subset list. Select the option to `CANCEL selections and redisplay menus` to start the selection process again.

It may not be wise to select `ALL software subsets` because you will select hardware-specific software subsets that your system does not need (such as fonts, keyboard types, and Xservers).

When you are finished making optional software subset selections, press Return at the prompt displayed at the end of the software subset list:

```
.
.
.
The following choices override your previous selections:
77) ALL mandatory and all optional subsets
78) MANDATORY subsets only
79) CANCEL selections and redisplay menus

Add to your choices, or press RETURN to confirm previous choices.
Free space remaining (root/usr/var): 18.4MB/176MB/192MB


Choices (for example, 1 2 4-6): 2 5 21-27 Return
```

You have the opportunity to confirm your selections before software subset loading begins.

5.14.1.1 If File Systems Are Full After Selecting Optional Software

As you are selecting optional software subsets using the text-based interface, free disk space is calculated automatically. Review these numbers as you make your selections because if your file systems are near capacity, you have a few options:

- Use the `history` command to go back and start software selection again or choose the selection number that corresponds to `CANCEL selections and redisplay menus` to reselect optional software subsets. This time, select only those software subsets actually needed.

- Use the `history` command to go back and select a different disk with larger partitions to contain the `root`, `/usr`, and `/var` file systems and swap space.
- Use the `history` command to go back and place the file systems and swap space on separate disks.
- If you are an experienced UNIX user, enter the `history` command to return to the first screen and choose the `UNIX Shell` option. Then, use the `disklabel` command to resize your disk partitions.

5.14.2 Selecting Optional Software Using the Graphical User Interface

When making software subset selections with the graphical user interface, you can click on an individual software subset or a software subset category (such as `Reference Pages`). Then, click on the `Add` button to add the software subset or software subset category to the list of selected software to install. Double-clicking on an individual subset or subset category has the same effect.

It may not be wise to click on the `Add All` button because you will select hardware-specific software subsets that your system does not need. However, an alternative to selecting one software subset (or category) at a time is to `Add All` subsets in one step and then double-click on the 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, Xservers, and fonts. The user interface will not let you remove software subsets that are mandatory for your system's hardware configuration.

If you want to remove (or deselect) optional software selections, position the cursor in the `Selected Software` window and double click on the software subset or software subset category you want to remove. Another way is to click on the software subset or software subset category and then click on the `Remove` button to remove the software subset or software subset category from the list. The `Remove` button is enabled only if the selected software subset or software subset category is removable.

When you are finished selecting optional software, click on `OK` to return to the `Installation Setup` window. Click on `Setup Done` to start the installation procedure. Then, click on `OK` to verify that you want the installation to begin.

5.14.2.1 If File Systems Are Full After Selecting Optional Software

As you are selecting optional software subsets using the graphical interface, free disk space is calculated automatically and is shown at the

bottom of the window. Review this information periodically to make sure your file systems are not full. You cannot proceed if a file system is full. If the file systems are at or near capacity, you have a few options:

- To free up disk space, remove (or deselect) optional software subsets in the `Selected Software` window.
- Click on `Remove All` to remove all selected optional software. Then, only mandatory software will remain in the `Selected Software` window.
- Return to the `Installation Setup` window and click on the `Partition Disks...` pushbutton to resize the disk partitions.
- Return to the `Installation Setup` window and select a different, larger partition on the same or different disk or put file systems and swap space on separate disks.

5.15 Verifying the Start of the Installation Procedure

Regardless of whether you chose a default or custom installation, you must indicate that you are ready to begin the installation. Up until this point, except for disk label changes (if any), your system is not changed in any way. This is the last chance you have to verify your disk, partition, and software selections.

- 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
Digital 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:
```

- If you are using the graphical interface, click on `OK` in the confirmation dialog box to begin the installation.

5.16 File System Creation

When the installation procedure starts, the `root`, `/usr`, and `/var` file systems and `swap` areas are created on the disks and partitions you selected for a custom installation, or are created on the default disk layout for a default installation.

The screen display looks similar to the following.

```
*** Creating the root file system on device rz1a ***


*** Creating the usr file system on device rz1g ***
```

```
*** Creating the swap1 file system on device rz1b ***
```

5.17 Loading Software Subsets

Software subsets are loaded after file systems are created. Even though disk space was checked during software selection, disk capacity is checked again before actual software subset loading begins. The software load display shows you how many software subsets will be installed and includes an incremental counter to show progress as the load proceeds. The software load display looks similar to the following:

```
Checking file system space required to install specified subsets:

File system space checked OK.

*** Loading the operating system software subsets ***

The installation procedure will now load the software on your
disk partitions.  This process will take from 45 to 120 minutes
to complete depending on your distribution media and processor
type.

Loading 1 of 28 subset(s)....

Base System
   Copying from system9 (inet)
 Working....Fri Dec 13 13:21:30 EDT 1996
   Verifying
 Working....Fri Dec 13 13:23:31 EDT 1996

Loading 2 of 28 subset(s)....

Base System - Hardware Support
   Copying from system9 (inet)
 Working....Fri Dec 13 13:24:18 EDT 1996
   Verifying

Loading 3 of 28 subset(s)....

Compiler Back End
   Copying from system9 (inet)
 Working....Fri Dec 13 13:24:59 EDT 1996
   Verifying

   .
   .

Loading 26 of 28 subset(s)....

Graphical Base System Management Utilities
   Copying from system9 (inet)
   Verifying

Loading 27 of 28 subset(s)....

Graphical System Administration Utilities
   Copying from system9 (inet)
   Verifying

Loading 28 of 28 subset(s)....
```

```
Graphical Print Configuration Application
   Copying from system9 (inet)
   Verifying

28 of 28 subset(s) installed successfully.
```

5.18 Rebooting the System

When you began the installation process, you booted either from the CD-ROM or over the network. If your system has unattended installation capability, the system is automatically rebooted off the newly installed disks after the software subsets are loaded. If your system does not have this capability, then the screen displays the `boot_osflags` variable, the `bootdef_dev` variable, and the `boot` command that you must enter to reboot your system. At the console prompt (>>>), enter the boot command sequence shown on your screen. The boot device you use depends upon your processor type and the installation media you are using. *Do not* enter the boot variables that are shown in the example.

Note

If your system has a graphics device on its ISA bus that requires a kernel device driver, you must modify the `isacfg` entry to match the kernel device driver before rebooting the system. When you issue this command, let the input line wrap; do `not` press the Return key in the middle of the line.

```
>>> isacfg -mod -slot slot_number -dev device_number
    -handle vendor_handle -etyp 1 -enadev 1
```

In the previous example, replace *`vendor_handle`* with the handle supplied in the vendor's installation documentation. If you performed a RIS installation from a RIS area that already has a kernel device graphics device driver installed and you already set the handle to the one specified in the vendor's installation documentation, you do not need to execute this command.

Your screen will look similar to the following if your system does not have unattended installation capability:

```
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
```

Enter the boot commands at the console mode prompt (>>>) as instructed:

```
>>> set boot_osflags A  Return
BOOT_OSFLAGS = A

>>> set bootdef_dev DKA0  Return
BOOTDEF_DEV = DKA0

>>> boot  Return
```

Write down the boot commands here in case you need them again:

```
>>>

>>>

>>>
```

Software configuration begins after the system boots. Section 5.19.2 provides samples of system configuration screens. A kernel build procedure begins after software configuration.

5.19 Software Configuration

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

5.19.1 Configuring Kernel Device Driver Graphics Kits

During the software configuration phase, if the installation procedure detects a graphics card not supported in the Digital UNIX base operating system, you are prompted to insert the media containing the graphics driver as shown in the following prompt:

```
This system requires a driver for its graphics card.

Enter the device where the kit can be found (e.g. rz4c),
or <return> to cancel:
```

- If the graphics driver is located on a floppy disk, insert the floppy disk into the drive and enter the floppy device location, for example, `fd0c`, and press Return.

- If the graphics driver is located on a CD-ROM, remove the Digital UNIX CD-ROM from the CD-ROM drive, and insert the CD-ROM containing the graphics driver. Then, enter the location of the CD-ROM device, for example, `rz4c`, and press Return.

When you enter the device where the graphics driver is located and press Return, the `setld` command displays a menu for each of the software kits on the distribution media. When you select the appropriate graphics driver, the graphics driver is copied to the system. Software subset configuration begins next.

5.19.2 Configuring Base Operating System Software Subsets

The name of each software subset is displayed as it is being configured. Your output depends upon the software subsets you chose to install and your processor type. The display is similar to the following:

```
** SYSTEM CONFIGURATION ***

Configuring "Base System " (OSFBASE410)

Configuring "Base System - Hardware Support " (OSFHWBASE410)

Configuring "Compiler Back End " (OSFCMPLRS410)

   ⋮

Configuring "Graphical Base System Management Utilities"
(OSFXSYSMAN410)

Configuring "Graphical System Administration Utilities"
(OSFXADMIN410)

Configuring "Graphical Print Configuration Application"
(OSFXPRINT410)
```

If you did not provide certain essential 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.

What happens after software configuration completes depends on whether you performed a default, custom, or cloned installation. Proceed to Section 5.20 for more information.

5.20 Building the Kernel

If you performed a default installation, the kernel is built automatically with the mandatory kernel parameters for your system configuration. None

of the options shown in Section 5.20.1 will be included in the kernel. After the kernel build, continue with Section 5.21, which shows you how to log in to your system for the first time. If you want to build a kernel with selected options after the default installation, refer to the `doconfig`(8) reference page.

If you performed a custom installation or invoked the update installation with the `-i` option, go to Section 5.20.1 to select kernel options.

If you performed a cloned installation, how the kernel build occurs is defined in the configuration description file (CDF). If the CDF was originally created during a default installation, the kernel is built automatically. If the CDF was originally created during a custom installation, you have the opportunity to select kernel options.

5.20.1 Selecting Kernel Options

The kernel options you see on the Kernel Option Selection menu depend on the software subsets that were installed. The installation (or update installation) of certain base operating system software subsets contain a kernel component, and the installation procedure gives you the option to include or exclude the use of the software in the kernel.

If you do not select the kernel option for the product, you will not be able to use that product. For example, if you do not select the `Logical Storage Manager (LSM)` kernel option, even though you installed the LSM software subsets, you will not be able to use LSM. When you select a kernel option, additional code to support the option is loaded into the kernel. Therefore, selecting `All of the above` kernel options significantly increases the size of the kernel.

The following kernel subsystems are mandatory on all systems except systems with less than 32 MB of memory:

- The `/proc` File System - required for System V Environment and used by debuggers
- Quotas - UNIX File System (UFS) file quotas
- Serial Line Interface Protocol (SLIP)
- Network File System (NFS) Server
- STREAMS protocol

If your system has less than 32 MB of memory, the kernel subsystems available for your system have been optimized and the selection of certain optional kernel subsystems has been disabled. If you choose any of these kernel options for systems with less than 32 MB system, you may negatively impact system performance.

The Kernel Option Selection menu has a Help option that displays online help about each kernel option.

The Kernel Option Selection menu is similar to the following:

```
*** KERNEL CONFIGURATION AND BUILD PROCEDURE ***

*** KERNEL OPTION SELECTION ***


    Selection   Kernel Option
-----------------------------------------------------------

        1       LAN Emulation over ATM (LANE)
        2       Classical IP over ATM (ATMIP)
        3       ATM UNI 3.0/3.1 Signalling for SVCs
        4       Asynchronous Transfer Mode (ATM)
        5       Advanced File System (ADVFS)
        6       System V Devices
        7       Kernel Breakpoint Debugger (KDEBUG)
        8       NTP V3 Kernel Phase Lock Loop (NTP_TIME)
        9       Packetfilter driver (PACKETFILTER)
        10      Point-to-Point Protocol (PPP)
        11      STREAMS pckt module (PCKT)
        12      X/Open Transport Interface (XTISO, TIMOD, TIRDWR)
        13      File on File File System (FFM)
        14      ISO 9660 Compact Disc File System (CDFS)
        15      Audit Subsystem
        16      ACL Subsystem
        17      Logical Storage Manager (LSM)
        18      All of the above
        19      None of the above
        20      Help
        21      Display all options again

-----------------------------------------------------------

Enter the selection number for each kernel option you want. For example,
 1 3 [19]:
```

The following is a description of each kernel option:

LAN Emulation over ATM (LANE)
: This option provides the ATM Forum standard LAN Emulation module. This should be configured when interoperating with other LANE end-systems or routers. This option is not required for Classical IP over ATM.

Classical IP over ATM (ATMIP)
: This option provides IETF standard IP over ATM (RFC 1577). This module should be configured when interoperating with other end-systems and routers that also use Classical IP. This option is not required in configurations that communicate using only LANE.

ATM UNI 3.0/3.1 Signalling for SVCs

This option provides ATM Forum standard UNI 3.0 and UNI 3.1 signaling protocols. This option should be configured when connected to an ATM network that supports SVCs via UNI signaling. This module does not need to be configured when using PVCs only. In general, UNI signaling and one or both of Classical IP over ATM or LANE will be configured. At least Classical IP over ATM or LANE is required to use TCP/IP over ATM.

Asynchronous Transfer Mode (ATM)

The ATM option installs the kernel software and applications necessary to use an ATM network. ATM technology is a connection-oriented wide area/local area technology based on the high-speed switching of 53-byte cells across a network. ATM can traverse microwave, copper, and fiber and is not limited to one kind of data. The ATM software subsets are installed automatically if the installation process detects ATM hardware. The Digital UNIX ATM subsystem supports the ATM Forum User-Networking (UNI) Version 3.0 specification, including ILMI for registration of a single address, UNI signaling for point-to-point connections, and QOS class 0 with best effort delivery.

System V Devices

The System V Devices option includes kernel options for devices required for the System V environment product. These devices are `/dev/prf` (System V kernel profiler) and `FFM_FS` (File On File File System).

Advanced File System (AdvFS)

The Advanced File System is a log-based, local file system that allows modification and expansion of file systems by mounting on different devices or adding devices to that file system.

If you chose AdvFS as the file system type for `root`, `/usr`, or `/var`, the subset is mandatory will not be displayed in the menu; AdvFS will be configured automatically.

NTP V3 Kernel Phase Lock Loop (NTP_TIME)

The NTP_TIME kernel option enables the kernel phase lock loop (PLL) time adjusting algorithm described by RFC 1589, for use with the NTP V3 daemon. The NTP V3 daemon can be used without the NTP_TIME kernel option.

If the NTP_TIME kernel option is configured, a new system call is available to `xntpd` that uses a PLL algorithm in the kernel for improved accuracy when adjusting the system clock frequency. A

detailed description of the PLL algorithm can be found in RFC 1589. Refer to *Network Administration* for more information about NTP.

Kernel Breakpoint Debugger (KDEBUG)
: The Kernel Breakpoint Debugger loads the kernel debugger `kdebug` and provides physical memory space for debugging custom kernels.

`/proc` Application Debugger
: The `/proc` file system enables running processes to be accessed and manipulated as files by the system calls `open`, `close`, `read`, `write`, `lseek`, and `ioctl`. While the `/proc` file system is most useful for debuggers, it enables any process with the correct permissions to control another running process. Thus, a parent/child relationship does not have to exist between a debugger and the process being debugged.

Packetfilter driver
: The packetfilter is a software interface that allows an application to send and receive packets directly to or from a local area network (Ethernet or FDDI). The packetfilter provides flexible demultiplexing (filtering) of incoming packets, so that many such applications may run simultaneously.

  The Digital UNIX packetfilter supports two filtering models: the original CMU/Stanford model, as supported in ULTRIX, and the BSD Packet Filter (BPF), which provides more flexible and efficient filtering. (BPF was developed by the University of California, Lawrence Berkeley Laboratory.) Several public domain applications that use the packetfilter are integrated in Digital UNIX, including `rarpd`, `tcpdump`, `tcpslice`, `nfswatch`, and `nfslogsum`. Refer to the `packetfilter`(7) reference page for more information.

Point-to-Point Protocol (PPP)
: The Point-to-Point Protocol (PPP) supports an asynchronous serial line or a pseudo-device terminal so that users can transfer files or NFS mount file systems across phone lines. Applications such as `telnet`, `ftp`, `ping`, Worldwide Web browsers, or any X program can be run over the IP network facility of the PPP data link layer. PPP is more configurable and robust than SLIP.

  Refer to *Network Administration* for more information about PPP.

STREAMS pckt module (PCKT)
: The STREAMS pckt module provides emulation for the SVR4 pty packet module.

Data Link Bridge (DPLI V2.0 Service Class 1)
: Provides a DLPI V2.0 (Service Class 1) interface to BSD IFNET based network interfaces that allows STREAMS based protocol stacks to utilize BSD IFNET based network interfaces. This kernel option is mandatory for LAT (Local Area Transport).

  If you installed LAT, Data Link Bridge does not appear as a kernel option.

Serial Line Interface Protocol (SLIP)
: Interface protocol support for a serial line so that users can transfer files or NFS-mount file systems across phone lines.

  This functionality is mandatory on systems with greater than 24 MB of memory.

  Refer to *Network Administration* for more information about SLIP.

Quota
: UFS disk quotas provide users with the ability to establish a limit on the number of blocks and inodes (or files) that a user or a group of users can allocate.

  This functionality is mandatory on systems with greater than 24 MB of memory. Disk quotas for AdvFS are configured into the kernel by default, on systems in which AdvFS is installed.

STREAMS protocol (STREAMS, STRKINFO, LDTTY, RPTY)
: The STREAMS framework provides an alternative to sockets. The STREAMS interface was developed by AT&T and consists of system calls, kernel routines, and kernel utilities that are used to implement everything from networking protocol suites to device drivers. Applications in user space access the kernel portions of the STREAMS framework using system calls such as `open`, `close`, `putmsg`, `getmsg`, and `ioctl`.

  This functionality is mandatory on systems with greater than 24 MB of memory. The STREAMS framework is required by many of the personal computer protocols and DECnet.

X/Open Transport Interface (XTISO)
: The X/Open Transport Interface (XTISO) defines an application interface that is independent of any transport provider. Programs written to XTI can be run over a variety of transport providers, such as Transmission Control Protocol (TCP) or User Datagram Protocol (UDP). The application specifies which transport provider to use.

Selecting this kernel option allows DECnet/OSI to load its kernel modules dynamically; you do not have to rebuild the kernel and reboot.

File on File File System (FFM)
: File on File (FFM) is a file system that permits mounting a regular, character, or block special file on top of a regular file to support the STREAMS subsystem. This feature is used mainly by SVR4 compatible system calls. It can be viewed as a dynamic version of named pipes. The contents of the covered file are still available to any process that had the file open at the time of the FFM mount. FFM is required for the System V Environment.

ISO 9660 Compact Disc File System (CDFS)
: CDFS provides the ability to mount CD-ROMs formated to the ISO 9660 standard or the High Sierra Group (HSG) format.

Audit Subsystem
: The Audit Subsystem provides a security audit system configurable through the `audit_setup` command. The subset provides additional security on system features such as passwords, account ownership, and remote access.

ACL Subsystem
: Loading the optional ACL kernel subsystem causes the system to enforce any access control lists (ACLs) that may be present on files. ACLs can be set and displayed with or without having the ACL subsystem loaded. An ACL is an extension to the traditional permission bits that normally control access to a file. ACLs allow additional users, groups, or both to be specified along with the permission bits that should apply for a matching request. Refer to the `acl`(4), `getacl`(1), and `setacl`(1) reference pages for more information.

Simple Network Management Protocol (SNMP)
: The Simple Network Management Protocol (SNMP) is the Internet standard protocol for exchanging network management information. The SNMP agent provides a local or remote network manager with system information, network interface data, address resolution information (ARP), information about the routing layer (IP and ICMP), and information about the transport layer (TCP and UDP). The operating system includes an SNMP agent that allows a host to be managed by a network manager.

Local Area Transport Support

The LAT protocol provides an efficient 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 that requests for connections can be made by server users. LAT also permits host applications to initiate connections to the server's ports, designated as applications ports, to access remote devices such as printers. Digital UNIX supports 1500 logins using LAT.

If you chose the LAT subset when you made your subset selections, the option is not displayed in the kernel option menu and is configured automatically. If you add the LAT subset after the installation, you must reconfigure the kernel using the `doconfig` command.

Refer to *Network Administration* for more information about LAT.

Logical Storage Manager (LSM)

The Logical Storage Manager is an integrated, host-based disk storage management tool that protects against data loss and improves disk input/output (I/O) performance. Basic LSM functionality includes disk spanning and concatenation. System administrators use LSM to perform disk management functions without disrupting users or applications accessing data on those disks.

NFS Server

The Network File System Server option allows systems to export various file systems to other nodes.

This functionality is mandatory on systems with greater than 24 MB of memory.

Refer to *Network Administration* for more information about NFS.

After entering your choice of kernel options, the system displays a list of options you selected and asks you to verify your choice. For example:

```
You selected the following kernel options:

        Asynchronous Transfer Mode (ATM)
        System V Devices
        Logical Volume Manager (LVM)
        Kernel Breakpoint Debugger (KDEBUG)
        Packetfilter driver (PACKETFILTER)
        STREAMS pckt module (PCKT)
        Data Link Bridge (DLPI V2.0 Service Class 1)
        X/Open Transport Interface (XTISO, TIMOD, TIRDWR)
        File on File File System (FFM)
        ISO 9660 Compact Disc File System (CDFS)
```

```
        Audit Subsystem
        Local Area Transport Support
        Logical Storage Manager (LSM)

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

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

5.20.2 Editing the Configuration File

This section applies to custom installations or to update installations that were invoked with the `-i` option.

After you select kernel options, you have the option to edit the configuration file. The 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.

You may want to edit the configuration file to add devices, tune parameters, enable realtime preemption, or add third party layered product support. You may also want to recreate any customizations you may have made in a previous version of this file. Section 5.20.2.1 describes how to edit the configuration file to enable realtime preemption.

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). Refer to *System Administration* for information about the contents of the configuration file and the entries that you may want to edit.

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 5.20.3.

If you enter `y` to edit the configuration file, the following message displays:

```
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 configuration file.

The following example shows an editing session using the `ed` text editor where the value of `maxusers` is changed to a value of `64`:

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

1907                                    1
/maxuser                                2
maxusers          32                    3
s/32/64                                 4
maxusers          64                    5
w                                       6
1907                                    7
q                                       8
```

1 The number of lines in the configuration file.

2 Entering `/maxuser` searches for the line containing the word `maxusers`.

3 The line containing the word `maxusers` displays.

4 Entering `/s/32/64` substitutes the value `32` for the value `64`.

5 When you press the Return key, the line is redisplayed with the changed value.

6 Entering `w` writes (or saves) the change you made.

7 The total number of lines in the file is displayed, `1907`. Because new lines were not added to the file, the number of lines displayed is the same as when the editing session began.

8 Entering `q` quits (or exits) the editing session.

The kernel build begins when you write and quit the editing session.

5.20.2.1 Enabling Realtime Preemption

The Digital UNIX 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 installed previously as an option during base system 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 in the kernel during the installation procedure, edit the configuration file and set the `rt-preempt-opt` parameter equal to 1 as shown in the following example:

rt-preempt-opt=1

5.20.3 Kernel Build Messages

When the subsets are configured and the configuration file is completed, 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 13 15:45:24 EST 1996
       Working....Fri Dec 13 15:47:24 EST 1996
       Working....Fri Dec 13 15:49:25 EST 1996
       Working....Fri Dec 13 15:51:26 EST 1996
```

Your system may boot to single-user mode if the `boot_osflags` variable was not set as described in Section 5.18. The system reboots using the new kernel when `doconfig` completes. 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

Another method to bring the system to multiuser mode is to use the following syntax for the `init` command and specify one of the run levels shown in the previous list:

init [0 | s | S | 2 | 3]

5.21 Logging in to the System for the First Time

Logging in to a system means typing in a user name and password to gain access into the operating system. If the user name and password match an account name on the system, the user is permitted access to that account. On newly-installed systems, the only user name recognized by the system is the user `root`. After installation is complete, the system administrator sets up an *account* for each user. Chapter 6 describes how to set up the system for general use.

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

- If you have a graphics workstation, a Common Desktop Environment (CDE) login window is displayed. Enter `root` as the user name and then enter the `root` password you specified during the installation procedure. The `root` password is sometimes called the *superuser* password. When you correctly enter this information, the following displays:
  - A Help Viewer window, `Introducing the Desktop`. This online help describes basic desktop skills and how to activate online help for the desktop.
  - A dialog box labeled `Action Required`. This dialog box provides information about reading the new `/.dtprofile` file that describes how to modify your `.login` or `.profile` files to interact correctly with the new Common Desktop Environment (CDE).
  - The `File Manager` application displays the contents of the `root` (`/`) directory.
  - A `SysMan Configuration Checklist` contains a list of the configuration applications that you should run to set up your system for general use. Section 6.1 provides more information about the checklist.
  - The CDE Front Panel displays at the bottom of the screen. This Front Panel has replaced the DECwindows environment `Session Manager`.

    Refer to the *CDE Companion* guide for an introduction to CDE and for information about migrating from DECwindows Motif to CDE.
- If you do not have a system console with graphics capabilities, at the `login:` prompt, enter `root` as the login name and at the `password:` prompt, enter the `root` password you specified during the installation procedure.

Go to Chapter 6 for information about setting up your system for general use.

6

Postinstallation System Setup and Viewing Online Documentation

This chapter provides information about:

- Setting up your system for general use
- Viewing online documentation
- Enabling realtime preemption after the installation
- Enabling unattended reboots on multiprocessor systems

The goal of this chapter is to provide the information necessary for you to perform the user actions shown in Table 6–1.

Table 6–1: Summary of User Actions

By reading this chapter, you will ...
Invoke the *SysMan* applications using either the graphical or text-based interface to set up your system for general use.
Invoke Netscape Navigator to view the Digital UNIX documentation set on line.
Invoke the Bookreader application to view documentation that is provided in `.decw_book` files.

6.1 Setting Up the System from the SysMan Configuration Checklist

If your system has graphics capabilities, system setup is done from the `SysMan Configuration Checklist`. This checklist provides access to the *SysMan* applications that are available to set up your system for general use. There are three ways to invoke the checklist:

- The first time you log in as `root` after a system installation or the first time you log in to a factory installed software (FIS) system with graphics capabilities, the `SysMan Configuration Checklist` displays automatically.
- To open the `SysMan Configuration Checklist` from the UNIX command line, as superuser or root, enter the following command:

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

- To invoke the SysMan Configuration Checklist 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 SysMan Configuration Checklist application icon.

For your system to be fully productive and communicative with other systems and users, you may want to add user accounts, and configure the network, mail, and printers. In addition, when you buy a product from Digital, Digital issues you a license to use the product. The license is described by the license Product Authorization Key (PAK) you received. To be officially authorized to use the Digital UNIX operating system, you must register the license information on the PAK by using the License Manager application.

The SysMan Configuration Checklist provides access to a number of *SysMan* applications including but not limited to the applications shown in Table 6–2. Table 6–2 also lists the reference pages associated with the *SysMan* applications. Install the OSFMANWOS410 software subset if you want to view the graphical *SysMan* application reference pages with the man command.

Table 6–2: SysMan Configuration Checklist Applications and Associated Reference Pages

SysMan Application	Reference Page
Network Configuration Application	netconfig(8X)
BIND Configuration Application	bindconfig(8X)
NIS - Network Information Service	nissetup(8)
NFS Configuration Application	nfsconfig(8X)
License Manager	dxlicenses(8X)
Account Manager	dxaccounts(8X)
Mail Configuration Application	mailconfig(8X)
Disk Configuration Application	diskconfig(8X)
LAT - Local Area Transport	latsetup(8)
UUCP - UNIX-to-UNIX Copy System	uucp(1)
NTP - Network Time Protocol	ntpdate(8)
Printer Configuration Application	printconfig(8X)

Table 6–2: SysMan Configuration Checklist Applications and Associated Reference Pages (cont.)

SysMan Application	Reference Page
Security (BSD/2)	secsetup(8)
Security Auditing	audit_setup(8)
Prestoserver I/O Acceleration	presto(8)
Update Administration Utility	updadmin(8)
Graphical UI Selection Utility	

To invoke a *SysMan* application, double click on the icon that appears to the left of the application name. After you invoke and exit an application, a check mark appears in the box to the left of the icon. The date and time you last accessed an application is shown under the application name.

You can view an online overview of the SysMan Configuration Checklist applications by clicking on the Help pushbutton located at the lower right hand corner of the SysMan Configuration Checklist main window.

The applications on the SysMan Configuration Checklist appear in the approximate order in which Digital recommends them to 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 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) using the License Manager.

An application is *dimmed* from the checklist when it cannot be accessed, because it is not installed on the system.

Online help is available for each *SysMan* application by clicking on the Help pushbutton in the application. The online help describes how to use the application, the entries to make in the text entry fields, and reference material.

6.1.1 For More Information About System Setup

If you need more information about setting up the system for general use, read the relevant books in the Digital UNIX documentation set:

- The *Network Administration* guide provides information about setting up and administering a network.

- The *System Administration* guide provides information about system administration tasks such as configuring printers, adding user accounts, backing up and restoring files, shutting down the system, and so on.
- The *Software License Management* guide provides information about loading and registering license PAKs.

Section 6.6 describes how to use Netscape Navigator for online viewing of the Digital UNIX documentation set.

Section 6.6.2 describes how to activate the Bookreader application for online viewing of associated product documentation that is provided in `.decw_book` files.

6.2 Setting Up the System from the Command Line

If your system does not have graphics capabilities, you can access a set of menu-driven, text-based system setup scripts to set up your system for general use.

You can access this setup menu from the command line as the user `root` by entering the following commands:

```
# su -
password:
# /usr/sbin/setup
```

A menu similar to the following is displayed:

```
Use this menu to set up your system and network.  When you
select an item, you will be asked a series of questions.

For more information about the items on the menu and the
questions you must answer, see the System Administration
and Network Administration guides.


         1) Network Configuration Application
         2) BIND Configuration Application
         3) NIS - Network Information Service
         4) NFS Configuration Application
         5) License Manager
         6) Mail Configuration Application
         7) LAT - Local Area Transport
         8) UUCP - UNIX-to-UNIX Copy System
         9) NTP - Network Time Protocol
        10) Printer Configuration Application
        11) Security (BSD/C2)
        12) Security Auditing
        13) Prestoserve I/O Acceleration
        14) Update Administration Utility
        15) Graphical UI Selection Facility
        16) Exit

Enter the menu item number that you want:
```

Availability of the setup scripts on this menu depends on the software subsets that were installed. In the previous sample menu, all mandatory

and optional software subsets were installed, so all setup scripts are available. If a setup script does not have an option number next to it, the setup script is not available for use.

Each of the setup scripts is a series of interactive prompts during which questions are displayed on the screen and you respond accordingly. Most questions provide you with default responses and in most cases, you can choose the defaults. Any default parameters that you accept can always be changed at a later time.

The setup scripts appear on the menu in the order in which Digital recommends them to be run. For instance, if you want to set up the system to run in a networked environment, the first task you should perform is to set up networking information by using the `Network Configuration Application` followed by the `BIND Configuration Application`, `NIS - Network Information Service`, and the `NFS Configuration Application`. If you do not want to set up your system to run in a networked environment, the first task you should perform is to load and register your Product Authorization Keys (PAKs) using the `License Manager`.

You should read the relevant sections of the Digital UNIX documentation set before running a setup program or choosing an option from the Setup menu. The documentation lists the prerequisites to running a specific setup program.

- The *Network Administration* guide provides information about setting up and administering a network.
- The *System Administration* guide provides information about system administration tasks such as configuring printers, adding user accounts, backing up and restoring files, shutting down the system, and so on.
- The *Software License Management* guide provides information about loading and registering license PAKs.

Section 6.6 describes how to use Netscape Navigator for online viewing of the Digital UNIX documentation set.

Section 6.6.2 describes how to activate the Bookreader application for online viewing of associated product documentation that is provided in `.decw_book` files.

6.3 Files Left on Your System After the Installation

The installation procedure leaves the `init` file in the `/tmp` directory. This is an unnecessary file that you can delete.

Many files with the prefixes `.new..` and `.proto..` are left on the system. The update installation process (documented in Chapter 2) requires the `.new..` and `.proto..` files to retain customizations during the update installation process. **Do not remove these files**.

6.3.1 Installation Log Files

A list of the log files created during the installation is displayed on the screen (or in the console log if you have a workstation) after you log in for the first time. The display is similar to the following:

```
Digital UNIX V4.0B (Rev. xxx); Fri Dec 13 15:54:51 EDT 1996
Digital UNIX V4.0B Worksystem Software (Rev. xxx)

The installation software has successfully installed your system.

There are log files 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
```

The previous message is also recorded in the `/etc/motd` file for your future reference. 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 and include the choices you made during the installation (such as the disks and partitions you chose, the software subsets you installed, and so forth).

6.4 Enabling Realtime Preemption After the Installation

The Digital UNIX 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 installed as an option during base system 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.

There are two methods to obtain additional realtime capabilities:

- Use a text editor of your choice to edit the `/etc/sysconfigtab` file and set the `rt-preempt-opt` parameter equal to 1 as shown in the following example:

rt-preempt-opt=1

After setting this parameter, you must reboot your system. When the `rt-preempt-opt` parameter is set, the system chooses the correct lockmode to support realtime preemption. On a uniprocessor system, the lockmode is set to `1`. On a multiprocessor system, the lockmode is set to `3`.

You can also do the following to enable realtime preemption:

- Use the `setld` command as shown in the following example:

  1. Issue the following command:

     # **setld -c OSFBIN410 RT_ON**

  2. Run `doconfig` without any options to generate a new kernel configuration file. Then, copy the new kernel file, which is created in `/usr`, to the `root` directory as the file `/vmunix`, and reboot your system.After the RT_ON operation shown in Step 1, the kernel configuration file will contain the entry `options RT_PREEMPT_OPT` that causes preemption to be on by default (in the appropriate lockmode).

6.5 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, halt the system and set the following console parameters:

```
>>> set boot_osflags a
>>> set boot_reset off
>>> set auto_action restart
```

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 (`>>>`).

6.6 Invoking Netscape Navigator to View Digital UNIX Documentation

Each book in the Digital UNIX documentation set is shipped as individual files in HTML format, which enables them to be viewed with the Netscape Navigator World Wide Web browsing program. Digital UNIX Version 4.0B is shipped with Netscape Navigator Gold V3.0 and the Netscape software subset is installed automatically if the installation procedure detects graphics capabilities on your system. After installing Digital UNIX, you can invoke Netscape from an icon on the CDE front panel or directly from the command line. Detailed help for Netscape is available through the help menus.

After invoking Netscape, a Digital UNIX home page is located at the following location: `/usr/doc/netscape/Digital_UNIX.html`. The home page contains links to helpful documentation, including a local copy of the Netscape *User's Handbook* (consider adding this link to your list of Netscape bookmarks).

Follow these steps to mount the documentation CD-ROM and invoke Netscape:

1. As superuser or `root`, mount the CD-ROM labeled *Digital UNIX V4.0B Documentation Volume 1* under the `/usr/share/doclib/online` directory:

   a. If you do not know the CD–ROM device name, use the `file` command specifying the raw device to find it. CD–ROM devices are prefixed with the letters `RRD`. Using the `|` (`pipe`) command to filter the output of the `file` command to the `grep` command to search for `RRD` ensures that only your CD-ROM devices are output in the result of the command. Enter a command similar to the following:

   ```
   # file /dev/rrz*c | grep RRD
   /dev/rrz4c: character special (8/4098) SCSI #0 RRD44 disk #32 \
   (SCSI ID #4)
   ```

   In the previous example, the CD–ROM device is `RRD44` on device `/dev/rz4c`. The backslash in the previous example indicates line continuation and is not in the actual display. If you have more than one `RRD` device connected to your system, specify the device where the CD-ROM will be mounted.

   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.

b. Enter the `mount` command with the following syntax and substitute the unit number of your CD-ROM drive for the *unit_number*:

mount -r /dev/rz*unit_number*c *mount_point*

If your CD-ROM device is `rz4c`, use a command similar to the following to mount the CD-ROM on `/usr/share/doclib/online`:

```
# mount -r /dev/rz4c /usr/share/doclib/online
```

The `/usr/share/doclib/online` directory already exists; there is no need to create it.

2. Start Netscape from either the command line or from the common desktop environment (CDE) front panel:

a. To invoke Netscape from the command line, enter the following command:

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

b. To invoke Netscape from the CDE front panel:

- Click on the `Application Manager` icon on the CDE front panel.
- In the `Application Manager` window, double click on the `Desktop_Apps` folder.
- In the `Desktop_Apps` folder, double-click on the Netscape icon.

3. In the Netscape main window, load the Digital UNIX home page by clicking on the `Open` icon and entering the following file location in the `Open Location:` text entry field:

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

Save the home page as a bookmark by clicking on the `Bookmarks` menu and selecting the `Add Bookmark` option. Creating a bookmark lets you access the Digital UNIX home page quickly and easily.

4. When the Digital UNIX home page is loaded, click on the `Digital UNIX documentation` link to load the Digital UNIX documentation bookshelf.

A sample resource defaults file for Netscape is located in the file `/usr/doc/netscape/Netscape.ad`. Comments within this file show possible settings for each resource.

The `/usr/bin/X11/netscape` file is a shell script that performs the following:

- If a Navigator preferences file does not already exist at `$HOME/.netscape/preferences`, then a preferences file is copied there from `/usr/doc/netscape/default-netscape-preferences`.
- If a default Java class file does not already exist at `$HOME/.netscape/java_30`, a symbolic link is created there to point at `/usr/lib/netscape/java_30`.
- If a default null plugin file does not already exist at `$HOME/plugins/libnullplugin.so`, a symbolic link is created there to point at `/usr/lib/netscape/libnullplugin.so`.
- The LD_LIBRARY_PATH environment variable is set to point to /usr/lib/netscape and the actual Navigator binary at `/usr/bin/X11/real-netscape` is invoked. The setting of LD_LIBRARY_PATH allows Navigator to use a special version of `libXt.so` installed in the `/usr/lib/netscape` directory. This modified library is necessary to work around a Navigator problem that prevents Java applets from running within the Navigator on some X11R6-based platforms (for example, Digital UNIX).

This information may be important to know if you should download newer copies of Navigator from other sources (for example, Netscape) and install the files from those kits over the links in `$HOME/.netscape`. Should you want to revert to using Navigator Gold V3.0, you will first need to remove these files so that the `/usr/bin/X11/netscape` script is able to recreate the symbolic links mentioned above that point to the 3.0 Gold versions of these files. Also, if you choose to run a version of Navigator directly (that is, not through the `/usr/bin/X11/netscape` script), you will at least want to set the LD_LIBRARY_PATH environment variable to point to `/usr/lib/netscape` before doing so to ensure the proper functioning of Java applets.

To convert your existing NCSA Mosaic hotlist file into an equivalent Netscape bookmark file, invoke the shell script `/usr/doc/netscape/hot-convert.sh` with no arguments.

Digital recommends 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` in the resulting dialog box, and enter the correct values.

If a `.netscape-preferences` file does not exist in your home directory when Netscape is invoked, a default version of this file will be created. This default preferences file sets your home page to point to the Digital UNIX home page. It also incorporates the recommended settings for the global types and mailcap files described previously.

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 Digital UNIX home page.

6.6.1 Copying HTML Files from CD-ROM to Disk

Instead of using Netscape to read the Digital UNIX documentation from the CD-ROM, you can copy the documentation from the CD-ROM to a disk on your system. Copying the HTML files to a disk eliminates the need to keep the CD-ROM permanently mounted. The documentation files consume about 100 MB of disk space.

Digital strongly recommends using the same directories shown in the examples so you will not have to modify library bookshelf files.

Follow these procedures to copy the HTML files to a disk on your system:

1. Log in as the user `root` or become superuser.
2. Ensure that the CD-ROM labeled *Digital UNIX V4.0B Documentation Volume 1* is mounted on `/mnt`. Refer to Appendix B if you do not know how to mount the CD-ROM.
3. Do the following to copy the HTML files from the CD-ROM to the `/usr/share/doclib/online/DOCUMENTATION/HTML` directory. The backslash (\) in the `tar` command line is used to show command line continuation; do not enter the backslash in the command line. This example illustratres the process with the CD-ROM mounted on the directory `/mnt`.

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

4. Unmount the CD-ROM using a command similar to the following:

   ```
   # umount /dev/rr4c
   ```

   Refer to Appendix B if you do not know how to unmount a CD-ROM.

If you copied the files to a server system, you must export the directory to a workstation similar to the instructions shown in Section 6.6.2.2 for the Bookreader application.

Enter the following command to start Netscape:

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

6.6.2 Invoking the Bookreader Application to View Documentation

In Digital UNIX Version 4.0B, the Bookreader application is provided for you to view documentation that is provided as files in DECW_BOOK format. To use Bookreader, you must install the OSF-BASE, UNIX-SERVER, or UNIX-WORKSTATION PAK that was provided with your kit.

6.6.2.1 Accessing Online Documentation from a Workstation

To access the documentation on a workstation, follow these steps:

1. If you do not know the CD–ROM device name, use the `file` command specifying the raw device to find it. CD–ROM devices are prefixed with the letters `RRD`. Using the `| (pipe)` command to filter the output of the `file` command to the `grep` command to search for `RRD` ensures that only your CD-ROM devices are output in the result of the command. Enter a command similar to the following:

   ```
   # file /dev/rrz*c | grep RRD
   /dev/rrz4c: character special (8/4098) SCSI #0 RRD44 disk #32 \
   (SCSI ID #4)
   ```

   The backslashes in the previous example indicate line continuation and are not in the actual display.

   In the previous example, the CD–ROM device is `RRD44` on device `/dev/rz4c`. If you have more than one `RRD` device connected to your system, specify the device where the CD-ROM will be mounted.

   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.

2. As superuser or `root`, use the `mount` command to mount the CD-ROM. As shown in the following example, substitute the unit number of your CD-ROM drive for the *`unit_number`*.

   mount -r /dev/rz*unit_number*c /usr/share/doclib/online

   For example, enter the following commands to mount the `/usr/share/doclib/online` directory on `rz4c`:

   ```
   # mount -r /dev/rz4c /usr/share/doclib/online
   ```

To ensure that the CD-ROM is remounted in the event that your system crashes or is rebooted, use the text editor of your choice and open the /etc/fstab file. Add the following line:

```
/dev/rz4c   /usr/share/doclib/online   ufs   ro   0  0
```

When your edits are correct, write and quit the file.

The system will now mount the CD-ROM on /usr/share/doclib/online on every reboot.

3. Use the text editor of your choice to edit the /usr/lib/dxbook/library.decw_bookshelf file and ensure that the following *three* lines are included in the file. The backslashes at the end of a line indicate line continuations and are not included in the file.

```
TITLE\/usr/lib/dxbook\Digital UNIX Online Books

book\/usr/share/doclib/online/DOCUMENTATION/BOOKREADER/  \
d32vbkrd\Using Bookreader

shelf\/usr/share/doclib/online/DOCUMENTATION/BOOKREADER/  \
decosf1\Digital UNIX Online Books
```

4. Start Bookreader by entering the following command:

```
# /usr/bin/X11/dxbook &
```

Bookreader is run in the background by including an ampersand (&) after the command. After Bookreader is running, use it to read the books on the documentation CD-ROM.

For more information, read the online book *Using Bookreader*.

6.6.2.2 Accessing Online Documentation from a Server

If you have a server system without graphics capabilities, to view the Digital UNIX Bookreader files, you must export them to a workstation running either ULTRIX Version 4.2 (or higher) or Digital UNIX Version 1.3 (or higher).

The following steps assume that networking is set up on the server system. For more information on setting up a network, refer to the netconfig(8X) and nfsconfig(8X) reference pages or *Network Administration*.

Digital strongly recommends using the same directories shown in the examples so you will not have to modify library bookshelf files.

To export the Bookreader files to a workstation, follow these steps:

- On the server system:

  1. Log in as root or become superuser.

2. Ensure that the CD-ROM containing the documentation is mounted or that the Bookreader files have been copied to disk. This example mounts the CD-ROM on /usr/share/doclib/online. For instructions on how to mount a CD-ROM, refer to Section 6.6.2.1.
3. Using the text editor of your choice, place an entry in the /etc/exports file for the /usr/share/doclib/online directory and make sure that you specify the -ro option for a read-only export, as follows:

   /usr/share/doclib/online -ro

- On the client system:

1. Log in as root or become superuser.
2. Configure the client system as an NFS client by using nfsconfig client setup.
3. Modify the /etc/fstab file by placing the following entry in the file:

   ```
   /usr/share/doclib/online@<server_name> /usr/share/doclib/online nfs ro,bg 0 0
   ```

   where <server_name> is the name of the remote server.
4. Execute the following command to mount the remote directory:

   ```
   # mount /usr/share/doclib/online
   ```
5. Use the text editor of your choice to edit the /usr/lib/dxbook/library.decw_bookshelf file and ensure that the following *three* lines are included in the file. The backslashes at the end of a line indicate line continuations and are not included in the file.

   ```
   TITLE\/usr/lib/dxbook\Digital UNIX Online Books

   book\/usr/share/doclib/online/DOCUMENTATION/BOOKREADER/  \
   d32vbkrd\Using Bookreader

   shelf\/usr/share/doclib/online/DOCUMENTATION/BOOKREADER/  \
   decosf1\Digital UNIX Online Books
   ```
6. Start Bookreader by entering the following command:

   # **/usr/bin/X11/dxbook &**

   Bookreader is run in the background by including an ampersand (&) after the command. After Bookreader is running, use it to read the books on the compact disc. For more information, read the online book *Using Bookreader*.

6.6.2.3 Copying Bookreader Files from CD-ROM to Disk

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

Digital strongly recommends using the same directories shown in the examples so you will not have to modify library bookshelf files.

Follow these steps to make the Bookreader version of the documentation accessible from a disk on your system:

1. Log in as as the user `root` or become superuser.
2. Ensure that the CD-ROM that contains the documentation is mounted on `/mnt`. Refer to Appendix B if you do not know how to mount the CD-ROM.
3. Use commands similar to the following to copy the Bookreader documentation to the `/usr/share/online/doclib` directory. This example illustrates the process with the CD-ROM mounted on the directory `/mnt`. The backslash (\) in the `tar` command line is used to show command line continuation; do not enter the backslash in the command line.

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

4. Unmount the CD-ROM using a command similar to the following:

   ```
   # umount /dev/rr4c
   ```

   Refer to Appendix B if you do not know how to unmount a CD-ROM.

If you copied the files to a directory on a server system, you must export the directory to a workstation as shown in Section 6.6.2.2.

To start the Bookreader application, enter the following command:

```
# /usr/bin/X11/dxbook &
```

After Bookreader is running, you can use it to read the books. For more information about using the Bookreader application, read the online book *Using Bookreader*.

7

UNIX Shell Option

The goal of this chapter is to provide the information necessary for you to perform the following tasks:

- Invoke the UNIX shell from the text-based or graphical user interface
- Access devices
- Mount file systems
- Restore UFS or AdvFS file systems
- Use the `disklabel` command to change the size of disk partitions
- Access Logical Storage Manager (LSM) volumes

7.1 What Is the UNIX Shell Option?

The primary purpose of the UNIX shell option is to provide a way to perform disk and file system maintenance before the installation and to perform disaster recovery processes. The UNIX shell provides a way to access all UNIX commands that help you recover from serious problems such as `root` file system corruption and enables you to perform general file system and disk maintenance tasks.

The distribution media (CD–ROM or RIS) contains file systems that are laid out just as the software would be installed on the system and provides direct access to the `root`, `/usr`, and `/var` directories. This format makes almost every Digital UNIX command and utility available in the UNIX shell even if your operating system is not yet fully functional. In effect, the mounted distribution media is a full operating system environment.

You should perform system management activities in the UNIX shell only if you have extensive UNIX operating system experience and a full operating system environment is not available.

The following system management activities can be performed from the UNIX shell:

- Restoring a damaged `root` file system
- Checking the consistency of the `root` file system
- Restoring the boot block image

- Performing disk maintenance operations such as changing the disk partition layout before performing a text-based custom installation
- Correcting errors in LSM volumes used for `root` (`/`) or `/usr` file systems or the primary swap

7.2 Invoking the UNIX Shell

How you invoke the UNIX shell from the installation procedure depends upon whether you are using the graphical or text-based interface. When you invoke the UNIX shell option, the system is in a Bourne shell in single-user mode with superuser privileges.

7.2.1 Invoking the UNIX Shell from the Text-Based Interface

After you boot your processor from the Digital UNIX distribution media, your screen will look similar to the following:

```
       Welcome to the Digital UNIX Installation Procedure

This procedure installs Digital 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

There are two types of installations:

o  The Default Installation installs a mandatory set of
   software subsets on a predetermined file system layout.

o  The Custom Installation installs a mandatory set of
   software subsets plus optional software subsets that you
   select.  You can customize the file system layout.

The UNIX Shell option puts your system in single-user mode with
superuser privileges.  This option is provided for experienced
UNIX system administrators who want to perform file system or
disk maintenance tasks before the installation.

The Installation Guide contains more information about installing
Digital UNIX.

1) Default Installation
2) Custom Installation
3) UNIX Shell

Enter your choice:
```

Choose option 3 from the menu to access the UNIX shell option.

7.2.2 Invoking the UNIX Shell from the Graphical Interface

After you boot your processor from the Digital UNIX distribution media, the `Installation Setup` screen displays. Invoke the UNIX shell from the button labeled `UNIX shell`.

7.3 UNIX Shell Capabilities

The UNIX shell is an environment that has most of the capabilities of a full operating system environment. This environment works without a swap device and with very limited free disk space within the memory file system (MFS). These two factors mean that tasks requiring large amounts of memory that create the need to swap or tasks requiring large amounts of disk space (such as `/tmp` space) are likely to encounter failures in the UNIX shell environment.

Use the UNIX shell to perform the following tasks:

- Edit a file with the `ed` text editor. By default the `EDITOR` environment variable is set to `ed`. On systems with VGA monitors, you can enable the `vi` text editor by entering:

  ```
  # TERM=vt100
  # export TERM
  ```

- Create new file systems with the `newfs` command for UNIX File Systems (UFS) or with the `mkfdmn` and `mkfset` commands for Advanced File Systems (AdvFS).
- Restore file systems with the `restore` command (for UFS) or the `vrestore` command (for AdvFS).
- Modify partition tables with the `disklabel` command before the custom installation if you are using the text-based interface. Otherwise, use the graphical Disk Configuration Utility, `diskconfig`, which is accessed by clicking on the `Partition Disks...` pushbutton on the `Installation Setup` window.

  Remember to use the `-t advfs` or `-t ufs` option with the `disklabel` command depending upon which file system type is in use (AdvFS or UFS) for the `root` file system. Boot blocks must match the file system type of `root`. Refer to the `disklabel`(8) reference page for more information.
- Mount other disks and file systems with the `mount` command.
- Fix UFS file systems with the `fsck` command. The `fsck` command is not required for AdvFS file systems.

Note

The root file system located on the CD-ROM or the RIS server is mounted with read permissions. The memory file systems (MFS) at /var and /dev are mounted with read-write permissions. However, any changes that you make on files that you create in root are volatile and will not be saved when you halt the UNIX shell.

7.4 Creating Swap Space

If you need to perform a task that needs swap space, you can turn swapping on in the UNIX shell. The only suggestion for turning on swap space in the UNIX shell environment is that you should not use an area that contains data you want to preserve because it will be overwritten. To avoid this problem, use an area that has previously been used for swap space.

Follow these steps to turn on swapping in the UNIX shell:

1. Decide which device (that is, the device name and partition) you want to use for the swap area. Be careful not to choose an area that has data that you want to preserve.
2. Change to the /dev directory:

   # **cd /dev**

3. Use the MAKEDEV command with the following syntax to make the device special file for the swap area:

   ./MAKEDEV *swap_device*

   For example, to create a swap area on device rz0 in the h partition, enter a command similar to the following:

   # **./MAKEDEV rz0h**

4. Turn the swap device on. In this example, the swap device is rz0h:

   # **swapon /dev/rz0h**

5. Enter the following command to verify that the swap device is turned on:

   # **swapon -s**

7.5 Accessing Devices

Device special files must be present in the /dev directory to access your system's disk and tape devices. Enter the ls /dev command to see if the

required device special files exist. If these files do not exist, use the MAKEDEV command to create them.

For example, to create the device special file for a SCSI disk, unit number 0 (zero), execute the following commands:

1. Change to the /dev directory by entering:

   # **cd /dev**

2. Use the MAKEDEV command to create the disk device special file for rz0 by entering:

   # **./MAKEDEV rz0**

7.6 Mounting File Systems

The UNIX shell is used to perform maintenance operations on existing file systems. For instance, if the kernel (vmunix) on your root file system becomes damaged and you have a good backup, you can mount your root file system and replace the damaged kernel. If you are using LSM volumes for the root file system, refer to Section 7.9 for information about how to start LSM.

To mount an existing root file system located on /dev/rz0a, execute the following commands:

1. Create the device special files for the disk containing the root file system:

   # **cd /dev**
   # **./MAKEDEV rz0**

2. To prepare to mount the file system, create a mount point in /var or /tmp:

   # **mkdir /var/mnt**

3. Mount the file system:

   a. For UNIX file systems (UFS), enter:

      # **mount /dev/rz0a /var/mnt**

   b. For Advanced File Systems (AdvFS), enter:

      # **mkdir -p /etc/fdmns/root_domain**
      # **cd /etc/fdmns/root_domain**
      # **ln -s /dev/rz0a**
      # **mount root_domain#root /var/mnt**

The existing root file system is accessible at /var/mnt and can be modified at this point.

7.7 Restoring File Systems

The UNIX shell is ideal for restoring damaged `root` file systems. To restore your `root` file system, first create the device special files for the disk on which the `root` file system is to reside. Next create the device special files for the tape device that contains the dump of the `root` file system to be restored. Create these device special files using the `MAKEDEV` command as shown in Section 7.5.

If your system is using the Logical Storage Manager (LSM) volume `rootvol` for the `root` file system, refer to Section 7.9 for information about how to start LSM in the UNIX shell.

7.7.1 Restoring UNIX File Systems (UFS)

Use the following procedure to restore a UNIX file system:

1. If the disk does not have a label, which could occur if the disk was physically damaged or replaced, write the default disk partition tables and bootstrap programs. The disk partitions and bootstrap programs should be operational. To determine if the disk has a valid label, use the `disklabel` command with the following syntax:

   disklabel -r *disk*

   If there is no disk label, a message displays.

   If a disk label does not exist, use the `disklabel` command with the following syntax to write the default disk partition table:

   disklabel -rw -t ufs *disk disk_type*

   The `-t ufs` specifies that the UNIX file system bootstrap programs are installed. The *`disk`* parameter specifies the disk that includes the device mnemonic and unit number. The *`disk_type`* parameter specifies the type of disk associated with *`disk`* as described in the `/etc/disktab` file.

   For example, to write the default disk partition tables on an RZ57 disk, unit 0, on the `a` partition, enter the following command:

   ```
   # disklabel -rw -t ufs rz0 rz57
   ```

Note

The `disklabel` command used in this procedure writes the default disk partition tables to the disk. Writing a label with customized partition table settings may affect the entire disk. If the disk you are restoring has customized partition table settings, invoke the editing option of the `disklabel` command after writing the default disk label. Refer to *System Administration* or to the `disklabel`(8) reference page for more information.

2. Create a new `root` file system by using the following command syntax:

   newfs *raw_device disk_type*

   The *raw_device* parameter specifies the full raw device pathname of the disk device on your system. For example, to create a new file system on an RZ57, unit 0, enter the following command:

   ```
   # newfs /dev/rrz0a rz57
   ```

3. To prepare to mount the file system, create a mount point in `/var` or `/tmp`:

   ```
   # mkdir /var/mnt
   ```

   Digital suggests creating mount points under the `/var` or `/tmp` directories.

4. Mount the file system by using the following command syntax:

   mount *block_device* /var/mnt

   The *block_device* parameter specifies the full block device pathname of the disk device. For example, to mount the file system created in the previous step, enter the following command:

   ```
   # mount /dev/rz0a /var/mnt
   ```

5. Next, restore the file system. If you are restoring dump files from a local file system, change to the `/var/mnt` directory, insert the medium containing the dump file, and enter the `restore` command with the following command syntax:

   restore -Yrf *dumpfile*

   The *dumpfile* parameter specifies the pathname of the file containing the dump data. For a tape, enter the following commands:

   ```
   # cd /var/mnt
   # restore -Yrf /dev/rmt0h
   ```

You can use the UNIX shell to restore other file systems. Digital recommends performing file system restores from a full operating system environment. If such an environment is unavailable due to the need to restore either `/var` or `/usr`, you should boot your system to single-user mode by using your existing or restored `root` file system. In the single-user mode, more disk space is available, and swap space can be made available in the UNIX shell as shown in the instructions in Section 7.4.

7.7.2 Restoring Advanced File Systems (AdvFS)

Use the following procedure to restore AdvFS file systems:

1. If the disk does not have a label, which could occur if the disk was physically damaged or replaced, write the default disk partition tables and bootstrap programs. The disk partitions and bootstrap programs should be operational. To determine if the disk has a valid label, use the `disklabel` command with the following syntax:

   disklabel -r *disk*

   If the disk has no label, a message is displayed. If the disk has no label, use the `disklabel` command with the following syntax to write the default disk partition table:

   disklabel -rw -t advfs *disk disk_type*

   The `-t advfs` option must be used when creating an AdvFS `root` fileset to ensure that the correct boot blocks are in use in the boot partition. The *`disk`* parameter specifies the disk that includes the device mnemonic and unit number. The *`disk_type`* parameter specifies the type of disk associated with *`disk`* as described in the `/etc/disktab` file. For example, to write the default disk partition tables on an RZ57 disk, unit 0, enter the following command:

   ```
   # disklabel -rw -t advfs rz0 rz57
   ```

   Note

   The `disklabel` command used in this procedure writes the default disk partition tables to the disk. Writing a label with customized partition table settings may affect the entire disk. If the disk you are restoring has customized partition table settings, invoke the editing option of the `disklabel` command after writing the default label. Refer to *System Administration* or to the `disklabel`(8) reference page for more information.

2. Create a new root file domain by using the following command syntax:

   mkfdmn -t *disk_type raw_device domain*

   The *raw_device* parameter specifies the full raw device pathname of the disk device on your system. For example, to create a new file system on an RZ57, unit 0, enter the following command:

   ```
   # mkfdmn -t rz57 /dev/rz0a root_domain
   ```

3. Create a root fileset in the root_domain file by using the following command:

   ```
   # mkfset domain fileset
   ```

   The *domain* parameter specifies the name of the root file domain. For example, to create the root fileset in the root_domain file domain, enter the following command:

   ```
   # mkfset root_domain root
   ```

4. To prepare to mount the fileset, create a mount point in /var or /tmp:

   ```
   # mkdir /var/mnt
   ```

   Digital suggests creating mount points under the /var or /tmp directories.

5. Mount the root fileset by using the following command syntax:

   mount *domain#fileset* mount_point

   The *domain#fileset* parameter specifies the root file domain and the root fileset. The *block_device* parameter specifies the full block device pathname of the disk exist (directories are created using the mkdir command). For example, to mount the fileset created in the previous steps, enter the following command:

   ```
   # mount root_domain#root /var/mnt
   ```

6. Restore the fileset using the vrestore command. To restore files from a local file system, change to the /var/mnt directory, insert the medium containing the dump file, and enter the vrestore command using the following syntax:

   vrestore -vxf *dumpfile*

   The *dumpfile* parameter specifies the pathname of the file containing the dump data. Enter the following commands for a tape:

   ```
   # cd /var/mnt
   # vrestore -vxf /dev/rmt0h
   ```

Note

You can restore a UFS format dump tape to AdvFS (for instance if you are converting a UFS `root` file system to AdvFS) and you can make a `vdump` tape on UFS. The restore command you use depends on the format of the tape (`dump` or `vdump`). Use `vrestore` to restore AdvFS dumps performed with the `vdump` command and `restore` to restore dumps performed with the `dump` command. The corresponding restore command is used regardless of the target file system type.

You can use the UNIX shell to restore other file systems. Digital recommends performing file system restores from a full operating system environment. If such an environment is unavailable due to the need to restore either `/var` or `/usr`, you should boot your system to single-user mode by using your existing or restored `root` file system. In the single-user mode, more disk space is available, and swap space can be made available by issuing the following command:

```
# swapon -a
```

7. Verify the `/etc/fstab` and `/etc/fdmns` directories. The `mkfdmn` command added `/etc/fdmns/root_domain` to the `root` file system in the UNIX shell that is deleted when you exit the UNIX shell.

7.8 Changing the Size of a Disk Partition

If you are using the text-based installation interface, use the `disklabel` command and if you are using the graphical installation interface, use the `Disk Configuration` application to change the drive identification or the disk partitions on the drive or to replace a damaged label or bootstrap. Remember to use the `-t advfs` or `-t ufs` option with the `disklabel` command depending upon which file system type is in use (AdvFS or UFS). UFS boot blocks are installed by default if `-t advfs` is not specified. Refer to the `disklabel`(8) reference page for more information.

Note

If you have a VGA monitor and want `disklabel` to use the `vi` editor, you first have to set the following variables:

```
# TERM=vt100
# export TERM
# EDITOR=vi
# export EDITOR
```

To look at the existing disk partition layout, enter the `disklabel` command in the following format and replace the variable *n* with the unit number of the disk. For example, to look at the existing disk partition layout of an `rz` SCSI disk, enter the following command:

```
# disklabel -r /dev/rzn
```

In the previous example, *n* is the unit number of the disk. The system displays the existing disk partition layout.

To change the size of the disk partition, complete the following steps. The following example uses an `rz26` disk, unit number `0`. In this example, the size of the `b` partition is decreased and the size of the `g` partition is increased to include the space no longer being used by the `b` partition.

1. Change to the `/dev` directory:

   ```
   # cd /dev
   ```

2. Use the `MAKEDEV` command to create the disk device special files for `rz0`:

   ```
   # ./MAKEDEV rz0
   ```

3. Check the disk label information on `rz0`:

   ```
   # disklabel -r rz0
   ```

   If there is no label, the following message is displayed:

   ```
   Bad pack magic number (label is damaged, or pack is unlabeled)
   ```

   To label the disk with the default partitions with AdvFS boot blocks, enter the following command:

   ```
   # disklabel -rw -t advfs rz0 rz26
   ```

Note

The kernel device drivers do not allow the size of a disk partition to be decreased or the offset of a partition to be changed while it is open. Some device drivers create a label containing only a single large partition if a disk is unlabeled; thus the label must be written to the `a` or `c` partition of the disk while it is open. This sometimes requires the desired label to be set in two steps, the first one creating at least one other partition, and the second setting the label on the new partition while shrinking the `a` partition.

4. Set the EDITOR environment variable to use the ed editor:

```
# EDITOR=ed
# export EDITOR
```

Note

If you have a VGA monitor and want to use the vi editor, you first have to set the following variables:

```
# TERM=vt100
# export TERM
# EDITOR=vi
# export EDITOR
```

The examples shown in the remaining steps use the ed text editor.

5. Edit the disk label for rz0:

```
# disklabel -e rz0
```

6. Display the disk label by entering the following command:

```
1,$p
```

7. Search for the b partition by entering the following command:

```
/b:
```

Information similar to the following is displayed:

```
b:  262144  131072  unused  1024  8192  #  (Cyl. 164*- 492*)
```

8. Change the size of the b partition from 262144 sectors to 131072 sectors by entering the following command:

```
s/262144/131072/p
```

This reduces the size of the b partition from 128 MB to 64 MB. The revised information is displayed:

```
b:  131072  131072  unused  1024  8192  # (Cyl. 164*- 402)
```

There is no need to modify cylinder information; cylinder information is automatically modified when you save and exit the file.

9. Search for the g partition by entering the following command:

```
/g:
```

Information similar to the following is displayed:

```
g:  819200  393216  unused  1024  8192   # (Cyl. 492*- 1519*)
```

10. Because the size of the b partition was reduced by 131072 sectors, the size of the g partition should be increased by 131072 sectors. Change the size of the g partition from 819200 sectors to 950272 sectors by entering the following command:

```
s/819200/950272/p
```

This increases the size of the g partition from 400 MB to 464 MB.

11. Change the offset of the g partition by entering the following command:

    ```
    s/393216/262144/p
    ```

    The revised information is displayed:

    ```
    g: 950272  262144  unused  1024  8192  # (Cyl. 402*- 1519*)
    ```

12. To verify your changes, redisplay the disk label by entering the following command:

    ```
    1,$p
    ```

13. Save your edits and quit the editor by entering the following command:

    ```
    wq
    ```

    The system prompts if you want to write the new label. If you are satisfied with your changes, press Return to accept the default answer, y.

    ```
    Write new label? [y] Return
    ```

14. Display the newly customized disk by entering the following command:

    ```
    # disklabel -r rz0
    ```

15. Make sure you are in the root directory (cd /). Then, restart the installation by entering the restart command:

    Choose the custom installation by entering the number 2 at the prompt. If you choose the default installation option, the changes you made to the disk label will be lost because the default partitions are always used on the disk that contains the root file system.

```
       Welcome to the Digital Installation Procedure

This procedure installs Digital 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

There are two types of installations:

o  The Default Installation installs a mandatory set of
   software subsets on a predetermined file system layout.

o  The Custom Installation installs a mandatory set of
   software subsets plub optional software subsets that you
   select.  You can customize the file system layout.

The UNIX Shell option puts your system in single-user mode with
superuser privileges.  This option is provided for experienced
UNIX system administrators who want to perform file system or
```

```
disk maintenance tasks before the installation.

The Installation Guide contains more information about installing
Digital UNIX.

1) Default Installation
2) Custom Installation
3) UNIX Shell

Enter your choice:
```

7.9 Starting the Logical Storage Manager

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 `root` 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` diskgroup, use LSM commands to rectify the problem.

Use commands similar to the following to restart LSM in the UNIX shell:

1. Create device special files for at least one disk that has a valid LSM configuration database:

   ```
   # cd /dev
   # ./MAKEDEV rz9 rz10
   # cd /
   ```

2. Create LSM device special files:

   ```
   # mknod /dev/volconfig c 41 0
   # mknod /dev/volevent c 41 1
   # mknod /dev/voliod c 41 2
   # mknod /dev/volinfo c 41 3
   ```

3. Start the LSM error daemons, `voliod`:

   ```
   # voliod set 2
   # mkdir /etc/vol
   ```

4. Start the LSM configuration daemon in `disable` mode:

   ```
   # vold -m disable
   ```

5. Initialize the `/etc/vol/volboot` file:

   ```
   # voldctl init
   ```

6. Add one of the disks containing the LSM configuration database to the `/etc/vol/volboot` file:

   ```
   # voldctl add disk rz9
   ```

7. Put vold in the enabled mode and import all LSM diskgroups:

   # **voldctl enable**

8. Get a list of all disks known to LSM:

   # **voldisk list**

   Make sure that all disks have a device special files in /dev.

9. Execute the volprint command to obtain information about the LSM configuration:

   # **volprint -htA**

10. Start the LSM volumes:

    # **volume -g** *diskgroup* **-U** *usetype* **start** *volume_name*

11. To rectify problems in a file, the volume needs to be mounted. For example, the root file system may have to be mounted to fix a file such as /etc/vol/volboot or /etc/inittab.

    If the root 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 root 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.

7.10 Using a Disk That Contains ULTRIX Partition Information

Any disk that was in use under Digital's ULTRIX operating system will have a partition table. In such cases, the disklabel command displays the ULTRIX partition information and gives you the following options:

- Create a disk label based on the contents of the ULTRIX partition table
- Create a disk label based on the default Digital UNIX partition information found in /etc/disktab

The following is an example of the ULTRIX partition table:

```
ULTRIX compatible partition data found.
This data may be different than the standard
partition layout information in /etc/disktab.

ULTRIX partition table layout is:
partition     bottom        top       size    overlap
    a              0      32767      32768    c
    b          32768     163839     131072    c
    c              0    2050859    2050860    a,b,d,e,f,g,h
    d         163840     792845     629006    c,g
    e         792846    1421851     629006    c,g,h
    f        1421852    2050859     629008    c,h
    g         163840     983039     819200    c,d,e
    h         983040    2050859    1067820    c,e,f

Use the ULTRIX-style partition data? [y]: n
```

If you want to preserve the ULTRIX partition data, enter y at the prompt; otherwise, enter n. If you changed the partition data, the installation procedure recognizes the changes to the disk label and prompts if you want to use the customized partition layout or the default layout. To preserve your changes, choose the customized partition layout.

7.11 Returning to the Installation Procedure from the UNIX Shell

You must be at the root directory to restart the installation from the UNIX shell.

- After performing preinstallation, system maintenance, or troubleshooting activities in the UNIX shell, return to the installation procedure by entering the following command:

  ```
  # cd /
  # restart
  ```

- If you have a system console with graphics capability and you want to restart the installation procedure with the text-based interface instead of the graphical user interface, enter the following command:

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

- To exit from the UNIX shell and log in to your already installed system, as superuser or root enter:

  ```
  # halt
  ```

  When the console mode prompt (>>>) displays, enter:

  ```
  >>> boot system_disk
  ```

  Replace system_disk with the device where the current root file system is located. The system disk is usually an entry such as DKA0.

8

Using setld to Install and Remove Software Subsets After an Installation

The goal of this chapter is to provide the information necessary for you to use the `setld` command to perform the following tasks:

- Display an inventory of software subsets or files within a software subset
- Install or remove software subsets after an update or full installation

For more information about the `setld` command, see the `setld(8)` reference page.

8.1 Using the setld Command

The syntax of the `setld` command is as follows:

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 8–1 provides a brief description of the options for the `setld` command:

Table 8–1: Options for the setld Command

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 system hierarchy. Do not attempt to use this option to place software in a directory that is not a system root.
–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**

Table 8–1: Options for the setld Command (cont.)

Option	Description
–c	Runs the configuration phase of the named software subset's subset control program (SCP). Refer to the document supplied by your software vendor for the command syntax. For example: # **setld -c DNABASE100 INSTALL**
–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 OSFMANOS410**
–v	Runs the named software subset's Installation Verification Procedure (IVP). For example: # **setld -v OSFMANOS410** 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.
–d	Deletes the named software subset or software subsets. For example: # **setld -d OSFMANOS410 OSFMANOP410**

To list all the options available for the `setld` command, use the –h option:

```
# setld -h
```

8.2 Displaying Subset Inventories

You can use the `setld` command to display an inventory of the software subsets recognized by your system, showing the status (installed or not installed) of each software subset.

To display a software subset inventory, use the `setld` –i command with the following syntax:

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

The following command shows the status of the software subsets:

```
# /usr/sbin/setld -i
Subset        Status     Description
------        ------     -----------
OSFACCT410             System Accounting Utilities (System Administration)
OSFAFM410              Adobe Font Metric Files (Printing Environment)
OSFBASE410 installed   Base System (- Required -)
OSFBIN410  installed   Standard Kernel Objects (Kernel Build Environment)
   .
   .
   .
```

If you use the –i option to specify a software subset, the `setld` command 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 OSFCLINET410 software subset:

```
# /usr/sbin/setld -i OSFCLINET410
  ./etc/.new..acucap
  ./etc/.new..hosts
    .
    .
    .
  ./usr/sbin/bindsetup
  ./usr/sbin/fddi_config
```

Use the –D option to specify a root directory other than the system root.

8.3 Installing a Software Subset

This section describes how to install software subsets from a specified location. 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* variable specifies the location of the software subset that you want to install. You can specify the following *location* variables:

- *hostname*: specifies the name of the remote host (RIS server).
- *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.

To install software subsets from CD–ROM, use the following procedure. The distribution path given in the following examples is for the Digital UNIX base operating system CD–ROM. For other distribution kits, refer to the document supplied by your software vendor.

1. Place your CD–ROM optical disc in its caddy and 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 /mnt:

   ```
   # mkdir /mnt
   ```

3. Mount the CD–ROM on /mnt. Refer to Appendix B if you do not know how to determine the location of the CD-ROM device. The following example assumes the CD–ROM device is located on the c partition of the rz4 disk:

```
# mount -r /dev/rz4c /mnt
```

After mounting the CD–ROM, you can change to the `/mnt` (`cd /mnt`) directory to view the directories located on the CD–ROM.

4. To install a Digital UNIX base software subset, enter a command similar to the following:

```
# setld -l /mnt/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` command 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) GNU Emacs
     5) Local Area Transport (LAT)
     6) UNIX(tm) SVID2 Compatibility
     7) UNIX(tm) to UNIX(tm) Copy Facility

 - Kernel Build Environment:
     8) ATM Kernel Header and Common Files
     9) ATM Kernel Modules
```

```
    10) Logical Storage Manager Kernel Header and Common Files
    11) Logical Storage Manager Kernel Modules
    12) POLYCTR advfs Kernel Modules

 - Kernel Software Development:
    13) ATM Kernel Objects
    14) Hardware Kernel Objects
    15) Logical Storage Manager Kernel Objects
    16) POLYCTR advfs Kernel Objects
    17) Standard Kernel Objects

 - Mail Applications:
    18) DECwindows Mail Interface
    19) RAND Corp. Mail Handler (MH)

 - Network-Server/Communications:
    20) ATM Commands
    21) Additional Networking Services
    22) Dataless Management Services
    23) Remote Installation Service

--- MORE TO FOLLOW ---
Enter your choices or press RETURN to display the next screen.

Choices (for example, 1 2 4-6):

 - Printing Environment:
    24) Adobe Font Metric Files

 - Reference Pages:
    25) Ref Pages: Admin/User
    26) Ref Pages: CDE Admin/User
    27) Ref Pages: CDE Development
    28) Ref Pages: Programming
    29) Ref Pages: Realtime
    30) Ref Pages: Windows Admin/User
    31) Ref Pages: Windows Programming

 - Software Development:
    32) CDA(tm) Software Development
    33) CDA(tm) for X/Motif Development
    34) CDE Software Development and Programming Examples
    35) GNU Revision Control System
    36) Ladebug Debugger Version 4.0
    37) Ladebug Debugger Version 4.0 Release Notes
    38) Ladebug Debugger Window Interface
    39) Ladebug Debugger remote server
    40) Realtime Software Development
    41) Software Development Desktop Environment
    42) Source Code Control System
    43) Standard Header Files
    44) Static Libraries
    45) X Window and X/Motif Header Files
    46) X Window and X/Motif Programming Examples
    47) X Window and X/Motif Software Development
    48) X Window and X/Motif Static Libraries


Choices (for example, 1 2 4-6): 25 30

 - Supplemental Documentation:
    49) XIE Version 5 Online Documentation

 - System Administration:
```

```
    50) C2-Security
    51) C2-Security GUI
    52) Kernel Debugging Tools
    53) Logical Storage Manager
    54) Logical Storage Manager GUI
    55) Logical Volume Manager
    56) Obsolete Commands and Utilities
    57) Obsolete Locale databases
    58) POLYCTR advfs
    59) Single-Byte European Locales
    60) System Accounting Utilities
    61) System Exercisers

 - Text Processing:
    62) Doc. Preparation Tools
    63) Doc. Preparation Tools Extensions

 - Windowing Environment:
    64) DECwindows 75dpi Fonts
    65) LK201 Keyboard Support
    66) LK411 Keyboard Support
    67) LK421 Keyboard Support
    68) LK444 Keyboard Support
    69) PCXAL Keyboard Support
    70) X Customizations for OEM
    71) X Servers for Open3D
    72) X Servers for PCbus
    73) X/Motif 1.1

 - Windows Applications:
    74) Additional DECwindows Applications

--- MORE TO FOLLOW ---
Add to your choices or press RETURN to display the next screen.

Choices (for example, 1 2 4-6): 25 30 62

    75) Additional X Applications
    76) CDE Additional Applications
    77) Demo X Applications
    78) Nested X Server
    79) Old Additional DECwindows Applications
    80) Virtual X Frame Buffer

The following choices override your previous selections:

    81) ALL of the above
    82) CANCEL selections and redisplay menus
    83) EXIT without installing any subsets

Add to your choices, choose an overriding action or
press RETURN to confirm previous selections.

Choices (for example, 1 2 4-6):  25 30 62
```

6. After you enter your choices, the following confirmation message is displayed:

```
You are installing the following optional subsets:

 - Reference Pages:
       Ref Pages: Admin/User
       Ref Pages: Windows Admin/User
```

```
 - Text Processing:
       Doc. Preparation Tools

Is this correct? (y/n):
```

7. After you confirm your choice, messages similar to the following display as the software subsets are loaded and configured:

```
Checking file system space required to install selected
subsets:

File system space checked OK.

3 subset(s) will be installed.

Loading 1 of 3 subset(s)....

Doc. Preparation Tools
   Copying from dumper (inet)
   Verifying

Loading 2 of 3 subset(s)....

Ref Pages: Admin/User
   Copying from dumper (inet)
        Working....Fri Dec 13 11:46:17 EST 1996
   Verifying

Loading 3 of 3 subset(s)....

Ref Pages: Windows Admin/User
   Copying from dumper (inet)
   Verifying

3 of 3 subset(s) installed successfully.


Configuring "Doc. Preparation Tools " (OSFDCMT410)

Configuring "Ref Pages: Admin/User " (OSFMANOS410)

Configuring "Ref Pages: Windows Admin/User " (OSFMANWOS410)
```

8. If you are installing from CD–ROM, after the software subsets are installed, unmount the CD–ROM.

```
# umount /dev/rz4c
```

To install Digital software subsets on Remote Installation Services (RIS) clients, refer to *Sharing Software on a Local Area Network*.

8.4 Installing Software Subsets with Dependencies

If you select a software subset that has a dependency on another subset that is not yet selected or is not already installed, you will see a message similar to the following during subset loading:

```
Checking file system space required to install selected subsets:

File system space checked OK.

1 subset(s) will be installed.

Loading 1 of 1 subset(s)....
setld:
Error installing "Ref Pages: Admin/User " (OSFMANOS410)
This subset requires following subset(s) to operate correctly:

        "Doc. Preparation Tools " (OSFDCMT410)
setld:
Please install required subset(s) first.

0 of 1 subset(s) installed successfully.
```

In the previous example, the reference page software subset was not installed because it requires the installation of the `Doc. Preparation Tools (OSFDCMT410)`.

The `setld` command will not install software subsets with dependencies without installing the software subset on which the dependency occurs. You must invoke the `setld` command again and make sure you select all software subsets along with their dependencies.

Appendix D describes each software subset and shows the dependencies between software subsets (if any).

8.5 Rebuilding the Kernel After Installing Kernel Build Environment Subsets

Certain Digital UNIX base operating system products (such as the Logical Storage Manager, Advanced File System, and Local Area Transport) 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 the option to use the product will not be available. After building a new kernel, reboot with the new kernel to make the product available for use.

Refer to Table D–4 in Appendix D for a list of the software subsets that contain kernel components for which you must run `doconfig` to build a new kernel. Refer to the `doconfig`(8) reference page for more information about the `doconfig` utility.

8.6 Rebuilding the Kernel After Installing ATM Adapters

If you install the Asynchronous Transfer Mode (ATM) DGLTA adapter after installing Digital UNIX, you must boot the system off the generic kernel `genvmunix`, install the ATM software subsets from the CD-ROM, and then run the `doconfig` program to rebuild your system kernel to enable the added ATM support.

9

Performing a Worldwide Installation

Digital UNIX is an internationalized operating system. The worldwide language support software subsets provide support for various native languages and countries. Installing the worldwide language support software subsets enables software developers to develop internationalized software that can be used in different countries.

This chapter provides information about:

- Installing the Digital UNIX worldwide language support software subsets from CD–ROM or remote installation services (RIS) server
- Installing worldwide language support public domain program source and fonts
- Invoking `/usr/sbin/wwconfig` to tailor the Asian terminal options of the kernel
- Invoking `/usr/sbin/wwsetup` to set up the `sendmail` daemon and `wnn`
- Changes made to the default Digital UNIX operating system by the installation of worldwide support software
- The backup files created by a worldwide installation

9.1 Preparing for a Worldwide Installation

Before you start the worldwide installation procedure, perform the following tasks:

- Read Chapter 1, which describes the general preparation you should do before the installation.
- Make sure that the base Digital UNIX Version 4.0B operating system is already installed on your system.
- Refer to the descriptions of the worldwide language support software subsets in Appendix F to determine the software subsets you want to install.

For more information about the terminals and printers supported for different languages, refer to the *Digital UNIX Version 4.0B Software Product Description* (SPD). The SPD is located on the CD-ROM labeled

Digital UNIX V4.0B Operating System Volume 1 and is located in the /DOCUMENTATION/POSTSCRIPT or /DOCUMENTATION/TEXT directories.

9.2 Dependencies on Digital UNIX Base Software Subsets

Some of Digital UNIX worldwide support software subsets have dependencies on Digital UNIX base software subsets. Refer to the worldwide software subset descriptions in Appendix F for the dependencies of each worldwide software subset.

9.3 Increasing Available Disk Space

The installation of the worldwide software subsets loads most files to the subdirectories that are subordinate to the /usr/i18n directory.

If the /usr/i18n directory does not exist, the installation procedure creates it. If the /usr/i18n directory does exist, the installation procedure uses it. If you find that there is insufficient disk space for the worldwide software subsets, and you know that you have additional space on alternative disks or disk partitions on your system, follow these steps before beginning the installation process:

1. Log in as root or superuser.
2. If it does not exist, create the directory /usr/i18n as follows:

   # **mkdir /usr/i18n**

3. Specify in the /etc/fstab file that the newly created directory is a mount point to a disk partition where there is additional space.
4. Enter the mount -a command to mount the new mount point of /usr/i18n.

9.4 Starting the Worldwide Installation

Follow these steps to start a worldwide installation.

1. Log in to your system as the superuser root.
2. Shut down the system to single-user mode by entering the following command:

   # **shutdown now**

3. Remount the disks specified in /etc/fstab by entering the following command:

   # **mount -a**

Go to Section 9.4.1 if you are invoking the `wwinstall` script from the CD–ROM labeled *Digital UNIX V4.0B Associated Products Volume 1*

Go to Section 9.4.2 if you are invoking the `wwinstall` script from a remote installation services (RIS) server.

During the installation procedure, you are asked some questions about configuring the system. If you need help, enter a question mark (`?`) to display online help.

9.4.1 Installing from a CD-ROM

The following steps describe how to invoke the `wwinstall` script from a CD–ROM:

1. Load the CD-ROM optical disc labeled *Digital UNIX V4.0B Associated Products Volume 1* into the CD-ROM drive.
2. Make a directory to be the mount point of the CD-ROM and then mount the CD-ROM by entering commands similar to the following:

   ```
   # mkdir /cdrom
   # mount -rd /dev/rz4c /cdrom
   # cd /cdrom/ALPHA/WORLDWIDE
   ```

   In the previous example, `/dev/rz4c` is the name of the CD-ROM device. Refer to Appendix B if you do not know the device name of your CD-ROM device.
3. Invoke the `wwinstall` script to install Digital UNIX worldwide support software subsets as shown in the following example:

   ```
   # ./wwinstall
   ```

Go to Section 9.5 to continue the worldwide installation.

9.4.2 Installing from a RIS Server

You may install the worldwide support software subsets from a RIS server. However, you have to make sure that your system is registered as a client on the RIS server. The RIS area must have the worldwide language support software subsets installed. Refer to *Sharing Software on a Local Area Network* for more information on how to set up a RIS server and RIS client. Enter the following command to mount the local file systems and install the software subsets from a RIS server:

1. Mount the local file system:

   ```
   # /sbin/bcheckrc
   ```

2. Start the network:

```
# /sbin/init.d/inet start
# /sbin/init.d/route start
# /sbin/init.d/gateway start
# /sbin/init.d/nis start
# /sbin/init.d/named start
```

3. Mount the RIS server's mount point:

```
# setld -l server:
```

Replace *server* with the name of your RIS server appended with a colon (:). Go to Section 9.5 to continue the worldwide installation.

9.5 Responding to the wwinstall Script

The prompts displayed by the `wwinstall` script apply to systems where all the prerequisite base software subsets are installed. The screen displays are similar for installations performed from CD–ROM or RIS. If your system does not have the mandatory Digital UNIX base software subsets installed, the prompts and displays may be different.

The `wwinstall` script displays the disk space available in the `/usr/i18n` directory. You can quit now if there is insufficient disk space for the worldwide software. Refer to Section 9.3 for information about increasing disk space.

```
Most of subsets will be installed under the /usr/i18n directory.
Depending on the number of subsets you choose to install, you may
need more than 200 Mbytes of free disk space for installation.

You have the following amount of free disk space
available in /usr:

df -k /usr
Filesystem     1024-blocks   Used    Avail Capacity Mounted on
usr_domain#usr      828816 200475   592768    25%    /usr

Two ways to set up the /usr/i18n directory :

[1] Create the /usr/i18n directory
[2] Set up a symbolic link to another partition that has enough
    free disk space for installation

Which way do you want ? [1] :  Return
```

If you press the Return key or enter `1` to create the `/usr/i18n` directory, the following message is displayed:

```
Directory /usr/i18n has been created
```

If you enter 2 to create a symbolic link, the following message is displayed:

```
You have chosen to make a symbolic link to another partition.
Please enter the installation path:

You have the following amount of free disk space available in
/usr/i18n :

df -k /usr/i18n
Filesystem  1024-blocks    Used    Avail Capacity  Mounted on
/dev/rz3h        405476     372   364556     0%    /rz3h

Do you want to continue this installation procedure? (y/n) [y]:y
```

The installation script displays a list of countries to support:

```
*****************************************************************
*                                                               *
* Digital UNIX WORLDWIDE LANGUAGE SUPPORT INSTALLATION PROCEDURE  *
*                                                               *
*****************************************************************

 1) Czech Republic                   2) France
 3) Germany                          4) Greece
 5) Hong Kong                        6) Hungary
 7) Israel                           8) Italy
 9) Japan                           10) Korea
11) Lithuania                       12) Poland
13) Russia                          14) Slovakia
15) Slovenia                        16) Spain-Catalan
17) Spain-Spanish                   18) Sweden
19) Thailand                        20) Thailand
21) The People's Republic of China  22) Turkey

23) All of the above
24) None of the above

Choices (for example, 1 2 3) :
```

If you specify more than one number at the prompt, separate each number with a space. If you enter 23 in response to the previous prompt to select all countries, the display is similar to the following:

```
You are installing localized software for the following countries:

     Czech Republic
     France
     Germany
     Greece
     Hong Kong
     Hungary
     Israel
     Italy
     Japan
     Korea
     Lithuania
```

```
    Poland
    Russia
    Slovakia
    Slovenia
    Spain - Catalan
    Spain - Spanish
    Sweden
    Taiwan
    Thailand
    The People's Republic of China
    Turkey

Is this correct? [n]
```

- If you enter `n`, the software subset selection menu is displayed again, and you can reenter your choice.
- If the countries displayed are the ones you want to support, enter `y`.

Depending upon the countries you selected, the following questions may be displayed:

- To install outline fonts:

  ```
  Would you like to install outline fonts for printing
  and display? [y] :
  ```

  Enter `y`, to install outline fonts for better printing and displays. Outline fonts consume a considerable amount of disk space.

- To install public domain source files:

  ```
  Would you like to install program sources of the public domain
  software packaged in the Worldwide Language Support kit? [y] :
  ```

  Enter `y` to install program sources of the public domain software packaged in the Digital UNIX worldwide language support software. The components NEMACS, MULE, and Wnn are sourced from public domain and are shipped with their source code because of GNU license guidelines. MULE is a multilingual enhancement of GNU Emacs and is based on GNU Emacs Version 19.

- To install UCS (Unicode) locales:

  ```
  Would you like to install any UCS (Unicode) support? [y] :
  ```

  Enter `y` to install UCS (Unicode) locales. Digital UNIX provides locales and codeset converters that support the *The Unicode Standard: Worldwide Character Encoding, Version 2.0* and *Information Technology–Universal Multiple-Octet Coded Character Set, ISO/IEC 10646:1993*. These standards define the Universal Character Set (UCS), which includes characters in most native languages. Digital UNIX supports the Unicode encoding format known as UCS-4, in which

characters are encoded in 32-bit units (4 octets). This encoding format is identical to the one specified by the ISO/IEC 10646 standard.

- To enable 8-bit mail:

  ```
  Do you want to enable 8-bit mail support? (y/n) [y]:
  ```

  Enter `y` to enable 8-bit mail support. Refer to Section 9.7 for more information.

9.5.1 Selecting Worldwide Software Subsets

Next, a menu of available software subsets is displayed. The menu first shows a list of mandatory software subsets on which country-specific software subsets depend. These software subsets are loaded automatically. The installation procedure then displays a list of optional software subsets that you can install depending on which countries you have selected. If you specify more than one number at the prompt, separate each number with a space or a comma. Separate a range of numbers with a hyphen (`-`).

The following example shows the optional software that is available when `Italy` and `Japan` are the countries chosen for worldwide support. The optional software subset list is similar to the following:

```
*** Enter subset selections ***

The following subsets are mandatory and will be installed
automatically unless you choose to exit without installing any subsets:

      * Italian CDE Mail Interface
      * Italian DECwindows Mail Interface
      * Italian CDE Desktop Environment
      * Italian CDE Minimum Runtime Environment
      * Italian Old X Environment
      * Japanese CDE Mail Interface
      * Japanese DECwindows Mail Interface
      * Japanese Base System
      * Japanese Basic X Environment
      * Japanese CDE Desktop Environment
      * Japanese CDE Minimum Runtime Environment
      * Japanese DECwindows 100dpi Mandatory Fonts
      * Japanese DECwindows Mandatory Fonts
      * Japanese Old X Environment
      * Worldwide Kernel Headers and Common Files
      * Worldwide Standard Kernel Modules
      * Worldwide Base System
      * Worldwide Basic X Environment
      * Worldwide DECwindows Mandatory Fonts
      * Worldwide Motif 1.1
      * Worldwide CDE Desktop Environment

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.

Press RETURN to display the next screen:

 - Italian Support - Software Development:
     1) Italian CDE Software Development
     2) Italian X Window Software Development

 - Italian Support - Windowing Environment:
     3) Italian Basic X Environment
     4) Italian CDE Online Help

 - Italian Support - Windows Applications:
     5) Italian Additional DECwindows Applications
     6) Italian CDE Additional Applications
     7) Italian Old Additional DECwindows Applications

 - Japanese Support - General Applications:
     8) Additional Japanese Software
     9) Japanese Nemacs
    10) Wnn Input Method

 - Japanese Support - Operating System:
    11) Japanese (SJIS) Message Catalogs
    12) Japanese Message Catalogs

 - Japanese Support - Reference Pages:
    13) Japanese Ref. Pages for Additional Software
    14) Japanese Reference Pages
    15) Japanese Windows Reference Pages

 - Japanese Support - Software Development:
    16) Japanese CDE Software Development
    17) Japanese Ladebug Debugger Version 4.0-23 Window Interface
    18) Japanese Ladebug Debugger Version 4.0-23

--- MORE TO FOLLOW ---
Enter your choices or press RETURN to display the next screen.

Choices (for example, 1 2 4-6): 8-10

    19) Japanese Software Development
    20) Japanese X Window Software Development
    21) Wnn Software Development

 - Japanese Support - Windowing Environment:
    22) Japanese CDE Online Help
    23) Japanese DECwindows 100dpi Optional Fonts
    24) Japanese DECwindows 75dpi Mandatory Fonts
    25) Japanese DECwindows 75dpi Optional Fonts

 - Japanese Support - Windows Applications:
    26) Japanese Additional DECwindows Applications
    27) Japanese CDE Additional Applications
    28) Japanese Netscape Navigator Gold V3.0
    29) Japanese Old Additional DECwindows Applications

 - Worldwide Language Support - General Applications:
    30) Worldwide MULE

 - Worldwide Language Support - Operating System:
    31) Worldwide Phrase Input Support
    32) Worldwide User Defined Character Support
```

```
 - Worldwide Language Support - Printing Environment:
    33) Worldwide Printer Support

 - Worldwide Language Support - Software Development:
    34) Ladebug Debugger Version 4.0-23
    35) Ladebug Debugger Version 4.0-23 Release Notes
    36) Ladebug Debugger Version 4.0-23 Window Interface
    37) Ladebug Debugger Version 4.0-23 remote server
    38) Worldwide SVE MNLS Migration Tools
    39) Worldwide Software Development
    40) Worldwide X Window Software Development

--- MORE TO FOLLOW ---
Add to your choices or press RETURN to display the next screen.

Choices (for example, 1 2 4-6):  8-10

 - Worldwide Language Support - System Configuration:
    41) Worldwide Configuration Tool

 - Worldwide Language Support - Windowing Environment:
    42) Worldwide Old Bookreader
    43) Worldwide Two-Byte Outline Font Renderer
    44) Worldwide User Defined Character Workstation Service

 - Worldwide Language Support - Windows Applications:
    45) Worldwide Old Additional DECwindows Applications

The following choices override your previous selections:

    46) ALL mandatory and all optional subsets
    47) MANDATORY subsets only
    48) CANCEL selections and redisplay menus
    49) EXIT without installing any subsets

Add to your choices, choose an overriding action or
press RETURN to confirm previous selections.

Choices (for example, 1 2 4-6):  8-10 42
```

You have a chance to verify your choices as shown in the following example:

```
You are installing the following mandatory subsets:

        Italian CDE Mail Interface
        Italian DECwindows Mail Interface
        Italian CDE Desktop Environment
        Italian CDE Minimum Runtime Environment
        Italian Old X Environment
        Japanese CDE Mail Interface
        Japanese DECwindows Mail Interface
        Japanese Base System
        Japanese Basic X Environment
        Japanese CDE Desktop Environment
        Japanese CDE Minimum Runtime Environment
        Japanese DECwindows 100dpi Mandatory Fonts
        Japanese DECwindows Mandatory Fonts
        Japanese Old X Environment
        Worldwide Kernel Headers and Common Files
        Worldwide Standard Kernel Modules
        Worldwide Base System
        Worldwide Basic X Environment
        Worldwide DECwindows Mandatory Fonts
        Worldwide Motif 1.1
```

```
        Worldwide CDE Desktop Environment

You are installing the following optional subsets:

 - Japanese Support - General Applications:
        Additional Japanese Software
        Japanese Nemacs
        Wnn Input Method

 - Worldwide Language Support - Windowing Environment:
        Worldwide Old Bookreader

Is this correct? (y/n):
```

Enter n if you want to begin the software subset selection again. Enter y if the list is correct.

9.5.2 Loading Worldwide Software Subsets

The installation process checks to make sure there is enough disk space to load the selected subsets. A message similar to the following is displayed:

```
Checking file system space required to install selected subsets:
        Working....Fri Dec 13 09:53:20 EST 1996

File system space checked OK.
```

If there is not enough disk space to hold all the software subsets you selected, you must go back and select only those optional software subsets you need.

Next, the installation process installs the software subsets on your system. Messages similar to the following are displayed:

```
25 subset(s) will be installed.

Loading 1 of 25 subset(s)....

Worldwide Base System
   Copying from /cdrom/ALPHA/WORLDWIDE (disk)
   Verifying

Loading 2 of 25 subset(s)....

Worldwide Kernel Headers and Common Files
   Copying from /cdrom/ALPHA/WORLDWIDE (disk)
   Verifying

Loading 3 of 25 subset(s)....

Worldwide Standard Kernel Modules
   Copying from /cdrom/ALPHA/WORLDWIDE (disk)
   Verifying
   .
   .
Loading 23 of 25 subset(s)....

Japanese CDE Minimum Runtime Environment
   Copying from /cdrom/ALPHA/WORLDWIDE (disk)
   Verifying
```

```
Loading 24 of 25 subset(s)....

Japanese CDE Desktop Environment
   Copying from /cdrom/ALPHA/WORLDWIDE (disk)
        Working....Fri Dec 13 10:48:59 EST 1996
   Verifying

Loading 25 of 25 subset(s)....

Japanese CDE Mail Interface
   Copying from /cdrom/ALPHA/WORLDWIDE (disk)
   Verifying

25 of 25 subset(s) installed successfully.
```

9.5.3 Configuring Worldwide Software Subsets

Subset configuration occurs next, which is the process of tailoring the operating system software for use. Messages similar to the following are displayed. Review this screen output carefully; depending upon the software subsets you installed, you may be instructed to run setup scripts. If you performed the installation from CD–ROM, after the installation is complete, review the log file, `/var/adm/smlogs/wwinstall.log` file for a record of the installation. A log file is not created during RIS installations.

```
Configuring "Worldwide Base System " (IOSWWBASE405)
Configuring ./etc/csh.login ...
Configuring ./etc/profile ...

Configuring "Worldwide Kernel Headers and Common Files"
(IOSWWBINCOM405)

Configuring "Worldwide Standard Kernel Modules " (IOSWWBIN405)
   .
   .
Configuring "Japanese Nemacs " (IOSJPNEMACS405)

Configuring "Wnn Input Method " (IOSJPWNN405)

Please invoke /usr/sbin/wwsetup to configure wnn.
   .
   .
Configuring "Japanese CDE Minimum Runtime Environment" (IOSJPCDEMIN405)

Configuring "Japanese CDE Desktop Environment " (IOSJPCDEDT405)

Configuring "Japanese CDE Mail Interface " (IOSJPCDEMAIL405)
```

9.5.4 Building the Kernel

A kernel build begins automatically after software subset configuration.

Note

If you performed a dataless installation, the kernel build does not happen automatically. Follow the instructions in Section 9.6 to build the kernel.

The kernel build screen display is similar to the following:

```
*******************************************************
*                                                     *
* Rebuilding kernel to include incorporate Asian/Thai *
* tty drivers                                         *
*                                                     *
*******************************************************

 **** Adding Worldwide Support tty Features into Kernel
Configuration File ****

Starting kernel rebuild...

*** KERNEL CONFIGURATION AND BUILD PROCEDURE ***

Saving /sys/conf/HANDW3 as /sys/conf/HANDW3.bck


*** PERFORMING AUTO-EDIT OF CONFIGURATION FILE ***
Auto-editing /sys/conf/HANDW3 using /tmp/.script18679.....done.

*** PERFORMING KERNEL BUILD ***
        Working....Fri Dec 13 20:10:39 HKT 1996
        Working....Fri Dec 13 20:12:40 HKT 1996
        Working....Fri Dec 13 20:14:41 HKT 1996
        Working....Fri Dec 13 20:16:42 HKT 1996

The new kernel is /sys/HANDW3/vmunix

Saving /vmunix as /vmunix.IOS410.1
Copying /sys/HANDW3/vmunix to /vmunix

Reboot your system using the new kernel.

The installation software has completed the installation process.
The log file /var/adm/smlogs/wwinstall.log contains a record of
your installation.
```

If the kernel build fails, check the log file `/var/adm/smlogs/setld.log` for information to diagnose the problem. Refer to the `setld`(8) reference page for more information.

9.6 Building an Asian Kernel After the Installation

If you installed support software subsets for Japan, China, Hong Kong, Korea, Taiwan, or Thailand, the worldwide installation process builds a kernel with all the installed Asian or Thai terminal supports. Afterwards, you reboot the system with the new kernel to enable Asian or Thai terminal support in the kernel.

If you want to enable or disable some of the Asian or Thai terminal supports from the kernel, Section 9.6.1 describes the procedure to rebuild an Asian kernel.

9.6.1 Reconfiguring the Kernel to Support the Asian Terminal Driver and Daemons

To reconfigure the kernel to support the Asian terminal driver and daemons, invoke the `wwconfig` script with the `-a` option:

```
# /usr/sbin/wwconfig -a
```

Refer to the `wwconfig`(8) reference page for more information.

If you installed IOSWWBIN405 and installed at least one of the following subsets: IOSWWUDCOS405 (odld), IOSWWPHRASE405 (simd), or IOSJPBASE405 (kkcd), a UTX configuration selection table similar to the following displays. UTX is the mechanism to support communication between the Asian terminal driver and daemons.

```
# /usr/sbin/wwconfig -a

*** UTX  CONFIGURATION SELECTION ***

    Selection   Asian service Daemon
-------------------------------------------------------
        1       On Demand Font Loading (odld)
        2       Software Input Method  (simd)
        3       Kana-Kanji Conversion  (kkcd)
        4       All of the above
        5       None of the above
-------------------------------------------------------

Enter the selection number for each daemon you want.
For example, 1 2 :
```

After you make your selection, the daemons are displayed for your confirmation. If you choose `4 (All of the above)`, the following confirmation message is displayed:

```
You specified the following daemons:

    On Demand Font Loading (odld)
    Software Input Method  (simd)
    Kana-Kanji Conversion  (kkcd)

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

Enter `y` if the list includes the daemons you want to set up.

The installation procedure then asks how many UTX devices you want to create.

```
How many UTX devices do you want to create? [default: 32] :
```

The number you enter is saved in the `/var/i18n/sys/stanza.loadable` file. The actual creation of the UTX devices is done when you reboot your system.

There is one utxd master daemon that uses one UTX device. Each invocation of one of the `odld`, `simd`, and `kkcd` daemons uses one UTX device. Each user who turns on `odld` on a database not already served by another `odld` starts a new `odld` process. Refer to the `stty`(1) and `cedit`(1) reference pages for more information. Each user session that has the Software Phrase Input Method turned on requires one `simd`. Each user who turns on Kana-Kanji Conversion on a database (refer to `stty`(1) for more information) not already served by another `kkcd` starts a new `kkcd` process. Assuming that 10 users use all three functions, it requires 31 UTX devices to support 10 users.

If you installed the IOSZHBIG5405, IOSZHTELEX405, and IOSZHCONV405 software subsets, the following selection menu is displayed:

```
*** ADDITIONAL TERMINAL CODESETS SELECTION ***

    Selection   Terminal Codeset
-------------------------------------------------------------
        1       BIG-5
        2       Telecode
        3       Traditional & Simplified Chinese Conversion
        4       All of the above
        5       None of the above
-------------------------------------------------------------

Enter the selection number for each codeset you want.
For example, 1 2 :
```

Selecting a terminal codeset at this prompt means that you want to build support for that terminal codeset into the terminal driver. When codeset support is built into the terminal driver, users can select that codeset as their terminal code by using the `/usr/i18n/bin/stty` command.

Choose `3` if you want to support the proper codeset conversion when the terminal code is set to a Simplified Chinese codeset and the application code is set to a Traditional Chinese codeset or vice versa.

If only two out of the three software subsets are installed, the selection menu still appears but the uninstalled component is missing from the list.

If you installed just one of the software subsets, a question is asked instead. As shown in the following example, if you installed the IOSTHBIN410 software subset, the procedure asks if you want to add the Thai terminal driver to the kernel:

```
Do you want to install the Thai tty driver? (y/n) [y] :
```

The Thai terminal driver supports Thai terminal input/output (I/O). The other Asian languages are supported by the Asian terminal driver. If you have installed only the IOSTHBIN405 software subset and not the IOSWWBIN405 software subset, the previous question is the only question asked.

The installation procedure then asks if you want to rebuild the kernel.

```
If you wish, you may use an automated kernel build procedure by
answering 'y' to the next question.

You will need about 10 Mb available in the /sys file system
for the kernel build.  If you do not have this much space,
do not choose an automated build.

You have the following amount of free disk space available:

df -k /sys
Filesystem   kbytes      used     avail capacity  Mounted on
/dev/rz3g    825507    670890     72066    90%    /ufs/rz3g

Do you want this procedure to rebuild your kernel? (y/n):
```

If you enter y, the kernel build starts, and the display is similar to the following:

```
Starting kernel rebuild...

*** KERNEL CONFIGURATION AND BUILD PROCEDURE ***

Saving /sys/conf/ARUBA as /sys/conf/ARUBA.bck

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


*** PERFORMING KERNEL BUILD ***
        Working....Fri Dec 13 16:05:35 EDT 1996
        Working....Fri Dec 13 16:07:35 EDT 1996
        Working....Fri Dec 13 16:09:36 EDT 1996

The new kernel is /sys/ARUBA/vmunix

Saving /vmunix as /vmunix.IOS405.3
Copying /sys/ARUBA/vmunix to /vmunix

Reboot your system using the new kernel.
```

In the previous example, ARUBA is the system name. If you want to enable or disable some of the terminal options, you must enter the following command to reconfigure and rebuild the kernel:

```
# /usr/sbin/wwconfig -a
```

Reboot your system after a kernel rebuild to include the newly selected features.

9.7 Setting up the sendmail Daemon and wnn

After you have loaded the worldwide software subsets, invoke `/usr/sbin/wwsetup` to set up the `sendmail` daemon and to set up `wnn` if you have installed IOSJPWNN405.

When you invoke the `/usr/sbin/wwsetup` command, the following message is displayed:

```
        ====================================
        Worldwide setup for sendmail utility
        ====================================

The current configuration of sendmail utility does not support
8 bit data.

Do you want to enable 8 bit data support? (y/n) [n]:
```

If you enter `y`, the `sendmail` daemon is reconfigured to send and receive 8-bit mail. However, this option violates the 7-bit SMTP mail transmission protocol used by `sendmail` over a TCP/IP network. You may enter `n` if you want strict conformance to the TCP/IP network protocol.

If you enabled the 8 bit data support of `sendmail`, you are asked if you want to restart the `sendmail` daemon; only then is your change in effect.

```
You have changed the sendmail configuration.
You should restart the sendmail utility by using the command

/sbin/init.d/sendmail restart

Do you want to restart the sendmail utility now? (y/n) [y]:
```

You can also use `/usr/sbin/wwsetup` command to disable the 8-bit data support of the `sendmail` daemon.

If you installed the IOSJPWNN405 software subset, the following message may be displayed:

```
        ======================
        Worldwide setup for wnn
        ======================
```

If you have never installed the Wnn software subset before, the following message is displayed:

```
You can create the following symbolic links:

    /usr/local/bin/Wnn4 -> /usr/i18n/bin/Wnn4
    /usr/local/lib/wnn  -> /usr/i18n/lib/wnn

Do you want to create these links? (y/n) [y]:
```

If you enter `y`, symbolic links are created under the `/usr/local` directory to link to the corresponding Wnn directories under `/usr/i18n`. These links may be necessary if some of your existing applications assume that the Wnn binaries are located under `/usr/local`.

The installation procedure for the IOSJPWNN405 software subset also asks you to enter the password for creating dictionaries as shown in the following example:

```
Please input the dictionary password.

Enter Password :
Verify:

Dictionary set up ..............
done.
```

The following message is displayed:

```
You should start the wnn jserver daemon using the command

        /sbin/init.d/jserver start

Do you want to start the wnn jserver daemon now? (y/n) [y]: y

Nihongo Multi Client Server (4.10)
Reading /usr/i18n/lib/wnn/ja_JP/dic/pubdic/kihon.dic     Fid = 1
Reading /usr/i18n/lib/wnn/ja_JP/dic/pubdic/setsuji.dic   Fid = 2
Reading /usr/i18n/lib/wnn/ja_JP/dic/pubdic/koyuu.dic     Fid = 3
Reading /usr/i18n/lib/wnn/ja_JP/dic/pubdic/chimei.dic    Fid = 4
Reading /usr/i18n/lib/wnn/ja_JP/dic/pubdic/jinmei.dic    Fid = 5
Reading /usr/i18n/lib/wnn/ja_JP/dic/pubdic/special.dic   Fid = 6
Reading /usr/i18n/lib/wnn/ja_JP/dic/pubdic/computer.dic  Fid = 7
Reading /usr/i18n/lib/wnn/ja_JP/dic/pubdic/symbol.dic    Fid = 8
Reading /usr/i18n/lib/wnn/ja_JP/dic/pubdic/tankan.dic    Fid = 9
Reading /usr/i18n/lib/wnn/ja_JP/dic/pubdic/bio.dic       Fid = 10
Reading /usr/i18n/lib/wnn/ja_JP/dic/pubdic/full.fzk      Fid = 11
Finished Reading Files
/sbin/init.d/jserver: jserver daemon started
done.
```

9.8 Backup Files Created by the Installation

During the installation of Digital UNIX worldwide support software subsets, some backup files are created to save the contents of the original files that are replaced by the installation procedure. Table 9–1 lists the files replaced by the installation procedure.

The backup files have either the extension `.IOS405_sav.*` where the asterisk (`*`) is an integer, or have the extension `.IOS405_sav` (without the integer).

Table 9–1: Backup Files Created by Worldwide Installations

Files Saved with Extension:	File Name

`<file>.IOS405_sav.*`	`/vmunix`
	`/usr/var/adm/sendmail/sendmail.cf`
	`/usr/var/adm/sendmail/sendmail.cf.pd`

`.<file>.IOS405_sav`	`/usr/bin/X11/dxkeycaps`
	`/usr/bin/X11/dxnotepad`
	`/usr/lib/cda/defstyle.ddiff`

Backup files with extension `IOS405_sav` are data or binary files that are not likely to be modified by the system manager. They are restored to the original files when Digital UNIX worldwide support software subsets are removed. **Do not** delete files with the extension `IOS405_sav`. If you delete these files, the corresponding data and binary files cannot be restored during the removal of worldwide support software.

Data files that might be modified by the system managers, depending on the system configuration, have the extension `.IOS405_sav.*` for their backup. You can delete files with the extension `.IOS405_sav.*` to save space. These files are not restored to the originals during removal. Instead, the removal procedure creates new `.IOS405_sav.*` files from files that are currently used.

9.9 Working in a Worldwide Environment

To enable input and display in any language other than English, you must always set the locale in which your processes run. You set the locale by defining the `LANG` or `LC_ALL` environment variables. To set the language for the common desktop environment (CDE) from the CDE login window, click on `Options` and then click on `Language`.

Refer to the `locale`(1), `i18n_intro`(5), `l10n_intro`(5), and to the reference pages for individual languages (such as `spanish`(5), `italian`(5),

japanese(5), hebrew(5) and so on) for more information about working in an internationalized environment.

10

Performing a Worldwide Update Installation

This chapter describes how to update a system running Digital UNIX Version 4.0 or 4.0A worldwide support software to the latest version of the worldwide software.

Refer to Chapter 2 for information about performing an update installation of the Digital UNIX base operating system.

10.1 What Is an Update Installation of Worldwide Support Software?

An update installation means you are updating a system that is running Digital UNIX Version 4.0 or 4.0A with worldwide support software to Digital UNIX Version 4.0B. An update installation preserves disk partitions, file systems, file customizations, your print and network configuration, user accounts, user files, and any other system setup you may have done on a system already running the Digital UNIX operating system.

An update installation of worldwide support does the following:

1. Checks the current system status and saves system files.
2. Deletes Digital UNIX Version 4.0 or 4.0A worldwide support subsets.
3. Invokes the base system update installation command, `/sbin/installupdate` to update the base system from Digital UNIX Version 4.0 or 4.0A to Digital UNIX Version 4.0B.
4. Installs worldwide support subsets and merges the saved system files.

10.2 Preparing for the Worldwide Update Installation

Before you begin a worldwide update installation, make sure you have the following:

- If you are performing the worldwide update installation from CD-ROM, make sure you have the CD-ROM labeled *Digital UNIX V4.0B Operating System Volume 1*. During the worldwide update installation, you will be prompted to insert this CD-ROM into the drive. Also make

sure you have the CD-ROM labeled *Digital UNIX V4.0B Associated Products Volume 1* because that CD-ROM contains the Version 4.0B worldwide support software subsets.

- If you are performing the worldwide update installation from a remote installation services (RIS) server or network file system (NFS) server, make sure you have the Digital UNIX Version 4.0B base operating system kit available on the RIS or NFS server.

10.3 System Files Affected in an Update Installation of Worldwide Support

System files that are saved by an update installation of worldwide support subsets have the extension `.IOSUPD_sav`. Some of these files are merged back to the new system files automatically by the update installation procedure. User intervention is not needed for these merges. However, some system files cannot be merged automatically and must be merged back into the system manually.

The following system files are saved and merged automatically:

- `/etc/utxd.conf`
- `/sys/conf/`*`SYSTEM_NAME`*
- `/var/i18n/sys/config.file`
- `/var/i18n/sys/stanza.loadable`

The following system files are saved, but must be merged manually:

- Application default files of X11/DECwindows applications

10.4 System Backup

Digital recommends that you back up your operating system before beginning an update installation of worldwide support. If there are any interruptions (including pressing `Ctrl/c`) after the update installation has started, it is unlikely that the update will complete successfully. Should this happen, restore the original version of the Digital UNIX base system and the worldwide support that was previously installed on your system before you attempt another update installation.

10.5 If You Encounter Problems During the Update Installation of the Base System

If you encounter problems during the update installation of the base system such as file type conflicts or the existence of certain layered

products that are not compatible with the new version of the operating system, the update installation of the base system is aborted. In this case, fix any file conflicts and then invoke the `installupdate` script manually again to continue the update install of the base system.

Do not reboot the machine or switch it to multiuser mode or delete files in `/tmp` and the `/usr/tmp` directories. This corrupts the system and the update installation cannot be continued.

10.6 Required Disk Space

Your system needs about 100 MB of free disk space to perform an update installation of worldwide support software. Warning messages are displayed if there is less than 100 MB of free disk space in the `/usr/i18n` directory. Use the `df` command to check your current disk usage. If the update installation fails due to insufficient disk space, your system is in an indeterminate state. You must restore the original versions of the Digital UNIX software to your system before attempting another update installation.

10.7 Running wwinstallupdate from CD-ROM Media

Read this section if you are using CD-ROM media to perform an update installation of the worldwide support subsets:

1. Make sure that you backed up your system and that your system has sufficient disk space to perform an update installation.
2. Boot to single-user mode or shut down your system as follows:

   ```
   # shutdown +30 Please log out
   ```

   In this example, +30 shuts down the system in thirty minutes and sends the message `Please log out` to all users. Refer to the `shutdown`(8) reference page for more information about the `shutdown` command.
3. Mount the local file systems:

   ```
   # /sbin/bcheckrc
   ```
4. If your CD-ROM drive requires you to put the CD-ROM in a caddy, ensure that the CD–ROM labeled *Digital UNIX V4.0B Associated Products Volume 1* is loaded in the caddy and drive as described in Appendix B. Insert the CD-ROM into the CD-ROM drive.
5. If you do not know the CD–ROM device name, use the `file` command specifying the raw device to find it. CD–ROM devices are prefixed with the letters `RRD`. Using the `|` (`pipe`) command to filter the output of

the `file` command to the `grep` command to search for `RRD` ensures that only your CD-ROM devices are output in the result of the command. Enter a command similar to the following:

```
# file /dev/rrz*c | grep RRD
/dev/rrz4c: character special (8/4098) SCSI #0 RRD44 disk #32 \
(SCSI ID #4)
```

In the previous example, the CD–ROM device is `RRD44` on device `/dev/rz4c`. The backslashes in the previous example indicate line continuations and are not in the actual display. If you have more than one `RRD` device connected to your system, specify the device where the CD-ROM will be mounted. 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.

6. Mount the CD-ROM device. For example, if your CD-ROM device is device number 4 and you are mounting the CD-ROM on `/mnt`, enter a command similar to the following:

   ```
   # mkdir /mnt
   # mount -rd /dev/rz4c /mnt
   ```

7. Invoke the `wwinstallupdate` script to perform an update installation of worldwide support software:

   ```
   # /mnt/ALPHA/WORLDWIDE/wwinstallupdate /mnt
   ```

8. Insert the CD-ROM labeled *Digital UNIX V4.0B Operating System Volume 1* into your CD-ROM drive as instructed by the following prompt:

   ```
   Please insert the CD-ROM labeled Digital UNIX
   Operating System Volume 1 into the CD-ROM drive.
   Press <Return> to continue....
   ```

   If you do not have the CD-ROM, just press the Return key to continue and you will be prompted to enter a RIS or NFS server name as shown in the last step in Section 10.8.

Go to Section 10.9 to continue the worldwide update installation.

10.8 Running wwinstallupdate from an NFS Server System

Read this section if you are using NFS mounted media to perform an update installation of the worldwide support subsets.

The following steps assume that there is a CD-ROM mounted on an NFS server system `nfs_server` with mount point `/oskits`. The `/oskits` entry

is added to the /etc/exports file of the NFS server system for other client systems to mount it for normal or update installations.

1. Ensure that you backed up your system and that your system has sufficient disk space for an update installation.
2. Ensure that the network is configured and that your system can communicate with the NFS server. Use the following command to test the network connection to the server:

   # **ping -c2** *nfs_server*

   Substitute *nfs_server* with the host name of your NFS server system.
3. Boot to single-user mode or shut down your system as shown in the following:

   # **shutdown +30 preparing to update the system**

   In this example, +30 shuts down the system in 30 minutes and sends the message preparing to update the system to all users. Refer to the shutdown(8) reference page for more information about the shutdown command.
4. Mount the local file systems:

   # **/sbin/bcheckrc**
5. Start the network and NFS services:

   ```
   # /sbin/init.d/inet start
   # /sbin/init.d/route start
   # /sbin/init.d/gateway start
   # /sbin/init.d/nis start
   # /sbin/init.d/named start
   # /sbin/init.d/nfs start
   ```
6. Mount the NFS server's mount point:

   # **mount nfs_server:/oskit /mnt**
7. Enter the following command to invoke the wwinstallupdate script:

   # **/mnt/ALPHA/WORLDWIDE/wwinstallupdate /mnt**
8. At the following prompt, enter the mount point of the Digital UNIX Version 4.0B base operating system kit or the RIS server name:

   ```
   Please input local or remote mount point, device name or
   RIS server name for the base kit of Digital UNIX
   Operating System or press <return> to retry :
   ```

   If you enter a RIS server name in response to the previous prompt, the RIS server name must be appended with a colon (:).

Go to Section 10.9 to continue the worldwide update installation.

10.9 What Happens During the Worldwide Update Installation

After you invoke the `wwinstallupdate` program, a screen similar to the following is displayed:

```
Update installation of Worldwide Language Support from
Version 4,0 or later of Digital UNIX

Digital Equipment Corporation recommends that you perform complete
system software backups before proceeding.

Messages of Update Installation of Worldwide Language Support are
recorded in /var/adm/smlogs/wwupdate.log and /var/adm/smlogs/it.log

------------------------------------------------------------------------

Make sure that you have the base kit of Digital UNIX Operating
System which is either in
- CD-ROM labeled Digital UNIX Operating System Volume 1, or
- Network file system (NFS) server, or
- Remote installation service (RIS) server

------------------------------------------------------------------------

Press <RETURN> to review message again.
Do you want to continue the update installation? (y/n) []:
```

- If you enter `n`, the worldwide update installation procedure stops, and your system is in single-user mode at the `root` system prompt (#).
- If you enter `y`, system files are saved and worldwide support subsets are deleted. Then, the update installation procedure of the base operating system begins. Software subset configuration and the kernel build begin after all base operating system software subsets are updated. Refer to Chapter 2 for more information about the base operating system update installation.

If you invoked the worldwide update installation from CD-ROM, when the update installation of the base system is complete, the following message appears to prompt you to insert the CD-ROM of the worldwide kit into the CD-ROM drive:

```
Please insert the CD-ROM labeled Digital UNIX Associated
Products Volume 1 into the CD-ROM drive.
Press <Return> to continue.
```

If the base operating system kit for Digital UNIX Version 4.0B is in a network file system (NFS) server or remote installation service (RIS) server, the following message displays:

```
Base kit not found or read error.
Please input local or remote mount point, device name or
RIS server name for the base kit of Digital UNIX Operating
System or press <return> to retry :
```

Enter the mount point of the base kit or the name of the RIS server appended with a colon (`:`).

Messages from the update installation for worldwide support are recorded in the files `/var/adm/smlogs/wwupdate.log` and `/var/adm/smlogs/it.log`.

10.10 Installing Worldwide Subsets and Building the Asian Kernel

The last step in the update installation process is the kernel build. After the kernel build, the worldwide support subsets are installed. Finally, the Asian kernel is built, if necessary, and the system reboots.

A

Preinstallation Tasks for Systems Running LSM, LVM, Prestoserve, and AdvFS

Perform the preinstallation tasks described in this appendix if you are planning a full installation to Digital UNIX Version 4.0B and your system is using one or more of the following software products:

- Logical Storage Manager (LSM)
- Logical Volume Manager (LVM)
- Prestoserve
- Advanced File System (AdvFS)

A.1 Preparing for a Full Installation if Using LSM

Read this section only if your system is installed with and using the Logical Storage Manager (LSM) and you are performing a full installation.

The following steps should be performed to preserve the LSM configuration currently in use on a system. Steps 2 and 4 are not necessary when performing an update installation because the update preserves the LSM `volboot` file in the `root` file system.

1. Check the `/etc/vol/volboot` file to ensure that it contains valid LSM disks. Enter the following command to list the current disks in `/etc/vol/volboot`:

   ```
   # voldctl list
   ```

2. Create a backup copy of the `/etc/vol/volboot` file. The backup copy of `/etc/vol/volboot` must be restored after the installation is complete. 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/lsm
   # cp /etc/vol/volboot /backup/lsm/volboot
   ```

3. If the root file system and primary swap device were encapsulated to use LSM volumes rootvol and swapvol respectively, the volumes rootvol and swapvol should be removed before a full installation. If the /usr and /var file systems were encapsulated to LSM volumes, they also should be removed from the LSM configuration before a full installation. Unencapsulating volumes used for root, swap, /usr and /var is not necessary for update installations.

   Consider the following LSM configuration with mirrored rootvol and swapvol. The /usr file system is also encapsulated to use the LSM volume volrz10g:

```
v  rootvol    root       ENABLED  ACTIVE  131072  ROUND   -
pl rootvol-01 rootvol    ENABLED  ACTIVE  131072  CONCAT  -         RW
sd rz10-01    rootvol-01 0        131056  16      rz10       rz10
sd rz10-02    rootvol-01 16       0       131056  rz10       rz10
pl rootvol-02 rootvol    ENABLED  ACTIVE  131072  CONCAT  -         RW
sd rz14-01    rootvol-02 0        131056  16      rz14       rz14
sd rz14-02    rootvol-02 16       0       131056  rz14       rz14

v  swapvol    swap       ENABLED  ACTIVE  400880  ROUND
pl swapvol-01 swapvol    ENABLED  ACTIVE  400880  CONCAT  -         RW
sd rz10b-01   swapvol-01 0        0       400880  rz10b      rz10b
pl swapvol-02 swapvol    ENABLED  ACTIVE  400880  CONCAT  -         RW
sd rz14b-01   swapvol-02 0        0       400880  rz14b      rz14b

v  volusr    fsgen       ENABLED  ACTIVE   1787904  SELECT   -
pl volusr-01 volusr      ENABLED  ACTIVE   1787904  CONCAT -      RW
sd advfs_rz10g-01 volrz10g-01  0     0     1787904 advfs_rz10g rz10g
pl volusr-02 volusr     ENABLED  ACTIVE    1787904  CONCAT -      RW
sd advfs_rz14g-01 volrz10g-02  0     0     1787904 advfs_rz14g  rz14g
```

   Perform the following steps to remove the use of the LSM volumes for root, swap, and /usr:

   a. Disassociate the second plex in rootvol and swapvol and remove them from the LSM configuration. In this example, the full installation will later be done on rz10:

```
# volplex dis rootvol-02
# volplex dis swapvol-02
# voledit -rf rm rootvol-02 swapvol-02
# voldg rmdisk rz14 rz14b
# voldisk rm rz14 rz14b
```

   b. Execute the /usr/sbin/volunroot command to unencapsulate rootvol and swapvol. This requires a system reboot for the changes to take effect:

```
# /usr/sbin/volunroot
```

      Reboot the system at the next available opportunity.

   c. To remove the volumes used for /usr and /var, shut down the system to single-user mode and ensure that the /usr and /var file systems are unmounted. In the previous example, volume

volrz10g was used for the /usr file system in the AdvFS domain usr_domain.

Remove the LSM volume volusr from the LSM configuration:

```
# voledit -rf rm volusr
# voldg rmdisk advfs_rz10g advfs_rz14g
# voldisk rm rz10g rz14g
```

Change the /etc/fdmns/usr_domain directory to use /dev/rz10g instead of the LSM volume:

```
# cd /etc/fdmns/usr_domain
# rm volusr
# ln -s /dev/rz10g rz10g
```

If UNIX file systems (UFS) were used instead of Advanced File Systems (AdvFS), the /etc/fstab file should be modified to use /dev/rz10g for the /usr file system.

Similar steps for the /var file system are required if LSM volumes were used.

4. Save the current LSM configuration information for added safety. Create a backup copy of the current LSM configuration. 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:

   a. Save information regarding the disks currently being used with LSM:

   ```
   # voldisk list > /backup/lsm/voldisk.out
   ```

   b. Save the LSM diskgroup configuration. For example, enter the following command for each LSM diskgroup in the configuration. The backslashes (\) in the following two command lines indicate line continuation and should not be included in the actual command line:

   ```
   # volprint -g rootdg -mvps >  \
     /backup/lsm/volprint.rootdg.out

   # volprint -g diskgroup -mvps >  \
     /backup/lsm/volprint.diskgroup.out
   ```

   The backup files created in the previous steps should also be copied to a backup media (i.e., tape) before the installation is started for added safety. These configuration files do not need to be restored under normal circumstances; restoring the

/etc/vol/volboot file from backup has sufficient information for the LSM configuration.

5. Perform the installation process as documented in this guide.
6. After the full installation is complete, restore the backed up copies of the LSM volboot file before starting LSM. For example, while in multiuser mode, enter commands similar to the following:

```
# cp /backup/lsm/volboot /etc/vol/volboot
# volinstall
# rm -f /etc/vol/reconfig.d/state.d/install-db
# vol-startup
```

After the full installation, the /usr and /var file systems reside on disk partitions. Separate steps are required to encapsulate the disk partitions to LSM volumes. Before the current /usr and /var file systems can be encapsulated to LSM volumes, a cleanup of the LSM configuration that existed before the full installation has to be done. If either the /usr or /var file systems resided on LSM volumes before the full installation, you will have to clean up these LSM volumes because the LSM volumes will no longer be in use.

Refer to *Logical Storage Manager* for more information about LSM.

A.2 Preparing for a Full Installation if Using LVM

Read this section only if your system is installed with and using the Logical Volume Manager (LVM) and you are performing a full installation.

Note

As announced in a previous release, LVM has been retired beginning with Digital UNIX Version 4.0. LVM is being replaced with the Logical Storage Manager (LSM).

The following steps should be performed to preserve the LVM configuration currently in use on a system:

1. Create a backup copy of the LVM configuration. 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/lvm
# cp /etc/lvmtab /backup/lvm/lvmtab
```

2. Save the special device files associated with LVM volumes by creating a tar file of the special device files. For each LVM volume group on the system, create a tar file of all the special device files in /dev/*volume_group*. In the following example, vg1, vg2, and vg3 are the volume groups:

```
# tar cf /backup/lvm/lvm.devfiles.tar /dev/vg1 /dev/vg2 /dev/vg3
```

3. Save the current LVM configuration for added safety as shown in the following steps:

   a. For each LVM volume group in the configuration, enter the following command to back up the volume group information. In this example, vg1 is the volume group:

      # **vgdisplay -v /dev/vg1 > /backup/lvm/vg1.out**

   b. For each logical volume in a volume group, execute the following command to back up the configuration information. In this example, lvoll is the logical volume and vg1 is the volume group:

      # **lvdisplay -v /dev/vg1/lvol1 > /backup/lvm/vg1.lvol1.out**

   c. For each physical volume in a volume group, execute the following command to back up the configuration information for each physical volume in the volume group. In this example, /dev/rz8c is the physical volume:

      # **pvdisplay -v /dev/rz8c > /backup/lvm/vg1.rz8c.out**

4. Perform the full installation of Digital UNIX as described in this guide.

5. After the full installation is complete, restore the copy of /etc/lvmtab from the backup media as shown in this example:

   # **cp /backup/lvm/lvmtab /etc/lvmtab**

   Then, recreate the LVM special device files from the tar file stored in the /backup directory:

```
# tar xf /backup/lvm/lvm.devfiles.tar
```

Restoring the /etc/lvmtab file has sufficient information for a complete LVM configuration. The LVM configuration files that were backed up in Step 3 were backed for added safety and do not have to be restored.

Refer to *Logical Storage Manager* for information about encapsulating existing LVM volumes to LSM volumes.

A.3 Preparing for a Full Installation if Using Prestoserve

Read this section only if your system is using Prestoserve and you are performing a full installation.

You must save your current Prestoserve configuration before beginning a full installation because the root file system is overwritten during a full installation. To save and restore the Prestoserve configuration, follow these steps:

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 Digital UNIX as described in this guide.
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.

A.4 Preparing for a Full Installation if Using AdvFS

If your system is configured with AdvFS, a full installation overwrites the /etc/fdmns directory resulting in the loss of critical configuration data. If the file system layout of all of your AdvFS file systems will remain the same after the full installation, then save a copy of the /etc/fdmns directory and all files under the directory before beginning the installation. After the installation is complete, restore the directory. If you plan to change your file system layout during the full installation process (for example, /usr is currently on rz0g and you plan to change /usr to rz1g during the installation process), then you will need to selectively copy files before beginning the installation. After the installation is complete, selectively restore the files.

B

Compact Disc Overview

The Digital UNIX software is distributed on three read-only compact discs (CD-ROM):

- The first CD-ROM is labeled *Digital UNIX V4.0B Operating System Volume 1* and contains the operating system software subsets. The software subsets contained on this CD–ROM are documented in Appendix D.
- The second CD–ROM is labeled *Digital UNIX V4.0B Associated Products Volume 1* and contains the additional software that is shipped with the operating system software. The software subsets contained on this CD-ROM are documented in Appendix E.
- The third CD-ROM is labeled *Digital UNIX V4.0B Documentation Volume 1* and contains the Digital UNIX documentation set in HTML format for viewing with the Netscape Navigator World Wide Web browsing program. Section 6.6 describes how to invoke Netscape.

This appendix describes how to perform the following tasks:

- Load a CD-ROM in a caddy
- Insert and remove a CD-ROM
- Mount and unmount a CD-ROM

Before you insert a CD–ROM in its drive, make sure you know how to operate the disc drive. The *Optical Disc Drive Owner's Manual* contains instructions for using the disc drive.

B.1 Loading a CD-ROM in a Caddy

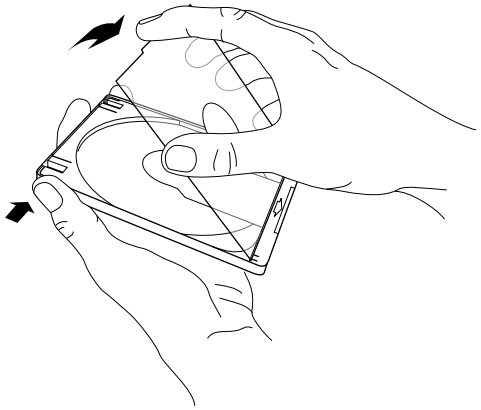
A Digital UNIX CD-ROM must be placed in a caddy before it can be inserted in an RRD42 or RRD44 disc drive. Caddies are not required for RRD43 or RRD45 disc drives. Follow these steps to load a CD-ROM in a caddy:

1. If a protective cellophane wrapper is on the caddy, remove the wrapper 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 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:

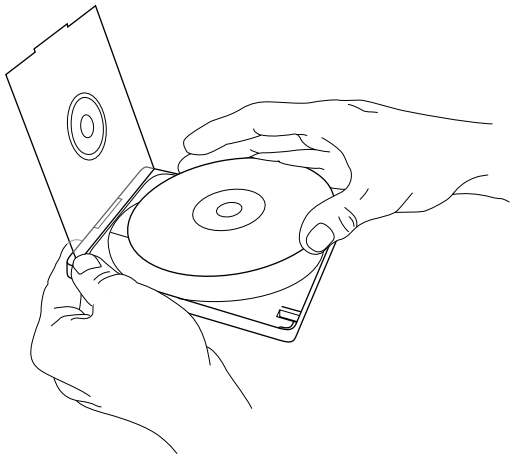
Figure B–1: Pressing Tabs and Lifting Lid of a CD-ROM Caddy



ZS-0443-MH

Figure B–2 shows how to place the disc in the caddy:

Figure B–2: Placing a Disc in a CD-ROM Caddy



ZS-0444-MH

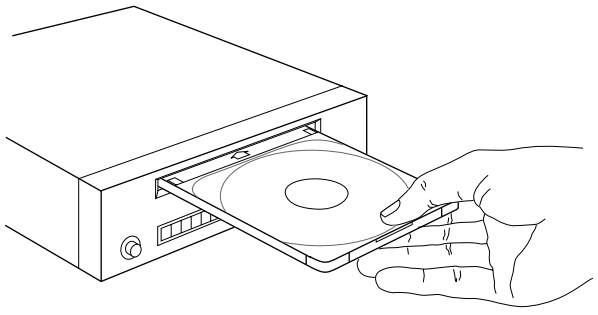
B.2 Inserting and Removing a CD-ROM

After placing the CD-ROM in a caddy, follow these steps to insert the disc caddy in to 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. If you do not know the CD–ROM device name, use the `file` command specifying the raw device to find it. CD–ROM devices are prefixed with the letters `RRD`. Using the `| (pipe)` command to filter the output of the `file` command to the `grep` command to search for `RRD` ensures that only your CD-ROM devices are output in the result of the command. Enter a command similar to the following:

```
# file /dev/rrz*c | grep RRD
/dev/rrz4c: character special (8/4098) SCSI #0 RRD44 disk #32 \
(SCSI ID #4)
```

   In the previous example, the CD–ROM device is `RRD44` on device `/dev/rz4c`. The backslash in the previous example indicates line continuation and is not in the actual display. If you have more than

one RRD device connected to your system, specify the device where the CD-ROM will be mounted.

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.

3. Make a directory that will be the mount point for the CD-ROM, using the mkdir command. 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 -r /dev/rz*unit_number*c */mount-point*

   For example, to mount the CD-ROM in drive /dev/rz4c on the directory /cdrom, enter the following commands:

   ```
   # mkdir /cdrom
   # mount -r /dev/rz4c /cdrom
   ```

4. To ensure that the CD-ROM is remounted in the event that your system crashes or is rebooted, you can use the text editor of your choice and open the /etc/fstab file. Add a line similar to the following:

   ```
   /dev/rz4c       /cdrom   ufs   ro   0  0
   ```

   When you have ensured that your edits are correct, write and quit the file. The system will now mount the CD-ROM on the /cdrom mount point on every reboot.

B.4 Unmounting a CD-ROM

You must unmount a CD-ROM 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 one directory above the mount point of the CD-ROM. Use a command similar to the following to unmount a CD–ROM:

```
# umount /dev/rz4c
```

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 not one directory above 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

Installation Enhancements

This appendix describes enhancements to the Digital UNIX Version 4.0B full (default or custom) installation process and to the installation cloning process. Table C–1 summarizes the installation enhancements in this release.

Table C–1: Summary of Digital UNIX Version 4.0B Installation Enhancements

Enhancement	Applies To:
The installation process searches for and invokes user-supplied files to enable customizations on the system to be installed. The files can be on diskette, a RIS server, the `/var/tmp` directory on your system, or on CD-ROM.	Full Installations and Installation Cloning
Administrators can modify the configuration description file (CDF) to achieve an unattended installation cloning process	Installation Cloning

The following information is included in this appendix:

- Overview of the installation cloning process and support of user-supplied files
- Role of the administrator
- Theory of operation for invoking user-supplied files and CDFs
- Description of the CDF
- Relationship between the user-supplied files and the CDF
- Acceptable differences between the CDF and the systems to be cloned
- Modifying the CDF to achieve unattended installation cloning of client systems
- Creating files for execution during a Digital UNIX full installation or installation cloning
- Moving the CDF and files to the appropriate distribution media (diskette, RIS server, or CD–ROM)

C.1 Installation Cloning Overview

Installation cloning allows an administrator to replicate the installation configuration from a model system that is already installed with Digital UNIX Version 4.0B onto one or more systems with the same or similar hardware configurations.

When a system is installed with Digital UNIX Version 4.0B, a configuration description file (CDF) is generated that contains the results of the questions answered during the installation. This file is located on the installed system in the `/var/adm/smlogs` directory under the file name `install.cdf`. The CDF contains all the configuration information required to perform an initial system installation on a client system.

C.1.1 Prerequisites for Installation Cloning

The only prerequisite for installation cloning is that the system to be installed by the installation cloning process has the same disk configuration as the system where the CDF was generated. This means that the disks used for the `/` (`root`), `usr`, and `var` file systems and `swap` areas on both systems must have the same disk type and the same device name.

It is possible, however, to support slight differences in configuration. Section C.7.1 describes these acceptable differences.

C.1.2 Benefits of Installation Cloning

The benefits to using installation cloning to mass-install systems are:

- Installation cloning produces identical installations.
- The administrator can set up the installation cloning process to run with very little user intervention.
- Installation cloning is ideal for environments in which there are many of the same or similar systems that need to be installed with Digital UNIX because it eliminates the need to perform duplicate installations on all systems.
- Once a suitable CDF has been located and optionally modified, the administrator has minimal involvement in the installation cloning process at the client systems.

C.1.3 Installation Cloning Features

The files necessary for the installation cloning process can be placed on a diskette, the `/var/adm/ris/clients/sets/`*`profile_set`* directory on a RIS server or in the `/isl` directory on a CD–ROM or extracted RIS area. A

CD–ROM is a read-only device and data cannot be written to it. However, if you have a special license agreement to copy and repackage the Digital UNIX Version 4.0B operating system, files can be written to the `/isl` directory of the image, which will be written to the CD–ROM. Refer to Section C.11.4 for more information about burning (writing to) CD–ROMs.

In Digital UNIX Version 4.0, installation cloning could be done only from a network connection to a remote installation services (RIS) server and required user intervention. In Digital UNIX Version 4.0B, however, installation cloning can be done from either a network connection or CD-ROM. In addition, installation cloning can be set up so that it automatically bypasses the following actions that previously required user intervention:

- Confirming use of the CDF to start an installation cloning
- Building a tailored kernel automatically

C.2 Overview of Support for User-Supplied Files

The Digital UNIX full installation and installation cloning processes have been enhanced to invoke user-supplied files that contain scripts, programs, or executables to perform user-defined customizations. This ability provides administrators with the opportunity to customize the installation procedure. The files can be provided on diskette, a RIS server, or in the `/isl` directory of the distribution media (either CD–ROM or an extracted RIS area). Refer to Section C.11.2.1 for things to consider when moving files to an extracted RIS area.

The first invocation of user-supplied files occurs before the actual installation process begins, that is, before any file systems are created and software is installed. At that point, for example, an administrator may want to write a new disk label onto a specific disk to customize disk partitions. This file must be named `preinstall`.

The second invocation is allowed after software is installed. At that point, for example, an administrator may want to install a customized software application after the installation of the Digital UNIX base software subsets. This file must be named `postload`.

Refer to Section C.9 and Section C.10 for more information about creating `preinstall` and `postload` files for execution during a full installation or installation cloning process.

C.3 Relationship Between CDFs and User-Supplied Files

CDFs are used only for an installation cloning process. User-supplied files are invoked and executed during both types of full installations (default and custom) and the installation cloning processes.

CDFs and user-supplied files can be used independently or in any combination. The CDFs and user-supplied files can be located on different sources. For example, the `install.cdf` file may be on a diskette, the `preinstall` file might come from the RIS server, and the `postload` file might come from the `/isl` directory of the distribution media.

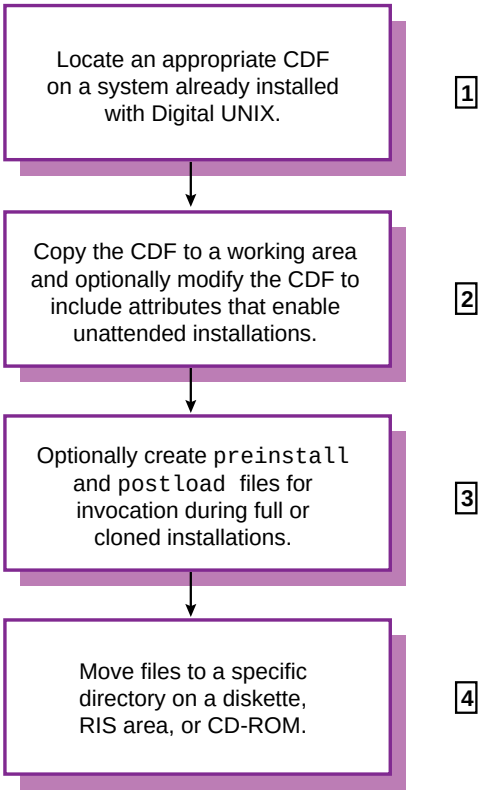
The installation process searches for the `install.cdf`, `preinstall`, and `postload` files in the following order of priority:

1. The `/` (`root`) directory of diskette drive `fd0` or `fd1`. If a diskette is used, it requires a standard UNIX File System (UFS).
2. The `/var/adm/ris/clients/sets/`*`profile_set`* directory on a RIS server where *`profile_set`* is a user-created directory name
3. The `/var/tmp` directory on the system to be installed. Keep in mind that CDFs or user-supplied files cannot be delivered in the `/var/tmp` directory. They can, however, be copied into this directory by executing the `preinstall` file, which has been previously customized to manipulate a CDF or other user-supplied file.
4. In the `/isl` directory of the distribution media (for CD–ROM or RIS installations) or the `/isl` directory of an extracted RIS area (for RIS installations only).

C.4 Role of the Administrator

To set up a system for installation cloning, an administrator performs the tasks described in Figure C–1. To execute user-supplied files during a full installation, the administrator performs Tasks 3 and 4 only. The numbered list after the task summary describes the tasks in more detail and provides pointers to more information.

Figure C–1: Summary of Administrator Tasks



1 An administrator locates a CDF that is suitable to use for installation cloning. On systems that are installed with Digital UNIX Version 4.0B, the CDF is located in the `/var/adm/smlogs` directory as the file named `install.cdf`. There is one CDF generated per system installation. Refer to Section C.6 for a description of the contents of the CDF. Refer to Section C.7 for information about what makes a CDF suitable for installation cloning and for information about acceptable differences between the CDF and the systems to be cloned.

2 The administrator copies and moves the CDF to a working area where it can be optionally modified for installation cloning. The administrator should make a copy of the `/var/adm/smlogs/install.cdf` file and move and modify the copy. The original CDF should be retained in the `/var/adm/smlogs` directory because it contains information about the initial system installation that could be valuable for future troubleshooting. The administrator has the option to modify the CDF so that the installation bypasses all user responses usually required during a Digital UNIX installation cloning process. Refer to

Section C.8 for information about the attributes in the CDF that can be modified to attain unattended installation cloning.

3 The administrator optionally creates scripts or programs to be executed at two predefined points in the full installation and installation cloning processes. The actions performed by these user-supplied files are determined by the administrator. Refer to Section C.9 and Section C.10 for more information about creating `preinstall` and `postload` files for execution during an installation.

4 The administrator moves the modified CDF and any user-supplied files to the `/` (`root`) directory on a diskette, to the `/var/adm/ris/clients/sets/`*`profile_set`* directory on a RIS server, or to the `/isl` directory on a CD–ROM if the Digital UNIX distribution media is being repackaged. The files can also be copied to the `/isl` directory within an extracted RIS area. Refer to Section C.11 for information about copying the CDF to the appropriate place and the guidelines surrounding each type of distribution media.

C.5 Theory of Operation

This section contains a synopsis of how the installation process uses the user-supplied files and CDFs during full and cloned installations. Detailed information is provided in subsequent sections. The work flow shown in Figure C–2 assumes that the administrator has completed the tasks shown in Section C.4.

Figure C–2: Theory of Operation

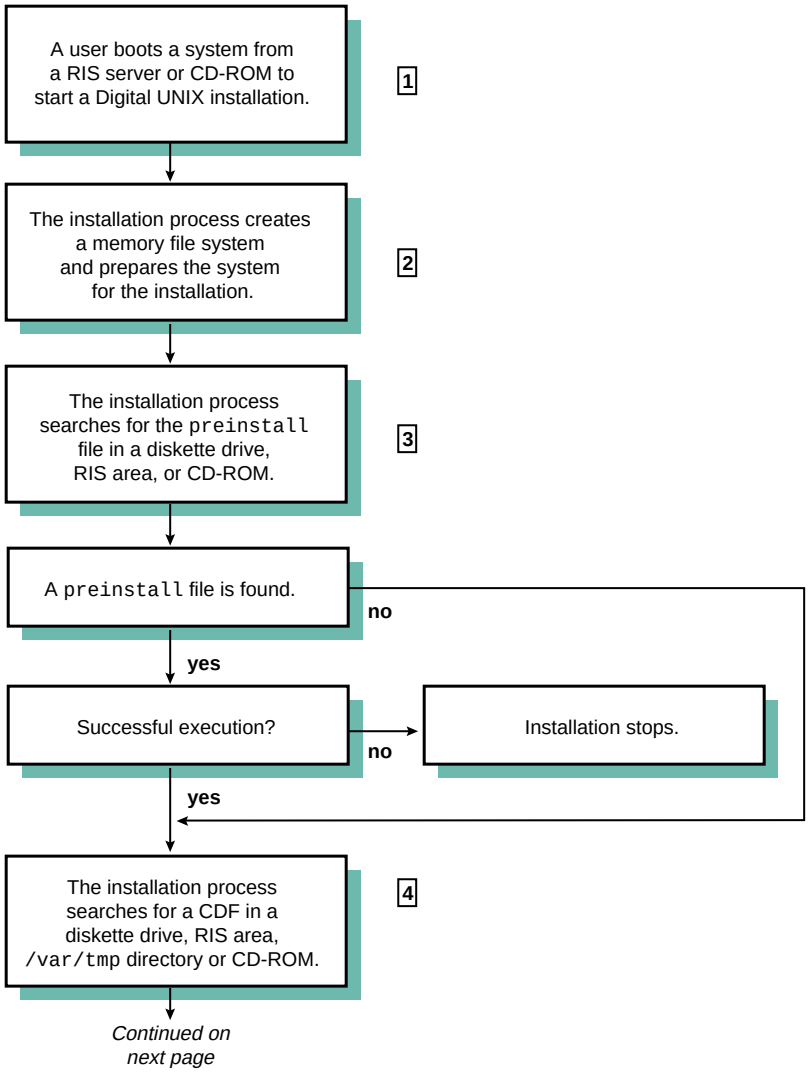


Figure C–3: Theory of Operation (cont'd)

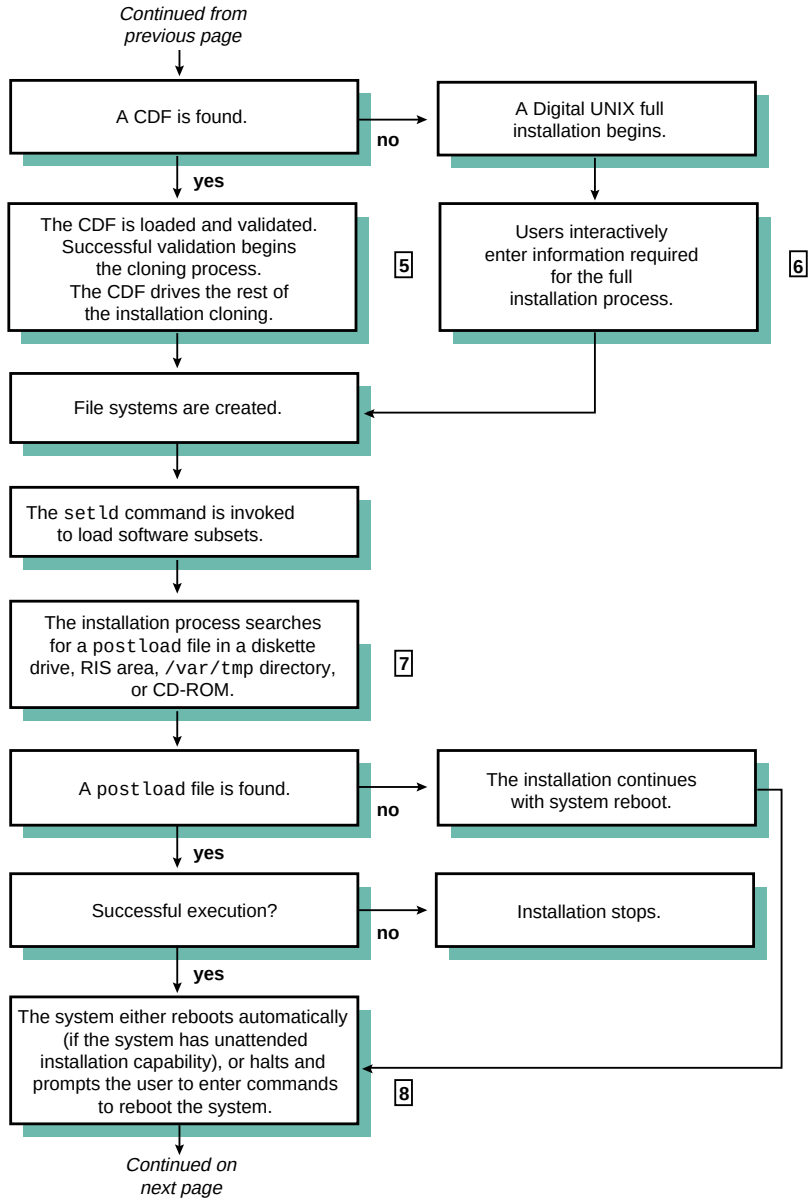
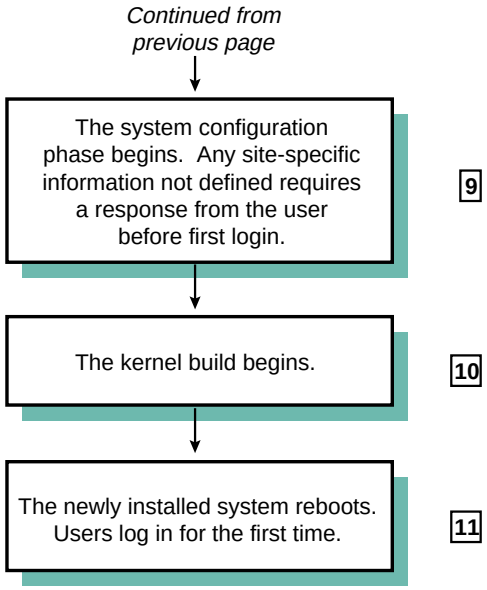


Figure C–4: Theory of Operation (cont'd)



1 To start an installation process, users boot the system from the Digital UNIX Version 4.0B CD–ROM or over a network connection to a RIS server.

2 The Memory File System (MFS) provides writable space required by the installation process.

3 The installation process searches for a file named `preinstall`, which is a user-supplied script, program, or executable containing specific actions to be carried out before the installation process begins. If this file is found, it is executed. If execution is successful, the installation process begins. If execution is not successful, the installation process stops. If a `preinstall` file is not found, the installation process begins the search for a CDF. Refer to Section C.9 for more information about creating a `preinstall` file.

4 The installation process searches for a CDF that, if found, drives the rest of the installation and begins an installation cloning process. This file, named `install.cdf`, is searched for in the same order as the `preinstall` file. If an `install.cdf` file is not found, a Digital UNIX full installation process continues. Section C.6 provides more information about the CDF.

5 The installation process validates the CDF before beginning an installation cloning process. Validation includes ensuring that the disk name and disk type specified in the CDF exists on the system to be cloned. A CDF validation failure causes the process to stop. For RIS

installations, validation includes comparing the versions of the software subsets included in the CDF with the software subset versions that are installed in the RIS environment. Diagnostic messages display the reason for validation failures. Upon successful CDF validation, an installation cloning process continues.

6 The user responses required during a full installation depend upon the type of full installation being performed (default or custom) and the user interface being used (text-based or graphical). Chapter 5 describes the responses required during a full installation process.

7 Upon completion of the software subset load phase, the installation process searches for a file named `postload`, which is a user-supplied script, program, or executable containing specific actions to be carried out after software subsets are loaded. If this file is found, it is executed. If execution fails, the installation process stops. Refer to Section C.10 for information about creating a `postload` file.

8 If your system has unattended installation capability, the system automatically reboots after the software subsets are loaded. If your system does not have unattended installation capability, the installation process halts and prompts you to enter commands to reboot the system from the newly installed disks. The screen displays the boot commands that must be entered to reboot the system.

9 The configuration phase begins automatically after the system reboots. Configuration refers to the process of tailoring the software subsets; setting the host name, `root` password, date, time, geographic location, and time zone; system tuning; and building a kernel. For installation cloning processes, refer to Section C.8.4 about setting these site-specific attributes in the CDF. If values are not defined for these attributes or if the user did not enter a response during the full installation, the installation process becomes interactive to request it.

10 For installation cloning, the type of kernel build is defined in the CDF by the `kernel_options=` attribute. Refer to Section C.8.3 for the options that are available.

For full installations, the type of kernel build depends on whether a default or custom installation was performed. Default installations have noninteractive kernel builds that select mandatory kernel options. Custom installations have interactive kernel builds to give users the opportunity to choose the options to build into the kernel.

11 Refer to Table C–5 for information about setting site-specific information if it was not defined in the CDF nor entered during a full installation. If any of these attributes is null, the installation process becomes interactive to request a response from the user.

C.6 Description of the Configuration Description File

When Digital UNIX Version 4.0B is installed on a system, the installation process creates a configuration description file (CDF). As described previously, the information stored in the CDF can be used to mass-install machines with the same or similar hardware configurations.

The CDF contains the following information about an installation:

- File systems that were created: `/` (`root`), `/usr`, and `var`
- Swap space that was created
- Disk types and disk names where file systems reside
- File system layout (the specific partitions where file systems reside)
- File system types (UNIX File System or Advanced File System)
- System-specific information such as host name and `root` password and site-specific information such as geographic location, time zone, and date and time
- Type of distribution media (CD–ROM or RIS) from which the installation took place
- Software subsets that were installed

The CDF, `install.cdf`, is located on a newly installed system in the `/var/adm/smlogs` directory.

NOTE

CDFs used in previous versions of the operating system may not be compatible with Digital UNIX Version 4.0B.

The CDF is in stanza file format, and is logically organized as groupings of **attribute-value** pairs. Each attribute-value pair is separated with an equal sign (=). Each logical grouping of attribute-value pairs is defined as an **item**. Refer to the `stanza`(4) reference page for more information about stanza file format.

Four items are defined in the installation CDF:

- `Inst_islinfo` contains initial system load information that conveys the state of the system before the start of the installation process
- `Inst_filesystem` contains file system information such as the number and type of file systems that were created on the installed system. There is one `Inst_filesystem` item for every file system and swap area that was created. At a minimum, there are four

`Inst_filesystem` items in the CDF to describe the `/` (`root`), `/usr`, and `/var` file systems and the swap device.

- `Inst_subsets` contains a list of the installed Digital UNIX base software subsets
- `Inst_cinstall` conveys client system configuration information to the installation process. All of the attributes specified in the `Inst_cinstall` item are optional. If values are not provided for these attributes, the installation process becomes interactive to request this information during the installation configuration phase.

C.6.1 Sample Configuration Description File

In the sample CDF shown in Example C–1, attributes marked with an asterisk (*) must be manually included into the CDF when it is retrieved from an installed system because the installation interfaces do not currently provide the ability to set these values. Section C.8 defines these attributes and shows you how to include them in the CDF.

Section C.6.2 provides definitions of all attribute-value pairs in the CDF.

Example C–1: Sample Configuration Description File (CDF)

```
install:
      _item=Inst_islinfo
      prompt=no   *
      media_type=REMOTE
      server_timezone=Eastern
      timeset=1
      server_locality=US
      server=daria
      risdir=/
      _action=create
      srcloc=daria:
      client=kramer

install:
      _item=Inst_filesystem
      maj_min_num=8388608
      disk_number=0
      disk_name=rz0
      controller_type=SCSI
      name=root
      partition=a
      controller_number=0
      disk_type=RZ26L
      _action=create
      file_system_type=UFS

install:
      _item=Inst_filesystem
      maj_min_num=8388608
      disk_number=0
      disk_name=rz0
      controller_type=SCSI
```

Example C–1: Sample Configuration Description File (CDF) (cont.)

```
      name=usr
      partition=g
      controller_number=0
      disk_type=RZ26L
      _action=create
      file_system_type=UFS

install:
      _item=Inst_filesystem
      maj_min_num=8388608
      disk_number=0
      disk_name="in /usr"
      controller_type=SCSI
      name=var
      partition=g
      controller_number=0
      disk_type=RZ26L
      _action=create
      file_system_type=UFS

install:
      _item=Inst_filesystem
      maj_min_num=8388608
      disk_number=0
      disk_name=rz0
      controller_type=SCSI
      name=swap1
      partition=b
      controller_number=0
      disk_type=RZ26L
      _action=create
      file_system_type=swap

install:
      _item=Inst_subsets
      names=OSFBASE410,OSFBIN410,OSFBINCOM410,OSFCDEDT410,OSFCDEMAIL410,
OSF CDEMIN410,OSFCLINET410,OSFCMPLRS410,OSFDPSFONT410,OSFFONT15410,OSFHWB
ASE410,OSFHWBIN410,OSFHWBINCOM410,OSFKBDLK401410,OSFMITFONT410,OSFNETCON
F410,OSFNETSCAPE410,OSFNFS410,OSFNFSCONF410,OSFOLDX11410,OSFPRINT410,OSF
SER410,OSFSERTC410,OSFSYSMAN410,OSFTCLBASE410,OSFTKBASE410,OSFX11410,OSF
XADMIN410,OSFXPRINT410,OSFXSYSMAN410
      _action=create
      advflag=1

install:
      _item=Inst_cinstall
      kernel_option=all   *
      password=C36V.nMSW0j/o
      timeset=yes
      timezone=Eastern
      locality=US
      _action=create
      hostname=kramer
```

C.6.2 Attribute-Value Pair Definitions

This section provides definitions for all attribute-value pairs in the CDF.

The attribute-value pairs within individual items differ as a result of the distribution method (CD–ROM or RIS) that was used to perform the initial installation of the model system.

Caution

Digital recommends that only experienced system administrators modify the attributes-value pairs in the CDF. If you are an experienced administrator, Digital does not recommend editing the CDF other than for those attribute-value pairs in the `Inst_cinstall` item and those marked with an asterisk in the sample CDF shown in Example C–1. Typographical errors and inserting attribute-value pairs into the incorrect item may result in serious corruption on the cloned systems and may render the systems unusable.

In addition, attribute-value pairs cannot contain blank spaces. Blank spaces cause data validation errors. Be very careful to remove all blank spaces especially at the end of a line. When you want to give an attribute a null value, make sure there is nothing (null) after the equal sign (=).

Do not modify or remove attributes that are prefixed with an underscore (_). These attributes, for example `_action=create`, are internal variables required by the full installation and installation cloning processes.

C.6.2.1 Attributes in the Inst_islinfo Item

Table C–2 defines the attributes in the `Inst_islinfo` item in the CDF. The `Inst_islinfo` item is used to convey the system state before the start of the installation process.

Table C–2: Attribute Definitions in the Initial Subset Load (Inst_islinfo) Item

Attribute	Definition
client=	This attribute is valid only for RIS full installations (not installation cloning) and specifies the client name of the system that was cloned. The client name is automatically determined as a result of the bootp request to the server. Do not modify this attribute for installation cloning because the value in this attribute does not have to match the client systems to be cloned.
clone=	This attribute is automatically inserted into the CDF as a result of an installation cloning process and is only valid during the installation cloning process. This attribute-value pair should not be manually set.
media_type=	This attribute is used by the full installation and installation cloning processes to indicate the type of distribution media for the current installation. This is the only required entry in the Inst_islinfo item. Valid values are REMOTE and CDROM. Edit this attribute when the type of distribution media used for the initial installation is different than the installation cloning that is to take place.
prompt=	This attribute is used by the installation cloning process to indicate whether the start of an installation cloning process requires a confirmation response from the user. This attribute must be manually entered into the CDF for an installation cloning process because the installation interfaces do not provide the ability to insert this attribute into the CDF. A value of yes indicates that the process should prompt for confirmation to use the CDF. A value of no indicates that the installation cloning process should use this CDF and bypass the confirmation question. If this attribute is not included in the CDF, the default is prompt=yes. Setting the attribute to no should be used with caution because the installation cloning begins as soon as the installation process detects a CDF. If you wanted to boot the system from the distribution media and perform system management or disk maintenance tasks, for example, you would not want the installation cloning to begin immediately.
risdir=	This attribute is specific to RIS full installations and is automatically set to the base RIS directory of the product environment to which the client system is registered. Do not modify this attribute for installation cloning.

Table C–2: Attribute Definitions in the Initial Subset Load (Inst_islinfo) Item (cont.)

Attribute	Definition
server=	This attribute is specific to RIS full and cloning installations and identifies the RIS server to which the client system is currently registered. Do not modify this attribute for installation cloning.
server_locality=	This attribute is specific to RIS full installations and specifies to the installation interfaces the current geographic location. Do not modify this attribute for installation cloning.
server_timezone=	This attribute is specific to RIS full installations and specifies to the installation interfaces the current geographic timezone. This value is automatically set during a RIS full installation. Do not modify this attribute for installation cloning.
srcloc=	This attribute is not used by either the full installation or installation cloning processes; it is used by the operating system for internal purposes. This attribute identifies the location of the software to load. For RIS installations, this value specifies the server name (appended with a colon). For CD–ROM installations, this value is the directory path /ALPHA/BASE. Do not modify this attribute unless the media_type attribute is changed because this value must be consistent with the value of media_type.
timeset=	This attribute applies to full installations and indicates to the installation interfaces whether the date and time on the client system have been successfully set and whether the date and time can be displayed during the installation. Valid values are: 0- Date and time have not been set and will not be displayed during the installation process 1- Date and time have been successfully set and will be displayed where appropriate during the installation process Do not modify this attribute for installation cloning.

C.6.2.2 Attributes in the Inst_filesystem Item

Table C–3 defines the attributes in the Inst_filesystem item in the CDF. The Inst_filesystem item is used to convey information about the number and type of file systems that are to be created on the cloned system. At a minimum, there must be at least four file system items to

describe the / (root), /usr, and /var file systems and one swap area. Except where noted, you optionally can modify all attribute-value pairs in this item, although Digital does not recommend editing the CDF.

Table C–3: Attribute Definitions in the File System (Inst_filesystem) Item

Attribute	Definition
name=	This attribute is a required attribute that specifies the name of the file system to be made. Valid values are: root, usr, var, swap1, and swap2. There can only be one item each for root, usr, var, swap1, and swap2.
file_system_type=	This attribute is a required attribute that specifies the file system type to be created for the named file system. Valid values are: ufs, advfs, and swap. If the value of the name= attribute is swap1 or swap2, the value of this attribute must be swap. **Caution** Be aware that changing this value from ufs to advfs may cause errors on the cloned system because the software subsets necessary to support an Advanced File System (AdvFS) may not be defined in the CDF and will not be installed on the cloned system. Therefore, the file system will be unreadable. Do not change this value to advfs unless other file systems have been set by the installation process to advfs or the required AdvFS software subsets are present in the names= attribute in the Inst_subsets item.
disk_name=	This attribute is a required attribute that specifies the disk name for the named file system as it is known to the operating system (for example, rz0). The value in this attribute must be consistent with (or match) the value in the disk_type= attribute. If you change this attribute, you must validate the change with respect to the disk_type= attribute. For example, if you change this value to disk_name=rz1, you must determine the type of disk at rz1. If it is an RZ58 type of disk, make sure the value of the disk_type= attribute is RZ58.
disk_type=	This attribute is a required attribute that indicates the type of disk for the specified disk_name (for example RZ26). The value in this attribute must be consistent with the disk_name= attribute. Refer to the disk_name= attribute for more information.

Table C–3: Attribute Definitions in the File System (Inst_filesystem) Item (cont.)

Attribute	Definition
`partition=`	This attribute is a required attribute that specifies the disk partition on which the named file system will be created. Valid values are the letters `a` through `h` inclusive. The `root` file system must always be located on partition `a`. If you change the value in this attribute for any file system other than `root`, make sure the partition you choose does not overlap another partition.
`controller_type=`	This attribute identifies the controller type to which the specified disk for the named file system is connected. During a full installation, this value is automatically provided for informational purposes. During an installation cloning process this attribute is not used, and can be omitted from the CDF.
`controller_number=`	This attribute identifies the controller number to which the specified disk for the named file system is connected. During a full installation, this value is automatically provided for informational purposes. During an installation cloning process this attribute is not used, and can be omitted from the CDF.
`maj_min_num=`	This value is automatically calculated for full and cloned installations so there is no need to modify it. This attribute is required for the `root` file system item and specifies the major and minor number of the specified disk for the named file system. The major and minor number is used to map the software device name (as known to the operating system) to the firmware device name (as known to the SRM console) so that the proper boot commands are displayed on the screen during the manual boot phase of the installation.

C.6.2.3 Attributes in the Inst_subsets Item

Table C–4 defines the attributes in the `Inst_subsets` item in the CDF. The `Inst_subsets` item is used to convey information to the installation cloning process about the Digital UNIX base software subsets that are to be installed on the system to be cloned.

Table C–4: Attribute Definitions in the Software Subsets Load (Inst_subsets) Item

Attribute	Definition
`advflag=`	Digital recommends that you do not modify this attribute. This attribute is a required attribute that specifies the type of installation (custom or default) that is to occur. Valid values are: `0`- Default installation `1`- Custom installation **Caution** Be aware that changing the value of this attribute may cause the `setld` command to fail during software subset loading because the software subsets defined in the CDF may not be compatible with the type of installation defined by this attribute. Setting this attribute to `0` nullifies the `kernel_option=` attribute in the `Inst_cinstall` item because default installations provide noninteractive kernel builds with mandatory kernel options.
`names=`	This attribute is a required attribute that specifies the list of Digital UNIX base software subsets to be installed. Each software subset name is separated by a comma (,) and must be on one continuous line (let the line wrap). If you add software subset names to this attribute, you must consider available disk space and dependencies upon other software subsets. Refer to Appendix D for software subset dependency information and disk space requirements.

C.6.2.4 Attributes in the Inst_cinstall Item

Table C–5 defines the attributes in the `Inst_cinstall` item in the CDF. The `Inst_cinstall` item is used to convey client system configuration information to the installation cloning process. All of the attributes specified in the installation configuration item are optional. If values are not provided for these attributes, the installation process becomes interactive to request this information during the installation configuration phase.

To use a single CDF to clone many systems, consider leaving the system-specific attributes such as host name and password null, but provide attributes for site-specific attributes such as kernel option, time zone, geographic location, and date and time.

Table C–5: Attribute Definitions in the Installation Configuration (Inst_cinstall) Item

Attribute	Definition
`hostname=`	This attribute specifies the client system's host name to the installation process. Host names for client systems that exist on the same network must be unique. Refer to the Installation Guide for guidelines on choosing a proper host name. During a RIS installation cloning process, this value is automatically set to the host name of the client system. For CD–ROM installations, make sure this value is set correctly or is null. A null value means that the installation process becomes interactive during the installation configuration phase to request a host name.

`kernel_option=`	This attribute specifies to the installation process whether the tailored kernel build should be interactive or noninteractive.
	
	This attribute must be manually entered in the CDF for an installation cloning process because the installation interfaces do not provide the ability to insert this attribute in the CDF.
	
	In an interactive kernel build session, a kernel options menu is presented allowing selection of any or all optional kernel options. To specify an interactive tailored kernel build, use the following value:
	
	`kernel_option=interactive`
	
	For noninteractive kernel builds, two options are provided:
	
	`kernel_option=mandatory`
	
	`kernel_option=all`
	
	The `mandatory` value builds a tailored kernel with only mandatory kernel options. The `all` value builds a tailored kernel with all mandatory and optional kernel options.
	
	The default behavior of a full, custom installation is the `interactive` type of kernel build. Full, default installations have `mandatory` type kernel builds.
	
	If the value of the `advflag` attribute in the `Inst_subsets` item is zero (`0`), the value given to the `kernel_option` attribute value is ignored.

Table C–5: Attribute Definitions in the Installation Configuration (Inst_cinstall) Item (cont.)

Attribute	Definition
`locality=`	This attribute specifies the geographic location of the client system. Valid values for this attribute are located on an installed system in the `/etc/zoneinfo` directory, which contains an entry (a file or a directory) for each geographic location. During a RIS installation cloning process, this value is automatically set to the geographic location of the RIS server. A null value means that the installation process becomes interactive during the installation configuration phase to request a geographic location.
`password=`	This attribute specifies to the installation process the encrypted `root` password for the client system. The presence of a value here means that all cloned systems share the same `root` password. A null value means that the installation process becomes interactive during the installation configuration phase to request a password. Because the value of `password=` must be encrypted, you cannot manually enter a new value for this attribute.
`timeset=`	This attribute specifies to the installation process that the system date and time have already been set on the client system. In the case of a RIS full installation or RIS installation cloning, this value is always set to `yes`. Valid values are: `no`- System date and time have not been set. The installation process becomes interactive to request the date and time. `yes`- System date and time have been set. For CD–ROM installations, users should verify the accuracy of the date and time after logging in for the first time because the installation process may not have set it correctly.

Table C–5: Attribute Definitions in the Installation Configuration (Inst_cinstall) Item (cont.)

Attribute	Definition
`timezone=`	This attribute specifies the time zone within a specific geographic location (if applicable). Valid values for this attribute are located in the subdirectories of the `/etc/zoneinfo` directory. During a RIS installation cloning process, this value is automatically set to the time zone of the RIS server. The value of `timezone` must be a valid time zone for the geographic location defined in the `locality=` attribute. For example, if `locality=US`, only time zones in the United States are valid. If the geographic location does not have a time zone, leave this value null. The installation process recognizes geographic locations that do not have time zones, and will not request a time zone during the configuration phase. If the geographic location has valid time zones, a null value means that the installation process becomes interactive during the installation configuration phase to request a time zone.

C.7 Generating or Selecting an Appropriate CDF

When generating a CDF through the installation of a system or selecting which CDF to use to clone other similar systems, you must consider the disk configuration, graphics adapter, font sizes and keyboard types of the systems to be cloned. Ideally, however, you should clone systems with identical hardware configurations.

To reduce the disk space required when Digital UNIX is installed, the software required to support the different graphics adapters, font sizes, and keyboard types has been packaged so that only the software subsets required to support options present on the system are mandatory and installed automatically. All other software subsets are considered optional and are not installed unless you specifically select them. Determining the mandatory software subsets for a system is done automatically by the installation process and guarantees that only appropriate software subsets are installed.

However, when a system is installed using installation cloning, the software subsets installed on to the system are defined in the CDF. Therefore, if the system to be cloned has a different graphics adapter, font size, or keyboard type than the system on which the CDF was created, the appropriate software subsets will not be installed and the cloned system may not be usable.

To generate a CDF that is versatile enough for use across differing systems, you may want to consider installing a system to use as a model. That is, perform a custom installation on a model system so that the CDF generated from that installation is usable by systems with different graphics adapters, font sizes, and keyboards. You do this by installing the software subsets to support all graphics adapters, font sizes, and keyboard types required by the systems to be cloned even though they are not required by the model system.

Acceptable differences in disk configuration, graphics adapter, font sizes, and keyboard type are explained in the following sections.

C.7.1 Acceptable Differences in Disk Configurations

The system to be installed by the installation cloning process should have the same hardware configuration as the system where the CDF was generated. However, it is possible to support slight differences in configuration.

The system to be cloned must have the same disk configuration for the disks on which `root`, `usr`, `swap1`, `var` (if it is not a directory under `/usr`) and `swap2` (if allocated) are to be installed as the system on which the CDF was generated. The same disk configuration means that the disk type (for example `RZ26`) and the device name (for example `rz0`) must match. If the partition tables for these disks are not identical on both systems, the software defined in the CDF may not fit on to the system to be cloned or would overlap the disk partitions.

Note

You may want to consider writing a `preinstall` script to install a common disk label on all systems to be cloned. Example C–2 contains a sample script that installs a common disk label.

It does not matter if disks other than those used for the file systems and swap areas created during an installation are different on the system to be cloned.

Table C–6 illustrates acceptable differences in disk configuration between a CDF generated from a model system and a system to be cloned.

Table C–6: Acceptable Differences in Disk Configuration Between a Model System and a System to be Cloned

System	Disk Type	Device Name
model system	RZ26	rz0[a]
	RZ25	rz1
system to be cloned	RZ26	rz0
	RZ26	rz1

[a]The / (root), and /usr file systems and swap1 space are located on the rz0 device on the model system.

Assuming there are no other differences in disk configuration, the system to be cloned can use the CDF generated from the model system. The difference in disk type at device name rz1 is acceptable because the file systems and swap space were not placed on it. If the disk device at rz0 were different, however, an installation cloning could not be performed.

C.7.2 Considering Differences in Graphics Adapters

When you install a model system from which you will use the CDF to clone other systems, you must consider the graphics options of the systems that will be cloned. If any of the systems to be cloned have different graphics options, the software subsets required to support the graphics options needed by those systems must be installed on the model system.

When selecting software subsets, look in the Windowing Environment category for software subsets starting with the words X Servers for *<name>*. Replace *<name>* with the name that describes the graphics options supported by the software subset. In Digital UNIX Version 4.0B, the following graphics software subsets are available:

- X Servers Base — Device independent X Server support (always installed)
- X Servers for Open3D — Supports the ZLXp-L graphics adapter
- X Servers for PCbus — Supports EISA bus and PCI bus graphics adapters
- X Servers for TurboChannel — Supports TurboChannel bus graphics adapters

Note

X Servers for PCbus adapters supported by Digital UNIX are specified in the *Software Product Description* (SPD).

Table C–7 displays the graphics adapters on a model system and a system to be cloned. The hardware configuration of the model system and the system to be cloned are determined to be similar enough to allow the CDF from the model system to be used for the installation cloning.

Table C–7: Acceptable Differences in Graphics Adapters Between a Model System and a System to be Cloned

System	Graphics Adapter
model system	`Open3D`
system to be cloned	`QVision (PCbus)`

During the installation of the model system, the `X Servers for Open3D` software subset is considered mandatory for the model system and is automatically installed. The `X Servers for PCbus` software subset is considered optional for the model system. Installing this optional software subset on the model system ensures that the appropriate software is available for the system to be cloned. If you do not install the `X Servers for PCbus` onto the model system, the graphics capabilities of the system to be cloned are likely to be disabled.

Caution

Do not use the CDF from a system that does not have graphics capabilities to clone systems that have the hardware to support graphics. There are several software subsets, most notably those associated with the common desktop environment (CDE), that will not be loaded on systems without graphics capabilities that are mandatory for systems with graphics capabilities. If you use a CDF from a system without graphics capabilities to clone a system with graphics capabilities, the desktop environment on the cloned system will be corrupted.

If you are unsure of which graphics options are available on the systems you want to clone, install all of the graphics software subsets that are available. However, installing all of the software subsets requires more disk space than loading only selected graphics software subsets.

C.7.3 Considering Differences in Font Size

To reduce the disk space required when Digital UNIX is installed, the software required to support the `75dpi` (dots per inch) and `100dpi` font sizes are contained in separate software subsets.

During an installation cloning, the font software subsets to be installed are defined in the CDF. If the system to be cloned requires a different size font than those defined by the software subsets in the CDF, the system to be cloned will not have the appropriate fonts loaded.

When generating the CDF through the full installation of a model system, you must consider the font sizes required by the systems to be cloned from the CDF. If the systems to be cloned require different size fonts, load the appropriate font software subset when installing the model system.

The need for `DECwindows 75dpi Fonts` or `DECwindows 100dpi Fonts` depends on the resolution of the graphics adapter being used. On a system already installed with Digital UNIX, this value can be determined by entering the following command:

```
# sizer -gr
```

When the resolution is 1024x768 or less, the `DECwindows 75dpi Fonts` are required. When the resolution is greater, the `DECwindows 100dpi Fonts` are required. If you are unsure of the resolution available on the systems to be cloned, select both font software subsets to ensure that the correct font is available.

Systems with multiple graphics adapters may require both the `DECwindows 75dpi Fonts` and `DECwindows 100dpi Fonts` if the adapters include those with 1024x768 or less resolution and those with greater resolution.

While there are other software subsets that contain fonts, only the DECwindows fonts are packaged separately by size.

Table C–8 displays the different font sizes required on a model system and a system to be cloned. The hardware configuration of the model system and the system to be cloned are determined to be similar enough to allow the CDF from the model system to be used for the installation cloning.

Table C–8: Acceptable Differences in Font Sizes Between a Model System and a System to be Cloned

System	Graphics Resolution	Required Font Size
model system	1024x680	DECwindows 75dpi Fonts
system to be cloned	1280x1024	DECwindows 100dpi Fonts

During the installation of the model system, the `DECwindows 75dpi Fonts` software subset is mandatory and is installed automatically; the `DECwindows 100dpi Fonts` software subset is optional. You should install the optional software subset to provide the necessary fonts for the installation cloning of the client system.

If you are unsure of the fonts available on the systems you want to clone, you can ensure that you provide the appropriate fonts by installing all of the font software subsets on to the model system. Installing all of the font software subsets will require more space than loading selected fonts.

C.7.4 Considering Differences in Keyboard Type

To reduce the disk space required when Digital UNIX is installed, the software subsets required to support the different Digital keyboard types is contained in separate software subsets.

During an installation cloning, the keyboard support software subset to be installed is defined in the CDF. If the system to be cloned has a different keyboard type than the model system, the cloned system will not have the appropriate keyboard software installed.

When generating the CDF through the installation of a model system, you must consider the keyboard type of the systems that will be cloned using the CDF. If the systems that will be cloned have different keyboard types, load the appropriate keyboard support software subset when installing the model system. The keyboard type can be determined from information available when the system is in console mode or by looking at the model number on the underside of the keyboard.

Table C–9 displays the keyboard types on a model system and a system to be cloned. The hardware configuration of the model system and the system to be cloned are determined to be similar enough to allow the CDF from the model system to be used for the installation cloning.

Table C–9: Acceptable Differences in Keyboard Types Between a Model System and a System to be Cloned

System	Keyboard Type
model system	PXCAL
system to be cloned	LK444

During the installation of the model system, the software subset PCXAL `Keyboard Support` is mandatory and is installed automatically. The software subset for LK444 `Keyboard Support` is optional. Selecting this optional software subset results in some unnecessary software being loaded on the model system but allows the CDF to be appropriate to clone the client system.

If you are unsure of the keyboard types available on the systems you want to clone, you can ensure that you provide the appropriate keyboard type by installing all of the keyboard software subsets. However, loading all

keyboard software subsets will require more disk space than loading selected keyboard software subsets.

C.8 Modifying Attributes in the CDF to Achieve Unattended Installations

Digital recommends that only experienced system administrators modify the attributes-value pairs in the CDF. Before modifying the CDF, make sure you read the information in the Caution in Section C.6.2.

Do not modify the original CDF located in the `/var/adm/smlogs` directory of an installed system. Instead, make a copy of `install.cdf` and modify the copy. The original `install.cdf` file contains information related to the system installation that could be valuable for future use. You should retain the `install.cdf` file in the `/var/adm/smlogs` directory.

Some attribute-value pairs must be manually added to the CDF for an installation cloning process because the installation interfaces do not currently provide the ability to set these values. The following sections describe the attribute-values pairs that can be manually added to the CDF to attain unattended installations.

C.8.1 Errors in the CDF

While modifying a CDF, a common error is to include a trailing blank space after an attribute-value pair. If the validation process detects a trailing blank space in the CDF, a message similar to the following will be displayed:

```
- ---------------------------------------
Some errors occurred:
SetItmAttr: invalid attribute value kernel_option=all
- ---------------------------------------
```

This error causes the installation process to stop. In the previous example, the validation process found a trailing blank space after the word `all` in the `kernel_option=all` attribute-value pair. The corrective action is to edit the CDF and remove the blank space. Then, restart the installation process at the client system.

C.8.2 Modifying the CDF Confirmation Attribute

Previous versions of the installation cloning process required the user to confirm that the CDF was to be used to start an installation cloning rather than a full installation. The purpose of this confirmation was to protect a system from an inadvertent installation cloning if the system was mistakenly still registered to a RIS environment and CDF.

The CDF confirmation question is now configurable through the prompt= attribute-value pair in the Inst_islinfo item in the CDF. The value of the prompt= attribute determines whether confirmation is required before the CDF is used to start an installation cloning process. Valid values are:

- prompt=yes — means that the user will be asked to confirm that the CDF should drive the installation cloning process.
- prompt=no — means that the installation cloning process will bypass the CDF use confirmation question and begin an installation cloning process automatically.

If this attribute-value pair is not defined or is null, the installation cloning process defaults to prompt=yes.

A portion of a CDF in the following example shows you where to include the prompt= attribute-value pair in the Inst_islinfo item:

```
install:

_item=Inst_islinfo
prompt=no
media_type=CDROM
server=cosmo
_action=create
srcloc=/ALPHA/BASE
```

C.8.3 Modifying the Tailored Kernel Build Attribute

A Digital UNIX default installation provides a noninteractive kernel build with mandatory kernel options enabled. A custom installation provides an interactive kernel build and allows you to tailor the kernel by allowing you to select mandatory and optional kernel options.

The kernel_option attribute in the Inst_cinstall item allows a noninteractive tailored kernel build with all kernel options (mandatory and optional) or mandatory kernel options only. In addition, the interactive value can be specified to allow you to tailor the kernel. The values for the kernel_option attribute are defined as follows:

- kernel_option=interactive — Provides an interactive kernel build. This is the default setting for this attribute.
- kernel_option=mandatory — Provides a noninteractive kernel build that selects mandatory kernel options only.
- kernel_option=all — Provides a noninteractive kernel build that selects all (mandatory and optional) kernel options.

A portion of a CDF in the following example shows you where to include the attribute-value pair into the Inst_cinstall item:

```
install:

_item=Inst_cinstall
kernel_option=all
password=SdDt78fuPrMkE
timeset=yes
timezone=Eastern
locality=US
_action=create
hostname=kramer
```

Kernel build failures that occur during a noninteractive kernel build cause the kernel build process to become interactive and provides the user with options for proceeding.

C.8.4 Modifying Site- and System-Specific Attributes

You must read this section if you plan to perform installation cloning from CD–ROM.

Setting site- and system-specific information such as host name, geographic location, time zone, date, and time are trivial in the case of a RIS installation because these values are obtained from the RIS server automatically during the installation. This statement is true for full installations from RIS or from a RIS installation cloning process.

In the case of a standalone system installed by a CD–ROM installation cloning process, however, setting these values must be determined from the CDF that drives the installation cloning. If the CDF does not define these attributes, the values must be entered interactively during the configuration phase of the installation cloning process that occurs after software has been loaded.

The system-specific attributes to be considered are:

- Host Name

  A system's host name is contained in the `hostname=` attribute-value pair in the `Inst_cinstall` item. Refer to Section 5.4 if you need guidelines for choosing a proper host name. Host names for client systems that exist on the same network must be unique. If the `hostname=` attribute does not exist in the CDF, or if the value associated with this attribute is null, the installation process becomes interactive during the configuration phase of the installation cloning process to request this information.

- Password

  Be aware that an encrypted value in the `password=` attribute means that all cloned systems share the same `root` password. You may want

to consider leaving this value null so that the installation process becomes interactive to request a root password. For security reasons, sharing passwords among systems is not recommended. If you choose to retain the encrypted password in the CDF, remember that the password came from the model system and you should change the password on that model system to protect it from unauthorized users. Because the value of the password= attribute must be encrypted, this value cannot be manually set. If you need to change the password on the model system, Section 5.5 contains guidelines for choosing appropriate passwords.

The site-specific attributes to be considered are:

- Geographic Location and Time Zone A system's geographic location and time zone are contained in the locality= and timezone= attribute-value pairs in the Inst_cinstall item. On a system already installed with Digital UNIX Version 4.0B, valid values for these attributes are located in the /etc/zoneinfo directory. Section 5.7 defines the acronyms shown in the /etc/zoneinfo directory. Geographic locations that are divided into time zones are shown as directories in /etc/zoneinfo. The contents of the /etc/zoneinfo directory is similar to the following. Geographic locations directories are identified by a slash (/):

```
Australia/  GMT      GMT+7    GMT-6    GMT4        Japan     Singapore
Belfast     GMT+0    GMT+8    GMT-7    GMT5        Libya     SystemV/
Brazil/     GMT+1    GMT+9    GMT-8    GMT6        London    Turkey
CET         GMT+10   GMT-0    GMT-9    GMT7        MET       UCT
Canada/     GMT+11   GMT-1    GMT0     GMT8        Mexico/   US/
Chile/      GMT+12   GMT-10   GMT1     GMT9        NZ        UTC
Cuba        GMT+13   GMT-11   GMT10    Greenwich   NZ-CHAT   Universal
Dublin      GMT+2    GMT-12   GMT11    Hongkong    Navajo    W-SU
EET         GMT+3    GMT-2    GMT12    Iceland     PRC       WET
Egypt       GMT+4    GMT-3    GMT13    Iran        Poland    Zulu
Factory     GMT+5    GMT-4    GMT2     Israel      ROC       localtime@
GB-Eire     GMT+6    GMT-5    GMT3     Jamaica     ROK       sources/
```

  The geographic location directories contain the time zones within that specific geographic location. When you specify a value for locality=, you must choose a valid time zone for that geographic location.

  When the geographic location (and when relevant, time zone) are specified in the CDF, these values are used to configure the system accordingly.

  If the locality= and timezone= attributes do not exist in the CDF, or if the value associated with these attributes is null, the installation process becomes interactive during the configuration phase to request this information. A locality= attribute can be present without a timezone= attribute because not all geographic locations are divided into multiple time zones. For example, the geographic location Japan does not have multiple time zones. In that situation, the installation

process recognizes the fact that Japan does not have multiple time zones and bypasses the request for a time zone.

- Date and Time

  It is not possible to specify dynamic values such as date and time in a CDF and still retain accuracy at the cloned system. The ability does exist, however, for the CDF to indicate that the date and time have been previously set either by invocation of one of the installation interfaces, or through a RIS installation cloning invocation. The method used is the `timeset=` attribute-value pair in the `Inst_cinstall` item:

  – `timeset=no` — Means that the system date and time have not been previously set. The installation cloning process becomes interactive to acquire this information.

  – `timeset=yes` — Means that the system date and time have been previously set. It is possible through the use of the `timeset=` attribute set to `yes` to continue the installation in an unattended fashion, even if the system time had not been actually set. The value of date and time is undetermined until the first user logs in and sets the date and time to the proper value using the `date` command.

C.9 Creating preinstall Files

The installation process tests for the existence of customer supplied files at predefined invocation points. The first invocation point is between the creation of the memory file systems (MFS) and the search for a CDF. At this point, the installation process searches for a file named `preinstall`, which is a user-supplied script, program, or executable containing specific actions to be carried out before the file system creation and software subset load phases of the installation process.

Actions to be carried out before file systems are created and software subsets are loaded might include writing a customized disk label to one or more disks.

You would not want the `preinstall` file to execute any function that requires the installed file systems and software to be available because these phases of the installation have not yet been completed.

The user-supplied file must be named `preinstall`, and the `preinstall` file and any files that it calls require execute permission.

It is not necessary that this file be contained in the same location in which the CDF and `postload` files are found.

If execution of the `preinstall` file fails, the `preinstall` file is responsible for supplying its own status or error messages. Digital does not

guarantee the results of executing the script or program but does guarantee that upon successful completion, the installation process proceeds.

The installation process queries the return status from the execution of the `preinstall` file and terminates the installation process if a non-zero return status is received.

The installation process searches for the `preinstall` file in the following order of priority:

1. The `/` (`root`) directory of diskette drive `fd0` or `fd1`. If a diskette is used, it requires a standard UNIX File System (UFS).
2. The `/var/adm/ris/clients/sets/`*`profile_set`* directory on the RIS server. Profile set directories are created by the RIS or system administrator. Refer to Section C.11.2 for more information about profile set directories on RIS servers.
3. In the `/isl` directory of the distribution media or to the `/isl` directory of an extracted RIS area.

The sample `preinstall` script shown in the following example applies a customized disk label to an `RZ26` disk.

Example C–2: Sample preinstall Script

```
#!/sbin/sh

#
# Write a custom disk label to the
# system disk before starting the installation.
#

# NOTE:  THIS FILE ASSUMES A DISK NAME OF rz0 AND DISK TYPE OF RZ26

#
# Make the device special file for rz0
#
(cd /dev; ./MAKEDEV rz0)

#
# First, zero the label
#
2>/dev/null disklabel -z rz0

#
# Next, restore the label
#
disklabel -Rr rz0 ./DLSAVE RZ26 ||                    [1]
{
 echo "\nError restoring disklabel on rz0\n"
 exit 1
}

echo "\nThe disklabel that has been applied is:\n"
disklabel -r rz0 | tail -10
```

Example C–2: Sample preinstall Script (cont.)

```
exit 0
```

1 The DLSAVE file called by the `preinstall` script must reside in the same directory as the `preinstall` script.

The sample DLSAVE file required by the `preinstall` script is shown in Example C–3. The DLSAVE file contains a disk label that was created by reading the disk label of the disk at `rz0` and redirecting the output into a file. To create this file, you would enter commands similar to the following:

```
# disklabel -r rz0 > DLSAVE
```

Example C–3: DLSAVE File Required By the Sample preinstall Script

```
# /dev/rrz8a:
type: SCSI
disk: rz26
label:
flags:
bytes/sector: 512
sectors/track: 57
tracks/cylinder: 14
sectors/cylinder: 798
cylinders: 2570
sectors/unit: 2050860
rpm: 3600
interleave: 1
trackskew: 0
cylinderskew: 0
headswitch: 0  # milliseconds
track-to-track seek: 0 # milliseconds
drivedata: 0

8 partitions:
#      size  offset  fstype [fsize bsize  cpg]
 a:  131072       0  4.2BSD   1024  8192   16  # (Cyl.    0 - 164*)
 b:  262144  131072  unused   1024  8192       # (Cyl.  164*- 492*)
 c: 2050860       0  unused   1024  8192       # (Cyl.    0 - 2569)
 d:  552548  393216  unused   1024  8192       # (Cyl.  492*- 1185*)
 e:  552548  945764  unused   1024  8192       # (Cyl. 1185*- 1877*)
 f:  552548 1498312  unused   1024  8192       # (Cyl. 1877*- 2569*)
 g: 1210000  393216  4.2BSD   1024  8192   16  # (Cyl.  492*- 2009*)
 h:  447644 1603216  4.2BSD   1024  8192   16  # (Cyl. 2009*- 2569*)
```

C.10 Creating postload Files

Upon completion of the file system creation and software subset load phases and the preparation of the configuration environment for the pending configuration phase, the installation process searches for a file named `postload`, which contains specific actions to be carried out.

Actions to be carried out after software subsets are loaded might include creating additional file systems or installing additional software that was not installed as part of the Digital UNIX base operating system.

The `postload` file and any files that `postload` calls require execute permission. The installation process searches for the `postload` file in the following order of priority:

1. The `/` (`root`) directory of diskette drive `fd0` or `fd1`. If a diskette is used, it requires a standard UNIX File System (UFS).
2. The `/var/adm/ris/clients/sets/`*`profile_set`* directory on the RIS server. Profile set directories are created by the RIS or system administrator. Refer to Section C.11.2 for more information about profile set directories on RIS servers.
3. In the `/var/tmp` directory on the system to be installed.
4. In the `/isl` directory of the distribution media or to the `/isl` directory of an extracted RIS area.

It is not necessary that the `postload` file be contained on the same media on which the CDF and `preinstall` file are found.

The installation process queries the results of the execution of the `postload` file and terminates the installation process upon a non-zero return status.

It is important to know that at this invocation point, the newly created `root`, `/usr`, and `/var` file systems on the magnetic media are mount-relative with respect to the directory `/mnt` until the system is rebooted from the default boot device. That is, the root file system is `/mnt`, the `usr` file system is `/mnt/usr`, and so on.

The sample `postload` script shown in Example C–4 is creating a new file system called `users` and is then adding the entry into the `/etc/fstab` file to mount the new file system upon every reboot.

Example C–4: Sample postload Script

```
#!/sbin/sh
#
# postload - script which is invoked after the subset load of a full
# installation.  The script creates a new file system and
# adds an entry in the fstab file.  Doing this will make the
# file system available as soon as the installation completes.

#
# Create a new file system on rz2c which is to be mounted at /usr/users
#

echo "postload:  creating new file system on rz2c\n"
```

Example C–4: Sample postload Script (cont.)

```
# First, make sure that all device special files exist

(cd /dev; ./MAKEDEV rz2)

# Next, create the UFS file system on rz2c, an RZ26L disk.

/usr/sbin/newfs -F /dev/rrz2c RZ26L ||
{
    echo "postload:  failed to create a new file system on rz2c\n"

    # We consider this a nonfatal error and allow the install to
    # continue.  This is done by returning 0.  Otherwise, exit with a
    # non-zero value.

    exit 0
}

# Next, add an entry to fstab so that this new file system is
# automatically mounted when the system boots.

# NOTE:  the actual installed file systems are mounted at /mnt.
# Therefore, we want to add the entry to /mnt/etc/fstab and
# not /etc/fstab.

echo "/dev/rz2c /usr/users ufs rw 1 2" >> /mnt/etc/fstab

# Finally, make sure the mount point is created.  Once again, create it
# relative to /mnt.

/bin/mkdir /mnt/usr/users

# Process complete!

exit 0
```

C.11 Moving the CDF and Files to the Appropriate Destination

It is the administrator's responsibility to place the `install.cdf` file, the `preinstall` and `postload` files and all files required by `preinstall` and `postload` into the appropriate directories so the installation process can find them. Depending upon how you want to deliver the CDF and all related files, you can copy them to the following destinations:

- The `/` (`root`) directory of diskette drive `fd0` or `fd1`. Refer to Section C.11.1 for more information about formatting the diskette and copying the CDF and files there.
- The `/var/adm/ris/clients/sets/`*`profile_set`* directory on the RIS server to which the client system is registered. Refer to Section C.11.2 for more information about moving the CDF and files to a profile set on the RIS server.

- The /var/tmp directory. Refer to Section C.11.3 for more information about moving the CDF and files there.
- The /isl directory of a CD–ROM image. Refer to Section C.11.4 for information about burning data onto a CD–ROM. You can also move the the files to the /isl directory of an extracted RIS area.

During an installation cloning, the cloning process searches for the CDF and user-supplied files in the following order of priority:

1. Diskette drive fd0 or fd1
2. The /var/adm/ris/clients/sets/*profile_set* subdirectory on the RIS server
3. The /var/tmp directory on the system to be installed.
4. The /isl directory on the distribution media (local CD–ROM or extracted RIS area). Refer to Section C.11.2.1 for things to consider when moving files to an extracted RIS area.

C.11.1 Moving the CDF and Files to a Diskette

Before you can copy the CDF and user-supplied files to the diskette, you must first format the diskette, write a new disk label, and then create a new file system using the following command syntax:

fddisk -fmt *raw_diskette_device*

disklabel -wr *diskette_drive disk_type*

newfs *raw_diskette_device_partition*

Use commands similar to the following to format the diskette in diskette drive fd0, write a new disk label specifying the rx23 type of diskette, and creating a new file system on the entire diskette (partition c):

1. Enter commands similar to the following to format a diskette drive fd0:

   # **fddisk -fmt /dev/rfd0**

2. Enter commands similar to the following to write a new disk label to an rx23 type of diskette. The diskette type is printed on the diskette.

   # **disklabel -wr fd0 rx23**

3. Use commands similar to the following to create a new file system on the entire diskette, the c partition:

   # **newfs /dev/rfd0c**

If either the `preinstall` or `postload` files are located on the diskette, all files called by the `preinstall` or `postload` files must be located on the diskette.

Use commands similar to the following to mount the diskette drive and copy the CDF and all related files to the diskette:

1. Mount the diskette drive on the `/mnt` mount point:

   ```
   # mount /dev/fd0c /mnt
   ```

2. Enter the `chmod` command to ensure all files have execute permissions:

   ```
   # chmod 777 *
   ```

   The asterisk (*) is a wildcard character that represents all files in the directory.

3. Assuming that you are in the directory in which the files are located, enter the following copy commands to copy the files to the diskette:

   ```
   # cp ./install.cdf /mnt/install.cdf
   # cp ./preinstall /mnt/preinstall
   # cp ./postload /mnt/postload
   # cp ./file_name /mnt/file_name
   ```

4. Unmount the diskette drive:

   ```
   # umount /mnt
   ```

C.11.2 Moving the CDF and Files to a RIS Server

The information contained in this section applies to RIS servers running Digital UNIX Version 4.0A and later. This functionality was different on RIS servers running Digital UNIX Version 4.0. For information about moving the CDF and user-supplied files to a RIS server running Version 4.0, see the appropriate Digital UNIX Version 4.0 documentation.

The Remote Installation Services utility (RIS) has been modified to support client registration to both RIS environments and profile set directories. RIS maintains the CDFs and user-supplied files in logically organized subdirectories that are created by the RIS administrator. These subdirectories, known as **profile sets** must be located within the `/var/adm/ris/clients/sets` directory. The administrator uses the `mkdir` command to make profile set directories.

A profile set is a directory that contains the files used during an installation process. The `sets` directory can contain many profile sets. Each of the profile set directories may contain a CDF (`install.cdf`), a preinstallation file (`preinstall`), a postinstallation file (`postload`), and all files called by the `preinstall` and `postload` files. All files are

optional; they can be used independently or in any combination. It is the RIS administrator's responsibility to place the appropriate files into the correct profile set directory.

The `profile_set` directories you create depend upon your working environment and how you want to logically organize the functions of the CDFs and files. If, for example, your site or facility requires engineering workstations to be installed and configured different than the workstations in the accounting department, you might want to create two profile set directories; one named `engineering` and one named `accounting`. Those profile sets would contain the CDFs and files that were created to suit the configuration needs of both departments.

Another hypothetical situation for defining profile sets is one in which separate CDFs and files are maintained for server type systems and workstation type systems. Profile set directories named `server` and `workstation` might be set up under that scenario.

Use procedures similar to the following to copy the CDF, `preinstall` and `postload` files, and related files to a profile set directory:

1. Change to the `/var/adm/ris/clients/sets` directory, and using the naming scheme of your choice, create a profile set directory with an appropriate name:

   ```
   # cd /var/adm/ris/clients/sets
   # mkdir engineering
   ```

2. To ensure files are copied to the correct directory, change to the new profile set directory:

   ```
   # cd engineering
   ```

3. Using the copy tool you usually use (for example, `ftp`, `dcp`, or ,`rcp`) copy the modified CDF and optionally the `preinstall`, `postload`, and all other related files from your working area to the new `engineering` profile set directory.

4. Enter the `chmod` command to ensure all files have execute permissions:

   ```
   # chmod 755 *
   ```

   The asterisk (*) is a wildcard character that represents all files in the directory.

After you copy the appropriate CDF and other files to the profile sets directory, you can register RIS clients for installation cloning or for user-defined file invocation during a full RIS installation. You do this by registering new clients to a RIS environment as well as to a profile set. If a RIS client is registered to a profile set and boots across the network to start

an installation, the order of priority in which a search for a CDF and other optional files is done is shown in Section C.11. If a CDF is found, it is retrieved and used by the installation process to provide the answers to all installation configuration questions.

C.11.2.1 Moving Files to an Extracted RIS Area

If an `install.cdf`, `preinstall`, or `postload` file is moved to the `/isl` area of an extracted RIS area, the files will be used by all client systems installing from that RIS area.

If this action is not appropriate, the administrator should create profile set directories to supply these files on a client-by-client basis.

C.11.2.2 Changes to the RIS Interface

The following changes have been made to the Digital UNIX Version 4.0B RIS interface to accommodate the addition of profile set directories:

- When RIS is invoked for the first time on a system that has been updated to Digital UNIX Version 4.0B that previously supported Digital UNIX Version 4.0 installation cloning, the existing RIS area is converted. In previous versions of Digital UNIX, CDFs were located in the `/var/adm/ris/clients/cdf` directory and could have any file name.

  The conversion process converts all existing CDFs into profile set directories. The new profile set directory has the same name as the original CDF and the original CDF is renamed to `install.cdf`. If the original CDF name could not be used to name the new profile set directory, a unique profile set name is created by appending a digit (starting with the number one) to the original CDF name.

  The first time RIS is invoked after Digital UNIX Version 4.0B has been installed, messages similar to the following are displayed:

```
Converting old cdf directory to new sets directory format...
CDF File acctng moved to set acctng and renamed install.cdf
CDF File acctng.cdf moved to set acctng1 and renamed install.cdf
CDF File acctng1.cdf moved to set acctng11 and renamed install.cdf
CDF File acctng.cdf2 moved to set acctng12 and renamed install.cdf
done
```

  After the conversion is done, these messages will not be displayed again.

- A question similar to the following is displayed during RIS client registration if at least one profile set directory exists. If no profile set directories exist, the question will not be displayed.

```
Do you want to specify an Installation Profile Set
for Installation Cloning on this client? [y/n]
```

If you enter y, a list of available profile sets is displayed for selection.

```
This RIS server has the following Installation Profile Sets available:

acctng acctng1 acctng11 acctng12

Enter a set name or press <Return> to exit set selection: acctng

You have selected the acctng installation profile set.
This set contains the following files:
install.cdf preinstall postload DLSAVE
```

Once a profile set is selected, RIS validates the CDF to ensure that the software subsets specified in the CDF match the software subset names and software subset version numbers present in the RIS environment to which the client system is registered. No validation of the user supplied files is performed.

C.11.2.3 Registering a RIS Client to a Profile Set

Follow the general procedures in *Sharing Software on a Local Area Network* to register a client system to a RIS environment and a profile set. The *Sharing Software on a Local Area Network* guide was not updated to reflect the new prompts shown in Section C.11.2.2.

C.11.2.4 Determining Registration for RIS Clients

To determine if a RIS client is registered to a profile set, examine the RIS database file, /var/adm/ris/clients/risdb, on the RIS server. The name of the profile set is specified in the fourth field; fields are separated by a colon. In the following sample entry in the risdb file, the client system kramer is registered to the engineering profile set:

```
kramer:08-00-2b-58-89-1c:ris2.alpha,product_1:engineering
```

C.11.2.5 Removing a RIS Client from Profile Set Registration

You can remove a client from profile set registration by using the Modify option from the RIS Utility Main Menu. When you are prompted to specify a profile set for the client, enter n or press Return to register the client without specifying a profile set.

C.11.2.6 Deleting Profile Sets from the RIS Server

If a profile set is no longer needed, you can delete it by removing the appropriate *profile_set* directory from the directory /var/adm/ris/clients/sets.

Examine the RIS database file on the RIS server, /var/adm/ris/clients/risdb, before deleting a profile set to ensure

that no clients are registered to it. The name of the profile set is specified in the fourth field; fields are separated by a colon (:). In the following sample entry in the risdb file, the client newman is registered to the accounting profile set:

```
newman:08-00-2b-58-89-1c:ris2.alpha,product_1:accounting
```

C.11.3 Moving the CDF and Files to the /var/tmp Directory

The /var/tmp directory is a writable directory created during the installation process and, therefore, cannot be used to ship the CDF and user-supplied files. However, if a preinstall script is used, it can copy dynamically the CDF , postload, and any files needed by postload into /var/tmp during the installation process. The preinstall file itself cannot be invoked from /var/tmp as it is the only mechanism available to move files into /var/tmp.

This feature is valuable for users repackaging the Digital UNIX operating system and who are providing the CDF and user-supplied files on the CD-ROM. When there is a need to modify or select a CDF or postload file as part of the installation process, a writable location is needed because the CD-ROM cannot be written to. For example, assume that several CDFs are shipped on the CD-ROM for the purpose of supporting different hardware or configurations from one distribution media. In this case, you can create a preinstall file that examines the system on which the installation is being executed, and based on the examination, select the appropriate CDF file from among those shipped. The preinstall file can then copy this CDF to /var/tmp/install.cdf where it will later be read by the installation process. Similarly, the preinstall file could choose from among several postload files and copy the one you want to /var/tmp/postload.

The preinstall script should assure that files copied to /var/tmp have the appropriate permission codes (chmod 777 * is the safest way to ensure appropriate permissions).

C.11.4 Burning the CDF and Files on to a CD–ROM

You can repackage the Digital UNIX Version 4.0B operating system CD–ROM to include CDFs and user-supplied files in the /isl directory.

Note

Copying software may be done only for the purpose of licensed use of Digital UNIX. A valid license agreement must be present for all instances of use of the copied Digital UNIX operating system.

Use the method you usually use to burn a CD–ROM (i.e., write to a CD-ROM) if you plan to provide the `install.cdf`, `preinstall`, and `postload` files on a CD–ROM. The method you use depends upon the type of CD–ROM burner you have.

The basic steps to create an image and burn a CD–ROM are:

1. Mount the Digital UNIX Version 4.0B CD–ROM to determine how much disk space is required on the magnetic disk to which you will be copying the contents of the CD–ROM. For example, to mount the CD–ROM in drive `/dev/rz4c` on the directory `/mnt`, enter commands similar to the following:

   ```
   # mkdir /mnt
   # mount -r /dev/rz4c /mnt
   # cd /mnt
   ```

2. Enter the following command to determine disk space in kilobytes:

   ```
   # df -k
   ```

   Remember this figure and make sure you have a disk large enough to meet the space requirement.

3. Unmount the CD–ROM using commands similar to the following:

   ```
   # umount /mnt
   ```

4. Create an image of the operating system by copying the contents of a Digital UNIX Version 4.0B CD–ROM on to a disk that is at least as large as the figure obtained in Step 2. Use commands similar to the following to copy the contents of the CD–ROM to disk. In the example, the input file is the CD–ROM device, (`/dev/rz4c`), the output file is the magnetic disk (`/dev/rz2c`), and the input and output block size is 32 kilobytes (`32k`).

   ```
   # dd if=/dev/rz4c of=/dev/rz2c bs=32k
   ```

   Caution

   The output file (`of=`) must specify a disk partition that starts at block zero (usually `a` or `c`). Specifying a partition that does not start at zero (`0`) results in an operating system image that is not bootable.

5. Mount the disk to which you just copied the contents of the Digital UNIX Version 4.0B CD–ROM, and use the `cp` command to copy the

`install.cdf`, `preinstall`, `postload` files and any files called by the files into the `/isl` directory of the image:

```
# mount /dev/rz2c /mnt
# cp ./preinstall /mnt/isl/preinstall
# cp ./install.cdf /mnt/isl/install.cdf
# cp ./postload /mnt/isl/postload
# cp ./file_name /mnt/isl/file_name
```

6. Depending upon the type of CD–ROM burner you have, use the recommended method to burn a CD–ROM from the modified image on the disk.

Note

To ensure that you have a valid, bootable Digital UNIX Version 4.0B image, Digital recommends that you verify the ability to boot from the image on the disk before burning the CD–ROM.

D

Base Operating System Software Subset Descriptions

The software subsets described in this appendix are located on the CD-ROM labeled *Digital UNIX V4.0B Operating System Volume 1*.

Digital UNIX software subsets are divided into the following categories: optional, mandatory, and conditionally mandatory.

- Optional software subsets can be selected during custom installations. These software subsets represent a variety of applications that can be installed to enhance your Digital UNIX operating system. Optional software subsets are not offered during the default installation. Refer to Chapter 8 for information about using the `setld` command to install optional subsets after the installation.
- Mandatory software subsets are installed automatically for default and custom installations. These software subsets represent the minimum software needed to install and run the Digital UNIX operating system.
- Conditionally mandatory software subsets are considered mandatory only when certain hardware or software is detected during the installation procedure. Table D–1 lists the software subsets that are conditionally mandatory. In Table D–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; a group of software subsets that contains the word `and` means that all software subsets are mandatory if the condition is met.

Table D–1: Conditionally Mandatory Software Subsets

Software Subset Description	What Makes It Mandatory?
`DECwindows 75dpi Fonts` or `DECwindows 100dpi Fonts`	Resolution of the graphics adapter attached to the system
`X Servers for Open3D`, `X Servers for PCbus`, or `X Servers for TurboChannel`	Type of graphics adapter attached to the system

Table D–1: Conditionally Mandatory Software Subsets (cont.)

Software Subset Description	What Makes It Mandatory?
Graphical Base System Management Utilities, Graphical Print Configuration Application, Graphical System Administration Utilities, Netscape Navigator Gold V3.0, CDE Desktop Environment, Basic X Environment, X Servers, X Fonts, Adobe Font Metric Files, CDE Mail Interface, and 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	Type of keyboard attached to the system
POLYCTR AdvFS and POLYCTR AdvFS Kernel Modules	Choosing AdvFS as the file system type for the root, /usr, or /var file systems during the installation
ATM Kernel Header and Common Files, ATM Kernel Modules, and ATM Commands	ATM hardware is detected by the installation procedure

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.

D.1 Mandatory Software Subsets

The mandatory subsets shown in Table D–2 are always installed automatically for the default and custom installations.

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 those subsets with the `setld` command.

Table D–2 describes the mandatory subsets.

Table D–2: Description of the Mandatory Software Subsets

Title and Contents	Subset Name	Dependencies
Base System This software subset includes fundamental utilities and data files for the Digital UNIX Base Operating System. The base operating system includes the editors and many of the general-purpose programs.	OSFBASE410	Required for all subsets. This software subset cannot be deleted.
Base System–Hardware Support This software subset provides the hardware dependent portion of the OSFBASE subset. This software subset also contains the Monitoring Performance History (MPH) utility that gathers information on the reliability and availability of the Digital UNIX operating system and associated platforms.	OSFHWBASE410	Required for all subsets. This software subset cannot be deleted.
Base System Management Applications and Utilities This software subset contains all files related to the base system management applications and utilities such as `diskconfig` and `mailconfig`.	OSFSYSMAN410	Requires Tcl Commands
Basic Network Configuration Applications This software subset contains all files related to the basic network configuration applications `bindconfig` and `netconfig`.	OSFNETCONF410	Requires Base System Management Applications and Utilities and Basic Networking Services

Table D–2: Description of the Mandatory Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
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`).	OSFCLINET410	Required for Local Area Transport (LAT), NFS Utilities, and Additional Networking Services
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 DEC 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.	OSFCMPLRS410	Required for Kernel Header and Common Files, Software Development Environment, and selected language layered products
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.	OSFHWBINCOM410	Requires Kernel Header and Common Files

Table D–2: Description of the Mandatory Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
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.	OSFHWBIN410	Requires Standard Kernel Modules
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.	OSFBINCOM410	Requires Compiler Back End. This software subset is required for Standard Kernel Objects, Hardware Kernel Objects, and Local Area Transport (LAT)
Local Printer Support This software subset provides printer commands such as `lpr`, `lpq`, and `lpd`; utilities; configuration files; filters; and PostScript printer support.	OSFPRINT410	
NFS(R) Configuration Application This software subset contains the files related to the network file system configuration application, `nfsconfig`.	OSFNFSCONF410	Requires Base System Management Applications and Utilities and NFS(R) Utilities
NFS(R) Utilities This software subset provides the software required to mount remote file systems using the Network File System (NFS).	OSFNFS410	Requires Basic Networking Services

Table D–2: Description of the Mandatory Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
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.	OSFBIN410	This software subset is required to build Digital UNIX kernels
Tcl Commands This software subset contains the binary distribution of Tool Command Language (TCL) and the TCLX extension package without graphical components. TCL is a scripting language. The package consists of TCL/TCLX shared libraries, the TCL/TCLSH shells, and script libraries. Install this software subset if you want to write or run TCL programs.	OSFTCLBASE410	

D.2 Optional Software Subsets

The optional software subsets contain software that supports a variety of applications. If you choose the default installation procedure, these software subsets are not available during the installation, but can be installed after the installation completes by using the `setld` command. If you choose the custom installation, these software subsets are available for selection during the installation procedure.

The optional software subsets can be deleted after they are installed.

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.

- General Applications – Table D–3
- Kernel Build Environment – Table D–4
- Kernel Software Development – Table D–5
- Mail Applications – Table D–6
- Network-Server/Communications – Table D–7

- Printing Environment – Table D–8
- Reference Pages – Table D–9
- Software Development – Table D–10
- Supplemental Documentation – Table D–11
- System Administration – Table D–12
- Text Processing – Table D–13
- Windowing Environment – Table D–14
- Windows Applications – Table D–15

D.2.1 General Applications Software Subsets

Table D–3 describes the software subsets in this category.

Table D–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 non-Digital terminals.	OSFTERM410	
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.	OSFLEARN410	

Table D–3: Description of the General Applications Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
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`.	OSFDOSTOOLS410	
GNU Emacs This software subset contains the GNU Emacs editor.	OSFEMACS410	
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.	OSFLAT410	Requires Kernel Header and Common Files and Basic Networking Services
Tk Toolkit Commands This software subset contains the Tool Command Language (TCL) graphical extensions package Version TK4.04b4 and TKX.04b5.	OSFTKBASE410	Requires Tcl Commands and Basic X Environment

Table D–3: Description of the General Applications Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
UNIX SVID2 Compatibility This software subset brings the Digital UNIX 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.	OSFSVID2410	
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.	OSFUUCP410	

D.2.2 Kernel Build Environment Software Subsets

Table D–4 describes the software subsets in this category.

Table D–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.	OSFATMBINCOM410	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.	OSFATMBIN410	Requires Standard Kernel Modules
Logical Storage Manager Kernel Header and Common Files This software subset contains the LSM kernel include files to build LSM with the kernel. This software subset supports uniprocessor, SMP, and realtime configurations.	OSFLSMBINCOM410	Requires Compiler Back End and Compiler Extensions
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.	OSFLSMBIN410	Requires Standard Kernel Modules
POLYCTR AdvFS Kernel Modules This software subset contains the POLYCENTER Advanced File System (AdvFS) kernel modules. AdvFS is a log based file system that allows for faster system restarts in case of system crashes.	OSFADVFSBIN410	Requires Standard Kernel Modules

D.2.3 Kernel Software Development Software Subsets

Table D–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 custom installation. Use the `setld` command if you want to install these software subsets.

Table D–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.	OSFATMBINOBJECT410	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.	OSFHWBINOBJECT410	Requires Hardware Kernel Modules
Logical Storage Manager Kernel Objects This software subset contains the Logical Storage Manager Kernel Objects needed for software development code that is to be built into the kernel.	OSFLSMBINOBJECT410	Requires Logical Storage Manager Kernel Modules

Table D–5: Description of the Kernel Software Development Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
POLYCENTER AdvFS Kernel Objects This software subset contains the POLYCENTER AdvFS Kernel Objects needed for software development of code that is to be built into the kernel.	OSFADVFSBINOBJECT410	Requires POLYCENTER 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.	OSFBINOBJECT410	Standard Kernel Modules

D.2.4 Mail Applications

Table D–6 describes the software subsets in this category.

Table D–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.	OSFCDEMAIL410	Requires CDE Desktop Environment
DECwindows Mail Interface This software subset provides the DECwindows mail application for `dxmail`.	OSFXMAIL410	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.	OSFMH410	Required for DECwindows Mail Interface

D.2.5 Network-Server/Communications Software Subsets

Table D–7 describes the software subsets in this category.

Table D–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.	OSFATMBASE410	
Additional Networking Services This software subset contains the software that provides the networking services; Berkeley Internet Name Domain (BIND) and Network Information Services (NIS).	OSFINET410	Requires Basic Networking Services Required for Remote Installation Services (RIS) and Dataless Management Services (DMS)
Dataless Management Service 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.	OSFDMS410	Requires Additional Networking Services
Remote Installation Services 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.	OSFRIS410	Requires Additional Networking Services

D.2.6 Printing Environment Software Subsets

Table D–8 describes the software subsets in this category.

Table D–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.	OSFAFM410	

D.2.7 Reference Pages Software Subsets

Table D–9 describes the software subsets in this category.

Table D–9: 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.	OSFMANOS410	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.	OSFCDEMANOS410	Requires Doc. Preparation Tools
Ref Pages: CDE Development This software subset contains the Common Desktop Environment development reference pages.	OSFCDEMANOP410	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.	OSFMANOP410	Requires Doc. Preparation Tools

Table D–9: Description of the Reference Pages Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
Ref Pages: Windows Admin/User This software subset provides the online reference pages for windows administrators and users. This software subset also contains the reference pages for the *SysMan* graphical system management applications.	OSFMANWOS410	Requires Doc. Preparation Tools
Ref Pages: Windows Programming This software subset provides the online reference pages for windows programmers.	OSFMANWOP410	Requires Doc. Preparation Tools

D.2.8 Software Development Software Subsets

Table D–10 describes the software subsets in this category.

Table D–10: Description of the Software Development Software Subsets

Title and Contents	Subset Name	Dependencies
CDA Software Development The CDA Software Development environment provides C header files that enable programmer access to the CDA Base Services run-time libraries.	OSFCDAPGMR410	Requires Software Development Environment
CDA for X/Motif Development This software subset provides a developer's environment for X11/DECwindows CDA architecture.	OSFXCDADEV410	Requires X Window Software Development and X Window Header Files
CDE Software Development and Programming Examples This software subset contains the header files, static libraries, and tools needed for Common Desktop Environment (CDE) development.	OSFCDEDEV410	Requires CDE Desktop Environment, X Window Software Development, and X Window Header Files

Table D–10: Description of the Software Development Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
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.	OSFRCS410	
Ladebug Debugger This software subset contains the command line interface for the Digital Ladebug Debugger for Digital UNIX. The Ladebug Debugger is a symbolic source-level debugger that supports debugging of ADA, C/C++, Fortran, and Fortran 90 applications.	OSFLDBBASE410	
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.	OSFLDBDOC410	
Ladebug Debugger Window Interface This software subset contains all the files needed to install the graphical user interface to the Ladebug Debugger.	OSFLDBGUI410	
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.	OSFLDBSRV410	
Programming Examples This software subset contains programming examples.	OSFEXAMPLES410	

Table D–10: Description of the Software Development Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
Realtime Software Development This software subset provides libraries and utilities useful for real time software development.	OSFRTDEV410	
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.	OSFSDECDE410	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 software subset, OSF-DEV-USER Product Authorization Key (PAK), is required to use the tools and utilities included in this software subset.	OSFSDE410	Requires Compiler Back End
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.	OSFSCCS410	
Standard Header Files This software subset contains the standard header files for C programming.	OSFINCLUDE410	

Table D–10: Description of the Software Development Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
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.	OSFPGMR410	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.	OSFLIBA410	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.	OSFXINCLUDE410	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.	OSFXEXAMPLES410	

Table D–10: 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.	OSFXDEV410	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.	OSFXLIBA410	Requires X Window Software Development and X Window Header Files

D.2.9 Supplemental Documentation Software Subset

Table D–11 describes the software subset in this category.

Table D–11: 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.	OSFXIEDOC410	

D.2.10 System Administration Software Subsets

Table D–12 describes the software subsets in this category.

Table D–12: Description of the System Administration Software Subsets

Title and Contents	Subset Name	Dependencies
C2 Security This software subset provides additional configurable system security features such as identification, authentication and audit.	OSFC2SEC410	
C2 Security GUI This software subset provides the graphical user interface for the C2 Security subset.	OSFXC2SEC410	C2 Security
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 8200/8400 systems) in enough time to prevent damage to the system itself. This subset contains the components needed to implement Environmental Monitoring.	OSFENVMON410	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 system with graphics capabilities.	OSFXSYSMAN410	Requires Base System Management Applications and Utilities, Tk Toolkit Commands, and CDE Minimum Run-time Environment

Table D–12: Description of the System Administration Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
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.	OSFXPRINT410	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 share`, `host manager`, `system info`, `kernel tuner`, `license manager`, `process tuner`, and `shutdown`. This software subset is mandatory on systems with graphics capabilities.	OSFXADMIN410	Requires Graphical Base System Management Utilities
Kernel Debugging Tools This software subset provides tools for analyzing and debugging kernels.	OSFKTOOLS410	
Logical Storage Manager This software subset contains the LSM administrative commands and tools required to manage an LSM configuration.	OSFLSMBASE410	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.	OSFLSMX11410	Requires Basic X Environment

Table D–12: Description of the System Administration Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
Logical Volume Manager The Logical Volume Manager (LVM) is a subset that is composed of physical devices and logical (virtual) entities to offer you a mechanism for transparently and dynamically storing and retrieving files and file systems across multiple devices and in multiple copies.	OSFLVM410	
Obsolete Commands and Utilities This software subset contains the commands and utilities that are no longer supported for Digital UNIX Version 4.0B.	OSFOBSOLETE410	
Obsolete Locale Databases This software subset contains obsolete locale databases and should be installed only if you are running applications that require internationalization support and were built on DEC OSF/1 V1.2 or DEC OSF/1 V1.3 systems.	OSFCTABLOC410	
POLYCTR AdvFS The subset contains the system administration commands required for creating and managing the Advanced File System (AdvFS).	OSFADVFS410	
Single-Byte European Locales This software subset provides basic internationalization and localization information for 21 Western European locales.	OSFEURLOC410	

Table D–12: 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.	OSFACCT410	
System Exercisers This software subset provides programs that help to diagnose problems with hardware and peripheral devices.	OSFEXER410	

D.2.11 Text-Processing Software Subsets

Table D–13 describes the software subsets in this category.

Table D–13: 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.	OSFDCMT410	Required for all reference page subsets
Doc. Preparation Tools Extensions This software subset contains additional `nroff` macro packages, bibliography tools, and `roff` tools.	OSFDCMTEXT410	Requires Doc. Preparation Tools

D.2.12 Windowing Environment Software Subsets

Table D–14 describes the software subsets in this category.

Table D–14: Description of the Windowing Environment Software Subsets

Title and Contents	Subset Name	Dependencies
Adobe Fonts This software subset contains the Type1 fonts and the Adobe font metrics files supplied by Adobe Systems Incorporated to be used by the DPS extension of the server. It also contains the `\.upr` file, which defines these fonts and their location for the DPS extension of the server. This software becomes mandatory and is installed automatically on systems with graphics capabilities.	OSFDPSFONT410	
Basic X Environment This software subset provides programs required for X11/DECwindows and includes the Bookreader application. This environment provides the following X window applications: `dxbook` (views online Bookreader documents), `dxconsole`, `dxkeycaps`, `dxterm`, `dxvdoc` (displays postscript documents). Bookreader is used to display online documentation if the documentation is contained in `.decw_book` files. This software becomes mandatory and is installed automatically on systems with graphics capabilities.	OSFX11410	
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.	OSFCDEDT410	Requires CDE Minimum Run-time Environment and Local Printer Support

Table D–14: Description of the Windowing Environment Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
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.	OSFCDEMIN410	Requires Basic X Environment and NFS(R) 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 OSFFONT150410) when low resolution graphics are detected during the installation.	OSFFONT410	
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.	OSFFONT15410	
LK201 Keyboard Support This software subset provides keyboard support for the Model LK201 Digital 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.	OSFKBDLK201410	

Table D–14: Description of the Windowing Environment Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
LK401 Keyboard Support This software subset provides support for the Model LK401 Digital 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.	OSFKBDLK401410	
LK411 Keyboard Support This software subset provides support for the Model LK411 Digital 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.	OSFKBDLK411410	
LK421 Keyboard Support This software subset provides support for the Model LK421 Digital 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.	OSFKBDLK421410	
LK444 Keyboard Support This software subset provides support for the Model LK444 Digital 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.	OSFKBDLK444410	

Table D–14: 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 Digital 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.	OSFKBDPCXAL410	
Old X Environment This software subset contains the following X window environment applications: `dxpause` and `dxsession`. This software subset is mandatory on systems with graphics capabilities.	OSFOLDX11410	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 Digital UNIX on their equipment. This software subset is not intended for general use and should not be installed if your site is not a Digital OEM.	OSFXOEM410	
X Fonts This software subset provides X11 fonts from the X Consortium compiled for the DEC X server. This software subset becomes mandatory and is installed automatically on systems with graphics capabilities.	OSFMITFONT410	

Table D–14: Description of the Windowing Environment Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
X Servers 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.	OSFSER410	
X Servers for Open3D This software subset provides the X server device-dependent support for the supported Digital UNIX 3D graphics cards. This software subset is mandatory and is installed automatically if 3D graphics cards are detected during the installation.	OSFSER3D410	X Servers and Basic X Environment
X Servers for PCbus This software subset provides graphics support for systems using the PCI bus. This software subset is automatically loaded 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 automatically loaded when the installation procedure detects QVision.	OSFSERPC410	

Table D–14: 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 automatically installed when the installation procedure detects a Turbochannel card.	OSFSERTC410	
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.	OSFMOTIF11410	Requires Basic X Environment

D.2.13 Windows Applications Software Subsets

Table D–15 describes the software subsets in this category.

Table D–15: 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`, `dxpaint` (a bitmap editor), `dxpresto` (a graphical display of Prestoserve state and statistics), and `dxprint` (captures and prints screen images).	OSFDECW410	
Additional X Applications This software subset contains the additional X Consortium X11 R5 client applications such as: `appres`, `bitmap`, `bmtoa`, `atobm`, `bdftopcf`, `dxpaint`, `editres`, `ico`, `iconv`, `listres`, `lndir`, `maze`, `mkdirhier`, `oclock`, `puzzle`, `resize`, `showfont`, `showrgb`, `viewres`, `x11perf`, `x11perfcomp`, `x11perfcomp`, `xauth`, `xbiff`, `dxcalc`, `xcalc`, `xclipboard`, `dxclock`, `xclock`, `xcmsdb`, `xcmstest`, `xcutsel`, `xdpr`, `xdpyinfo`, `xedit`, `xev`, `xeyes`, `xfd`, `xfontsel`, `xgc`, `xkill`, `xload`, `xlogo`, `xlsatoms`, `xlsclients`, `xlsfonts`, `xmag`, `xman`, `xmh`, `xmkmf`, `xon`, `dxpresto`, `dxprint`, `xpr`, `xprop`, `xrefresh`, `xstdcmap`, `xwd`, `xwininfo`, and `xwud`. Refer to the reference page for each of these applications for more information.	OSFXMIT410	
CDE Additional Applications This software subset contains the Common Desktop Environment additional applications such as: `dxkeyboard`, `dxprint`, `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.	OSFCDEAPPS410	Requires CDE Desktop Environment

Table D–15: Description of the Windows Applications Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
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 Digital UNIX.	OSFXDEMOS410	Requires Basic X Environment
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.	OSFXNEST410	Requires Basic X Environment
Netscape Navigator Gold V3.0 This software subset contains the Netscape Navigator World Wide Web viewer that is used to view the Digital UNIX documentation set on line. This software subset is mandatory on systems with graphics capabilities.	OSFNETSCAPE410	Basic X Environment

Table D–15: Description of the Windows Applications Software Subsets (cont.)

Title and Contents	Subset Name	Dependencies
Old Additional DECwindows Applications This software subset provides additional X11/DECwindows client applications such as `dxcalc` (a calculator), `dxcalendar`, `dxcardfiler`, `dxclock`, `dxnotepad`, and `dxpaint` (a bitmap editor). These applications will be retired in a future release of Digital UNIX.	OSFOLDDECW410	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.	OSFXVFB410	Requires Basic X Environment

E

Associated Product Descriptions

This appendix describes the associated products and software subsets that are shipped in addition to the Digital UNIX base operating system.

Table E–1 describes the products contained on the CD-ROM labeled *Digital UNIX V4.0B Associated Products Volume 1*. Table E–2 describes the products contained on the CD-ROM labeled *Digital UNIX V4.0B Associated Products Volume 2*.

Table E–1: Associated Products Volume 1

Product Directories in /ALPHA	Product Description
CDE_Video	Common Desktop Environment (CDE) Instructional Video
COMPILERS	Development Enhancements for Alpha Systems - Software Development
DEC_Ada_RTL	DEC Ada Run-Time Support Library for Alpha Systems
DEC_C++_RTL	DEC C++ Run-Time Support Library for Alpha Systems (shared libraries)
DEC_Cobol_RTL	DEC COBOL Run-Time Support Library for Alpha Systems and DEC Decimal Run-Time Support Library
DEC_EVENT	DECevent Event Management Utility
DEC_Fortran_RTL	DEC Fortran Run-Time Support Library for Alpha Systems
DEC_Pascal_RTL	DEC Pascal Run-Time Support Library for Alpha Systems
DEC_Sort_RTL	Sort Run-Time Library
DECtalk_Runtime	DECtalk Software for Digital UNIX
GNUSRC	Free Software Foundation GNU Source for Digital UNIX
Multimedia_Services	Multimedia Services for Digital UNIX
Netscape_FastTrack_Server	Netscape FastTrack Server V2.0

Table E–1: Associated Products Volume 1 (cont.)

Product Directories in /ALPHA	Product Description
Networker_SingleServer	NetWorker SingleServer Save and Restore for Alpha Systems
PanoramiX	Xserver Extensions Advanced Developer's Kit
Performance_Manager	Performance Manager for Digital UNIX
Porting_Assistant	Digital Porting Assistant
Worldwide	Worldwide Language Support. Appendix E contains worldwide software subset descriptions.

Table E–2: Associated Products Volume 2

Product Directories	Product Description
AFA	POLYCENTER Advanced File System Utilities
SVE	System V Environment
TCR	TruCluster

E.1 General Instructions 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 RIS. Refer to Chapter 8 for more information about the `setld` command.

Follow these steps if you are installing an associated product from either the CD-ROM labeled *Digital UNIX V4.0B Associated Products Volume 1* or the CD-ROM labeled *Digital UNIX V4.0B Associated Products Volume 2*:

1. Mount the CD-ROM. Refer to Section B.3 if you do not know how to mount a CD-ROM.
2. As superuser or `root`, do *one* of the following:
   - If you are installing an associated product from the CD-ROM labeled *Digital UNIX V4.0B Associated Products Volume 1*, do the following:

     # **/usr/sbin/setld -l /mnt/ALPHA/***product_directory*

     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 E–1 and Table E–2 list the directory names for each associated product.

The `setld` command displays a list of software subsets available to install. Choose the appropriate software subsets from the list.

- If you are installing an associated product from the CD-ROM labeled *Digital UNIX V4.0B Associated Products Volume 2*, do the following:

  # **/usr/sbin/setld -l /mnt/***product_directory*

  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 E–1 and Table E–2 list the directory names for each associated product.

  The `setld` command displays a list of software subsets available to install. Choose the appropriate software subsets 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 to the appropriate software environment.
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.
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 appropriate software subsets from the list.

E.1.1 Updating the whatis Database After Installing Reference Pages for Associated Products

The `apropos` and `whatis` commands access reference page entries in the `whatis` database. The `whatis` database that is created in `/usr/share/man` when you initially install Digital UNIX reference pages includes entries only for those reference pages.

The `whatis` database provided as part of the operating system product is not automatically updated when 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.

E.2 Common Desktop Environment (CDE) Instructional Video

The `CDE_Video` directory contains the following software subsets: `CDEVIDEO100` and `CDEVIDPLR100`. Follow the instructions in Section E.1 to install this product.

The CDE Video Tour runs a series of video files that provide information about:

- The icons on the CDE front panel.
- How to use the calendar manager, the file manager, and the desktop mailer.
- How to manage CDE workspaces.
- How to customize the colors on the desktop by using the style manager. Customized desktop fonts and backgrounds are also mentioned.

The following are required to install and run the CDE instructional video:

- The system installed with or serving the CDE instructional video must have 32 MB of memory and 80 MB of disk space
- You need headphones or speakers
- Your system must be installed with Multimedia Services (which is documented in this appendix).

Information about installing and running the CDE instructional video tour is located on the Help Viewer window, `Introducing the Desktop`. This window displays automatically after a Digital UNIX operating system installation. `Introducing the Desktop` describes basic desktop skills and how to activate online help for the desktop as well as how to invoke the instructional video.

After an installation, you can invoke the `Desktop Introduction` from the CDE front panel by clicking on the arrow over the question mark (`?`) icon and then clicking on `Desktop Introduction`.

E.3 Development Enhancements for Digital UNIX Alpha Systems

The `COMPILERS` directory contains the following software subsets: `CMPDEVENH410` and `CMPDEVALT410`. Follow the instructions in Section E.1 to install this product.

The following describes the two software subsets in this directory:

- CMPDEVENH410 – There are static and shared libraries which contain the `malloc()` system call as it was implemented in Digital UNIX Version 1.2 and Version 1.3. The libraries are shipped to ensure backwards compatibility with previous versions of Digital UNIX. 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 Digital UNIX Version 1.3. Refer to the TASO documentation for more information if your TASO code contains `mmap()`calls.
- CMPDEVALT410 – 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 Digital UNIX. 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 Digital UNIX Version 4.0B 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

Digital UNIX. 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.

E.4 DEC Ada Run-Time Library Support for Digital UNIX Alpha Systems

The DEC_Ada_RTL directory contains the ADALIB331 software subset. Follow the instructions in Section E.1 to install this product.

The Ada Run-Time Library subset is included on the Digital UNIX CD–ROM to facilitate deployment of applications built using DEC Ada.

The following table describes the contents of the DEC Ada Run-Time Library kit:

File Name	Description
libada.so	DEC Ada Run-Time Library, shared object
libada.a	DEC Ada Run-Time Library, archive library

Inclusion of the DEC Ada Run-Time Library in the base system allows users to run applications that were linked with the DEC Ada (run-time) libraries without requiring the user to purchase DEC Ada.

E.5 DEC C++ Class Library for Digital UNIX Alpha Systems

The DEC_C++_RTL directory contains the following software subsets: CXLSHRDA410 and CXLLIBA410. Follow the instructions in Section E.1 to install this product.

The DEC C++ Version 5.0 compiler kits no longer provide the Class Library archive libraries when installed on Digital UNIX Version 4.0B.

The CXLSHRDA410 software subset contains the shared libraries required for the C++ Complex and Task Packages. The CXLLIBA410 software subset contains the corresponding archive libraries.

The mandatory base operating system software subset, OSFBASE410 contains the shared library for the remaining packages, including IOStream, as well as the run-time support. The optional base operating system subset, OSFLIBA410 contains the corresponding archive library.

If you run C++ applications on your system, install the CXLSHRDA410 software subset. If you develop C++ applications on your system, install

both C++ subsets, CXLSHRDA410 and CXLLIBA410 as well as the base operating system software subset OSFLIBA410.

There is no need to remove the CXXSHRDA subset that was included in Digital UNIX Version 4.0 or 4.0A before you upgrade to Digital UNIX Version 4.0B. However, you must remove the old CXXSHRDA subset before you can install CXLSHRDA410.

The CXLLIBA410 subset will not install if your system has the DEC C++ Version 1. *n* compiler installed. Before you install the CXLLIBA410 subset Digital recommends that you upgrade the DEC C++ compiler to Version 5.0 or later.

E.6 DEC COBOL Run-Time Support Library for Digital UNIX Systems

The `DEC_Cobol_RTL` directory contains the following software subsets: `DCARTL230` and `02ABASE230`. Follow the instructions in Section E.1 to install this product.

DEC COBOL Run-Time Support Library for Digital UNIX 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 for Digital UNIX 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 DCARTL230 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 O2ABASE230 subset:

File Name	Description
libots2.a	DEC Decimal Support Run-time (archive) Library
libots2.so	DEC Decimal Support Run-time (shared) Library

E.7 DECevent Management Utility

The DEC_EVENT directory contains the DIABASE211 software subset. Follow the instructions in Section E.1 to install this product.

The DECevent utility is an event management utility for Digital UNIX operating systems that provides the interface between a system user and the system's event log files. This lets system users produce ASCII reports derived from system event entries. The format of the ASCII reports depends on the command entered on the command line or on the command entered from the graphical user interface (GUI). Command line commands are restricted to 255 characters. Event report information can be filtered by event types, date, time, and event entry numbers. Event report formats can be selected from full disclosure to very brief information messages. The -i (include) and -x (exclude) flags provide a wide range of selection criteria to narrow down the focus of event searches.

The DECevent utility also offers an interactive command shell interface, accessible with the command --int, that recognizes the same commands used at the command line. From the interactive command shell users can customize, change, or save system settings.

DECevent uses the system event log file /usr/adm/binary.errlog as the default input file for event reporting, unless another file is specified. To produce a translated report using the built-in defaults, type the following command at the command line:

```
# dia
```

To produce a translated event report using the GUI, click on the translate/auto icon in the DECevent GUI menu bar.

Digital UNIX users need super user privileges to use the translation and reporting features of DECevent, unless the event log file privileges have been changed to let all users read the event log file.

E.8 DEC Fortran for Digital UNIX Alpha Run-Time Support

The DEC_Fortran_RTL directory contains the DFARTL364 software subset. Follow the instructions in Section E.1 to install this product.

The DEC Fortran for Digital UNIX 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 Digital UNIX 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

E.9 DEC Pascal for Digital UNIX Alpha Run-Time Support

The DEC_Pascal_RTL directory contains the DPORTL540 software subset. Follow the instructions in Section E.1 to install this product.

The DEC Pascal for Digital UNIX 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 Pascal programming language implementation. The DEC Fortran for Digital UNIX Alpha Run-Time Support subsets must be installed at the same time as the DEC Pascal for Digital UNIX Alpha Run-Time Support Library subset.

File Name	Description
libpas.a	DEC Pascal RTL
libpas.so	
libpas_msg.cat	DEC Pascal RTL message catalog

E.10 DECtalk Software for Digital UNIX

The DECtalk_Runtime directory contains the following software subsets: DTKRT420, DTKRTDOC420, DTKRTRELNOT420, DTKDFCRT420, DTKRTCDE420, and DTKEMSRT420. Follow the instructions in Section E.1 to install this product.

DECtalk Software for Digital UNIX is a text-to-speech software based on Digital Equipment Corporation's industry-leading text-to-speech synthesis technology.

DECtalk Software lets applications convert standard ASCII text in American English into highly intelligible and natural sounding speech, playable through audio hardware on Alpha workstations.

DECtalk documentation and release notes are loaded into the subdirectories under the `/usr/opt/DTKRTDOC420/doc` directory when the DTKRTDOC420 software subset is installed. The *DECtalk Software User's Guide* is available on line in `/usr/opt/DTKRT420/docs/html`.

The DECtalk Software applications provide reference pages, which are located in the `/usr/man/man1` directory. Use the `man` command to access the following reference pages:

- `aclock(1)`
- `decface(1)`
- `dectalk(1)`
- `emacspeak(1)`
- `mailtalk(1)`
- `say(1)`
- `speak(1)`
- `windict(1)`

The DECtalk run-time package is bundled with several sample applications:

- `Speak`- is a windowed text editor that can read. Controls are provided to pick one of nine different speaking voices and to change speaking rate from a slow 75 words per minute to 600 words per minute. Start and stop controls are provided to control the speech output. `Speak` can also convert ASCII text into an audio file in WAVE format. For customization of the pronunciation of specialized words or acronyms, `Speak` can load a custom pronunciation dictionary. These dictionaries are prepared using another application supplied called `Windict`.
- `Windict`- is a windowed application that accepts words and their associated phonetic pronunciation. From these lists it compiles a user dictionary that can be used by DECtalk. `Windict` has a translate function that aids in creating phonetic spellings.
- `Say`- is a command line command that speaks specified files or text. It enables simple integration of text-to-speech with shell scripts or applications that can generate shell commands. `Say` can also be used as a text to WAVE file converter.

- Aclock- is a talking clock. Aclock can be set to speak the current time periodically.
- Mailtalk- is a program that notifies users of the arrival of mail messages. It is a speech enabled version of the UNIX biff command. For example when a mail message arrives, mailtalk will say "You have just received a message from John Doe, subject: mailtalk is great!"
- Emacspeak- uses text-to-speech extensively to provide emacs with access for the visually impaired. Emacspeak is context sensitive emacs extension that intelligently reads the contents of the screen rather than just scanning the screen and literally reading characters off the screen.

  Information on how to use emacspeak is provided in files located in subdirectories under the /usr/opt/DTKRT420/emacspeak/docs directory. See also the emacspeak(1) reference page for more information.
- DECface- is a computer-generated, synthetic face that synchronizes facial movements to synthesized speech provided by DECtalk. As DECtalk generates speech, DECface displays the facial expressions of a human actually speaking those words. DECface offers the ability to develop a large variety of new applications by combining the audio functionality of a speech synthesizer with the graphical functionality of a computer-generated face. For example, an audio biff can be simply modified to become a face biff, a talking articulated face. In addition, a synthetic character can give multimedia presentations or monitor a system and report anomalies as a feedback agent. One of the more intriguing possibilities is assisting a user by combining an interactive face with Digital Speech Recognition.

  DECface enhances DECtalk by providing an obvious and immediate visual feedback mechanism. In particular, multimedia projects involving direct user interaction can be enhanced to better attract and maintain the attention of viewers.

  Specific information on how to invoke and use DECface can be found in files located in subdirectories under the /usr/opt/DTKRT420/decface/docs directory. See also the decface(1) reference page for more information.

E.11 Free Software Foundation GNU Source for Digital UNIX

The GNUSRC directory contains the following software subsets from the GNU Free Software Foundation: FSFGAWKSRC410, FSFINDENTSRC410, FSFEMACSSRC410, FSFRCSSRC410 and FSFGZIPSRC410. Follow the instructions in Section E.1 to install this product.

The GNU awk Source subset, FSFGAWKSRC410, contains source files for the GNU awk (gawk) programming language. Gawk is the GNU Project's implementation of the awk programming language. Refer to the gawk(1) reference page for more information.

The GNU Emacs Source subset, FSFEMACSSRC410, 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.

The GNU Revision Control System Source subset, FSFRCSSRC410, contains source files for the GNU Revision Control System (RCS). Refer to the rcs(1) reference page for more information.

The GNU ident Source subset, FSFINDENTSRC410, 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.

The GNU gzip source subset, FSFGZIPSRC410, contains the source files for the gzip utility which compresses or expands files. Refer to the gzip(1) reference page for more information.

E.12 Netscape FastTrack Server V2.0

The Netscape FastTrack Server V2.0 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 on installing this product are different from the instructions for installing the other associated layered products that use setld -l. The Netscape FastTrack Server kit is located on the *Digital UNIX 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 *Digital UNIX 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/rz4c 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/rz4c /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 *Digital UNIX Associated Products Volume 1 CD-ROM*, 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 Digital recommends 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.

E.13 NetWorker SingleServer Save and Restore

The Networker_SingleServer directory contains the following software subsets: BRXSOAKIT320, BRXCKIT320, BRXMAN320, and BRXRNOTES320. Follow the instructions in Section E.1 to install this product.

NetWorker SingleServer Save and Restore, also known as NetWorker SingleServer, is a graphical utility that backs up and restores local files on a single local system to a local tape or loader. Unlike standard UNIX backup utilities such as tar, cpio, dump/restore, or vdumd/vrestore, NetWorker SingleServer provides easy to use user interfaces for saving and restoring data and for performing system administration tasks.

NetWorker SingleServer is a subset of Digital's POLYCENTER NetWorker Save and Restore product and is licensed free of charge with the Digital UNIX base operating system.

The OSF-BASE, UNIX-SERVER, or UNIX-WORKSTATION Product Authorization Key (PAK) gives you a license to install and use SingleServer; you do not need to load and register a special PAK.

Following is a description of the four NetWorker SingleServer software subsets:

- `BRXSOAKIT` contains the NetWorker SingleServer graphical user interface and utilities.
- `BRXCKIT` contains the client software for the Digital UNIX client and the Windows NT client. This software subset is not required for NetWorker SingleServer.
- `BRXRNOTES` contains the NetWorker Save and Restore and NetWorker SingleServer documentation and Release Notes.
- `BRXMAN` contains the NetWorker Save and Restore reference pages.

After you install the NetWorker SingleServer subset `BRXRNOTES320`, postscript files containing the NetWorker documents are loaded into `/usr/opt/BRX320/usr/doc`.

During the installation, you are asked if you want to start the NetWorker daemons. If you enter `no`, the daemons will be started when the system is rebooted. To start the daemons manually without rebooting, refer to `nsrd`(8).

E.14 Sort Run-Time Library

The `DEC_Sort_RTL` directory contains the `SORLIB300` software subset. Follow the instructions in Section E.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 Digital UNIX 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 SORLIB300 subset.

File Name	Description
libsort.so	Shareable object of Sort RTL routines
libsort.a	Library of Sort RTL routines
libsort.cat	Sort message catalog

E.15 PanoramiX Xserver Extension Advanced Developer's Kit

The PanoramiX directory contains the PRXADK100 software subset. Follow the instructions in Section E.1 to install this product.

This section discusses the Digital solution for a multiheaded single root window. The implementation removes graphics drawing screen size contraints and creates a screen equal to the combined width and height of all screens connected to the system.

The PanoramiX Extensions is provided in this advanced development kit (ADK). The following table lists the contents of the PanoramiX ADK:

File Name	Description
libpanoramiX.so	PanoramiX extension shared library
libos.so	Modified version of core server library
libmi.os	Modified version of core server library
libdix.so	Modified version of core server library
libextshape.so	Modified version of shape extension library
PanoramiX	Modified version of Xdec
Xserver.conf	Modified version of server config file
README_PANORAMIX.TXT	Contains information about PanoramiX extension. Read this file before enabling the extensions.

E.16 Performance Manager for Digital UNIX

The Performance_Manager directory contains the following software subsets: PMGRBASE210, PMGRGUI210, PMGRUTIL210, and PMGRMAN210. Follow the instructions in Section E.1 to install this product.

Performance Manager Version 2.0 (PM V2) is a realtime performance monitoring, analysis, and management application. A single-system version

of PM V2 is included with Digital UNIX Version 4.0B. A separate license is available to enable the distributed Performance Manager.

While providing many of the features of previous versions of the Polycenter Performance Solution for Digital UNIX , PM V2 is a complete reimplementation with a new GUI, application-accessible metrics, user extensibility and performance analysis capability.

The following Performance Manager software subsets are located in the `Performance_Manager` directory:

- `PMGRBASE210`- Performance Manager Data Collector and Base
- `PMGRGUI210`- Performance Manager Graphical User Interface
- `PMGRMAN210`- Performance Manager Reference Pages
- `PMGRUTIL210`- Performance Manager Additional Utilities

Postscript and text versions of the Performance Manager Installation Guide and Release Notes are located under the `DOCUMENTATION/PERFORMANCE_MANAGER` directory on the CD-ROM labeled *Digital UNIX V4.0B Documentation Volume 1*.

Features of the Performance Manager are:

- 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. The conclusions of the analyses are presented in clear text with suggestions for remedial action if appropriate.
- System and Script Management - Provides a script management capability, which lets users incorporate their own system management and other scripts into PM.
- Open Metrics Access - You can access PM V2 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 AFAADVDAEMON410 software subset and appropriate license.

E.17 Digital Porting Assistant

The Porting_Assistant directory contains the following software subsets: PRTBASE200 and PRTMAN200. Follow the instructions in Section E.1 to install this product.

The Digital Porting Assistant is a Motif-based tool to help you port your C, C++, and FORTRAN source code to Digital UNIX 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 Digital UNIX specific code segments
- Provides information on porting your application

The Porting Assistant is licensed and provided to you with the Digital UNIX Developers' Toolkit, but it requires separate installation.

For detailed information about the Porting Assistant, refer to its extensive online HyperHelp system. You can also refer to the port reference page for command options and details.

After installation, invoke the Porting Assistant from the Common Desktop Environment (CDE) or from the command line:

- From CDE: If you install the Software Development Tools and Utilities for CDE (OSFSDECDE410), you can invoke the Porting Assistant from an icon on the desktop.
- From the command line, enter the following:

  ```
  # port
  ```

E.18 Multimedia Services for Digital UNIX

The Multimedia_Services directory contains the following software subsets: MMERELNOTES201, MMEMANRT201, MMERT201, MMECDE201, MMERTSMPLDAT201, MMEDRVAV201201, MMEDRVAV3X1201, MMEDRVMSB201, MMEDRVA3001201, and MMEDRVBBA201. Follow the instructions in Section E.1 to install this product.

Multimedia Services Version 2.0A for Digital UNIX brings audio and video capabilities to Digital 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 Digital UNIX.

Installing the reference pages for Multimedia Services (MMEMANRT201) 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.

Digital UNIX 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:

- MMERELNOTES201 - Multimedia Services for Digital UNIX Release Notes. Contains product release notes, Software Product Description (SPD) and a cover letter. Files are installed in `/usr/opt/MMERELNOTES201`.
- Run-Time Kit:
  - MMEMANRT201 - Multimedia Services for Digital UNIX Run-time Man Pages. This subset contains the man pages for run-time applications and commands. Requirements: OSFDCMT410 Doc. Preparation Tools
  - MMERT201 - Multimedia Services for Digital UNIX 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.

  - MMERTCDE201 - Multimedia Services for Digital UNIX CDE Integration. This subset contains the icons and action files to enable multimedia integration with the Common Desktop Environment (CDE). Requirements: MMERT201 and OSFCDEEDT410.
  - MMERTSMPLDAT201 - Multimedia Services for Digital UNIX Sample Data. This subset contains sample audio and video clips. Requirements: MMERT201 and OSFCDEEDT410.
- Hardware Option Support for PCI/EISA/ISA Bus Machines:
  - MMEDRVAV201201 - FullVideo Basic (AV201) Device Support. This subset contains the device support files for the FullVideo Basic option module. Requirements: MMERT201, PCI bus machine. Installation requires a kernel rebuild.
  - MMEDRVAV3X1201 - FullVideo Supreme (AV321/AV301) Device Support. This subset contains the device support files for the FullVideo Supreme option modules. Requirements: MMERT201, PCI bus machine. Installation requires a kernel rebuild.
  - MMEDRVMSB201 - Microsoft Sound Board Device Support. This subset contains the device support files for the Microsoft Sound Board option module. Requirements: MMERT201, ISA or EISA bus machine. Installation requires a kernel rebuild.
- Hardware Option Support for TURBOchannel Bus Machines:
  - MMEDRVA3001201 - Sound and Motion (J300) Device Support. This subset contains the device support files for the Sound and Motion option module. Requirements: MMERT201, TURBOchannel bus machine. Installation requires a kernel rebuild.
  - MMEDRVBBA201 - Base Board Audio Device Support. This subset contains the device support files for the Base Board Audio module. Requirements: MMERT201, TURBOchannel bus machine. Installation does not require a kernel rebuild.

The `/DOCUMENTATION/Multimedia_Services` directory on the CD-ROM labeled *Digital UNIX V4.0B Documentation Volume 1* contains the following Multimedia Services documents:

- `/BOOKREADER/runtime_guide.decw_book`
- `/POSTSCRIPT/runtime_guide.ps`
- `/TEXT/runtime_guide.txt`

The `/DOCUMENTATION` directory on the CD-ROM labeled *Digital UNIX V4.0B Associated Products Volume 1* contains the following Multimedia Services documents:

- `/HTML/MME201_RELNOTES.html`

- /POSTSCRIPT/MME201_IGUIDE.ps
- /POSTSCRIPT/MME201_RELNOTES.ps
- /POSTSCRIPT/MME201_SPD.ps
- /TEXT/MME201_IGUIDE.txt
- /TEXT/MME201_RELNOTES.txt
- /TEXT/MME201_SPD.txt

E.19 POLYCENTER Advanced File System Utilities

The AFA directory contains the following software subsets: AFAADVANCED401, AFAADVDAEMON401, AFAADVGUI401, and AFAADVMAN401. Follow the instructions in Section E.1 to install this product.

The POLYCENTER Advanced File System Utilities consist of several management utilities that extend the capabilities of the POLYCENTER Advanced File System (AdvFS). The AdvFS Utilities let you:

- Spend less time managing file systems
- Improve performance
- Keep your data on line during routine maintenance
- Extend the capacity of files and file systems

The software subsets contain:

- AFAADVANCED401 - POLYCENTER Advanced File System Advanced Utilities
- AFAADVDAEMON401 - POLYCENTER Advanced File System Daemon
- AFAADVGUI401 - POLYCENTER Advanced File System Graphical User Interface
- AFAADVMAN401 - POLYCENTER Advanced File System Advanced Utilities Reference Pages

E.20 System V Environment

The SVE directory contains the following software subsets: SVEENV410, SVEADM410, SVEBCP410, SVEDEV410, SVEMAN410, and SVEPRINT410. Follow the instructions in Section E.1 to install this product.

The System V Environment product combines the features of both Digital UNIX and SVR4 to provide a truly unified UNIX product on the ALPHA AXP platform. The System V Environment functionality includes

SVID3–compliant commands, utilities, system calls and libraries, and many SVR4 features.

The software subsets contain:

- SVEENV410 - System V Environment Setup Files Package
- SVEADM410 - System V Environment System Management Package
- SVEBCP410 - System V Environment Base Compatibility Package
- SVEDEV410 - System V Environment API and Development Tools Package
- SVEMAN410 - System V Environment Reference Pages Package
- SVEPRINT410 - System V Environment Print Package

E.21 TruCluster

The TCR directory contains the following software subsets: TCRASE140, TCRCMS140, TCRCOMMON140, TCRCONF140, TCRDSVC140, and TCRMCA140. Follow the instructions in Section E.1 to install this product.

TCR consists of the following products:

- TruCluster Available Server Software — This product lets you create an integrated organization of systems and disks located on a shared SCSI bus that together provide highly available software and data to client systems. Available Server provides multihost access to shared storage and a generic failover mechnism for network-based applications and system services.
- TruCluster Production Server Software — This product lets you create a cluster of two or more systems with clusterwide, multihost access to shared storage. Production Server supports highly parallelized database applications, such as Oracle Parallel Server™, which provide high performance and high availability. The distinguishing feature of Production Server is its support of the PCI-based MEMORY CHANNEL as a cluster interconnect, bringing leadership performance to intracluster communication.
- TruCluster MEMORY CHANNEL Software — This product lets programmers write distributed applications requiring direct access to the MEMORY CHANNEL for high performance. MEMORY CHANNEL consists of a device driver and a routine library.

The license (PAK) that is registered determines which group of the TCR subsets will be displayed when the user runs `setld -l`. The Production Server license gives the customer complete access to the full kit. The Available Server and MEMORY CHANNEL Software licenses allow access

to only certain portions of the kit. See the appropriate TCR documentation for more information.

The software subsets contain:

- TCRASE140 - Available Server Software
- TCRCMS140 - Cluster Monitor
- TCRCOMMON140 - Common Components
- TCRCONF140 - Configuration Software
- TCRDSVC140 - Production Server Software
- TCRMAN140 - Reference Pages
- TCRMCA140 - MEMORY CHANNEL Software

F

Worldwide Software Subset Descriptions

This appendix describes the Digital UNIX Version 4.0B worldwide language support software subsets. Worldwide language software subsets are located on the CD-ROM labeled *Digital UNIX V4.0B Associated Products Volume 1* in the `/ALPHA/WORLDWIDE` directory. The worldwide installation script is located at `/ALPHA/WORLDWIDE/wwinstall`.

Refer to Chapter 9 for information about performing a worldwide installation. There is no special license registration required to install the worldwide language support software subsets.

The following languages are supported:

- Worldwide Language Support
- Czech
- German
- Greek
- Spanish
- French
- Hungarian
- Italian
- Hebrew
- Japanese
- Korean
- Polish
- Russian
- Slovak
- Swedish
- Thai
- Turkish
- Chinese
- Catalan

- Lithuanian
- Slovene

F.1 Worldwide Support Software Descriptions

Worldwide support provides the following software subsets:

- IOSLDBBASE405 Ladebug Debugger (Software Development) – This software subset contains the internationalized Ladebug debugger which supports 16 bit wide-character. This software subset is optional.
- IOSLDBDOC405 Ladebug Debugger Release Notes (Software Development) – This software subset contains the release notes of the internationalized Ladebug debugger. This software subset is optional.
- IOSLDBGUI405 Ladebug Debugger Window Interface (Software Development) – This software subset contains the window interface of internationalized Ladebug Debugger. This software subset is optional. This software subset requires the OSFX11410 software subset.
- IOSLDBSRV405 Ladebug Debugger remote server (Software Development) – This software subset contains the remote server of internationalized Ladebug debugger. This software subset is optional.
- IOSULUCSBASE405 Universal Locale Unicode Support (Operating System) – This software subset contains the locales, method libraries and codeset converters of Universal Locale Unicode UTF8. It is mandatory.
- IOSWWBASE405 Worldwide Base System (Operating System) – This software subset is mandatory for all languages. It requires the presence of the OSFBASE410 software subset of the base operating system.
- IOSWWBIN405 Worldwide Standard Kernel Modules (Kernel Build Environment) – This software subset contains the standard kernel modules for the Asian terminal drivers and services. This software subset is mandatory for Asian languages. This software subset requires the IOSWWBINCOM405 and OSFBIN410 software subsets.
- IOSWWBINCOM405 Worldwide Kernel Headers and Common Files (Operating System) – This software subset is mandatory for Asian languages. It contains kernel header and other common files for building standard kernel or extended kernel which contains Asian/Thai terminal drivers and services. This software subset requires the OSFBINCOM410 software subset.
- IOSWWCDEDT405 Worldwide CDE Desktop Environment (Windowing Environment) – This software subset contains font alias files for Greek, Hungarian, Russian, Lithuanian, Slovene, and Turkish language supports in CDE environment. This software subset requires the

OSFCDEDT410 software subset. It is a mandatory subset if the OSFCDEDT410 software subset is installed.

- IOSWWFONTM405 Worldwide DECwindows Mandatory Fonts (Windowing Environment) – This software subset contains the workstation font files.
- IOSWWLAT2FONT100M405 Worldwide ISO-LATIN2 DECwindows 100dpi Mandatory Fonts (Windowing Environment) – This software subset contains workstation ISO-LATIN2 100dpi mandatory 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.
- IOSWWLAT2FONT100P405 Worldwide ISO-LATIN2 DECwindows 100dpi Optional Fonts (Windowing Environment) – This optional software subset contains Workstation ISO-LATIN2 100dpi optional font files.
- IOSWWLAT2FONT75M405 Worldwide ISO-LATIN2 DECwindows 75dpi Mandatory Fonts (Windowing Environment) – This software subset contains Workstation ISO-LATIN2 75dpi mandatory font files. This software subset is mandatory for systems using low resolution graphics monitor and is optional for systems using either the VR160 15-inch monitor or a higher resolution graphics monitor.
- IOSWWLAT2FONT75P405 Worldwide ISO-LATIN2 DECwindows 75dpi Optional Fonts (Windowing Environment) – This optional software subset contains Workstation ISO-LATIN2 75dpi optional font files.
- IOSWWLAT4FONT100M405 Worldwide ISO-LATIN4 DECwindows 100dpi Mandatory Fonts (Windowing Environment) – This software subset contains workstation ISO-LATIN4 100dpi mandatory 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.
- IOSWWLAT4FONT100P405 Worldwide ISO-LATIN4 DECwindows 100dpi Optional Fonts (Windowing Environment) – This optional software subset contains Workstation ISO-LATIN4 100dpi optional font files.
- IOSWWLAT4FONT75M405 Worldwide ISO-LATIN4 DECwindows 75dpi Mandatory Fonts (Windowing Environment) – This software subset contains Workstation ISO-LATIN4 75dpi mandatory font files. This software subset is mandatory for systems using low resolution graphics monitor and is optional for systems using either the VR160 15-inch monitor or a higher resolution graphics monitor.

- IOSWWLAT4FONT75P405 Worldwide ISO-LATIN4 DECwindows 75dpi Optional Fonts (Windowing Environment) – This optional software subset contains Workstation ISO-LATIN2 75dpi optional font files.
- IOSWWLATCFONT100M405 Worldwide ISO-LATIN Cyrillic DECwindows 100dpi Mandatory Fonts (Windowing Environment) – This software subset contains Workstation ISO-LATIN Cyrillic 100dpi mandatory font files. It 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.
- IOSWWLATCFONT100P405 Worldwide ISO-LATIN Cyrillic DECwindows 100dpi Optional Fonts (Windowing Environment) – This optional software subset contains Workstation ISO-LATIN Cyrillic 100dpi optional font files.
- IOSWWLATCFONT75M405 Worldwide ISO-LATIN Cyrillic DECwindows 75dpi Mandatory Fonts (Windowing Environment) – This software subset contains Workstation ISO-LATIN Cyrillic 75dpi mandatory font files. This software subset is mandatory for systems using a low resolution graphics monitor and is optional for systems using either the VR160 15-inch monitor or a higher resolution graphics monitor.
- IOSWWLATCFONT75P405 Worldwide ISO-LATIN Cyrillic DECwindows 75dpi Optional Fonts (Windowing Environment) – This optional software subset contains Workstation ISO-LATIN Cyrillic 75dpi optional font files.
- IOSWWLAT2OLFONT405 Worldwide ISO-LATIN2 Outline Fonts (Windowing Environment) – This optional software subset contains ISO-LATIN2 outline font files. This software subset requires the OSFAFM410 software subset.
- IOSWWLATCOLFONT405 Worldwide ISO-LATIN Cyrillic Outline Fonts (Windowing Environment) – This optional software subset contains ISO-LATIN Cyrillic outline font files. This software subset requires the OSFAFM410 software subset.
- IOSWWMOTIF11405 Worldwide Motif 1.1 (Windowing Environment) – This software subset contains Worldwide Motif 1.1.3 libraries. They are used by dxnotepad software and for backward compatibility. This software subset requires the OSFMOTIF11410 software subset. It is a mandatory subset if the OSFMOTIF11410 software subset is installed.
- IOSWWMULE405 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 optional.

- IOSWWOLDBKR405 Worldwide Old Bookreader (Windowing Environment) – This subset contains dxbook Version 3.0 which has been renamed as mdxbook. mdxbook supports printing of multibyte characters where the dxbook utility of the windowing system does not. Except for the multibyte printing capability, the quality of mdxbook is not as good as dxbook. You only install this subset if you need multibyte printing capability. This subset also contains localization files for Japan, Korean, PRC and Taiwan. This is an optional subset and requires the IOSWWX11405 subset.
- IOSWWOLDDECW405 Worldwide Old Additional DECwindows Applications (Windows Applications) – This software subset contains Worldwide version of X11/DECwindows client application dxnotepad, which will be retired in the future version of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSWWX11405 software subsets. It is a mandatory subset if the OSFOLDDECW410 software subset is installed.
- IOSWWPGMR405 Worldwide Software Development (Software Development) – This software subset contains header files and examples for Worldwide software development. This software subset is optional and requires the IOSWWBASE405 software subset.
- IOSWWPHRASE405 Worldwide Phrase Input Support (Operating System) – This software subset contains binary files for the phrase input methods and daemons. This software subset is optional and requires the IOSWWBASE405 software subset.
- IOSWWPRINT405 Worldwide Printer Support (Operating System) – This software subset contains the lp* commands for Chinese, Greek, Japanese, Korean, Thai, and Turkish languages. It also contains common print filters for all Asian language variants. This software subset is requires the OSFPRINT410 and IOSWWBASE405 software subsets. This software subset is mandatory if the OSFPRINT410 software subset is installed.
- IOSWWSVEDEV405 Worldwide SVE MNLS Migration Tools (Software Development) – This software subset contains the migration tools of SVE MNLS, System V Environment Multinational Languages Support. This software subset is optional.
- IOSWWSYSMAN405 Worldwide Configuration Tool (System Configuration) – This software subset contains the Worldwide configuration tool. This software subset requires the IOSWWBASE405, OSFSYSMAN410 and OSFXSYSMAN410 software subsets. This software subset is optional.

- IOSWWUCSBASE405 Worldwide Unicode UCS-4 Locales Support (Operation System) – This software subset contains codeset converters for Unicode UCS4 locales and method library of Unicode UCS4 locales. This software subset is mandatory.
- IOSWWUDCOS405 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 IOSWWBASE405 software subset.
- IOSWWUDCWOS405 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 IOSWWX11405 software subset.
- IOSWWX11405 Worldwide Basic X Environment (Windowing Environment) – This software subset contains the X11/DECwindows required programs. This software subset is mandatory and requires the OSFX11410 and IOSWWBASE405 software subsets.
- IOSWWXDEV405 Worldwide X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce X/Motif Window system client applications. It also includes example programs demonstrating how to get started using the client applications. This software subset is optional and requires the IOSWWX11405 and OSFXDEV410 software subsets.
- IOSWWXFR405 Worldwide Two-Byte Outline Font Renderer (Windowing Environment) – This software subset contain the outline font renderer for two-byte outline font. This software subset is optional requires the IOSWWX11405 software subset.
- IOSWWMULESRC405 Worldwide MULE Source Files (Public Domain Source) – This software subset contains the source files for MULE. This software subset is optional.

F.2 Czech Support

Czech Support contains the following software subsets:

- IOSCSCDEAPPS405 Czech CDE Additional Applications (Windowing Applications) – This software subset contains Czech resource files and message catalogues for the Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSCSCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.
- IOSCSDECW405 Czech Additional DECwindows Applications (Windowing Applications) – This software subset contains Czech

resource files and UID files for the X11/DECwindows client applications `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSCSX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.

- IOSCSCDEDEV405 Czech CDE Software Development (Software Development) – This software subset contains Czech Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSCSCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSCSCDEDT405 Czech CDE Desktop Environment (Windowing Environment) – This software subset contains Czech resource files and message catalogues for the Common Desktop Environment. This software subset requires the OSFCDEDT410 and IOSCSCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSCSCDEMAIL405 Czech CDE Mail Interface (Mail Applications) – This software subset contains Czech resource files and message catalogues for the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSCSCDEDT405 software subsets. This software subset is mandatory if the OSFCDEMAIL410 software subset is installed.
- IOSCSCDEMIN405 Czech CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Czech resource files and message catalogues for the Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and OSCSX11410 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSCSOLDDECW405 Czech Old Additional DECwindows Applications (Windows Applications) – This software subset contains Czech resource files and UID files for the X11/DECwindows client application `dxnotepad`, which will be retired in a future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSCSX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSCSOLDX11405 Czech Old X Environment (Windowing Environment) – This software subset contains Czech resource files and UID files for the X window applications `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSCSX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.

- IOSCSUCSBASE405 Czech Unicode Support (Operating System) – This software subset contains the Czech Unicode locale. This software subset is mandatory and requires the IOSWWUCSBASE405 software subset.
- IOSCSX11405 Czech Basic X Environment (Windowing Environment) – This mandatory software subset contains Czech X11/DECwindows required programs and shared libraries and provides Czech resource and UID files. This software subset requires the OSFX11410 and IOSWWBASE405 software subsets.
- IOSCSXDEV405 Czech X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Czech X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSCSX11405 software subsets.
- IOSCSXMAIL405 Czech DECwindows Mail Interface (Windowing Environment) – This software subset contains the Czech DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSCSX11405 software subsets.

F.3 German Support

German Support contains the following software subsets:

- IOSDECDEAPPS405 German CDE Additional Applications (Windowing Applications) – This software subset contains German resource files and message catalogues of the Common Desktop Environment (CDE) additional applications. This software subset requires the OSFCDEAPPS410 and IOSDECDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 subset is installed.
- IOSDECDEDEV405 German CDE Software Development (Software Development) – This software subset contains the German Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSCDEDT405 software subsets. It is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSDECDEDT405 German CDE Desktop Environment (Windowing Environment) – This software subset contains German resource files and message catalogues of the user interface for the Common Desktop Environment. This software subset requires the OSFCDEDT410 and IOSDECDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSDECDEHLP405 German CDE Online Help (Windowing Environment) – This software subset contains German online help files

for the Common Desktop Environment. This software subset is optional and requires the IOSDECDEDT405 software subset.

- IOSDECDEMAIL405 German CDE Mail Interface (Mail Applications) – This software subset contains German resource files and message catalogues of the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSDECDEDT405 software subsets. This software subset is mandatory if the OSFCDEMAIL410 software subset is installed.
- IOSDECDEMIN405 German CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains German resource files and message catalogues for the Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSDEX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 subset is installed.
- IOSDEDECW405 German Additional DECwindows Applications (Windowing Applications) – This software subset contains German resource files and UID files for the X11/DECwindows client application `dxpaint` and dxprint. This software subset requires the OSFDECW410 and IOSDEX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSDEOLDDECW405 German Old Additional DECwindows Applications (Windows Applications) – This software subset contains German resource files and UID files for the X11/DECwindows client application `dxnotepad`, which will be retired in the future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSDEX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSDEOLDX11405 German Old X Environment (Windowing Environment) – This software subset contains German resource files and UID files for the X window applications: `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSDEX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSDEX11405 German Basic X Environment (Windowing Environment) – This mandatory software subset contains German X11/DECwindows required programs and shared libraries. It also provides German resource files and UID files. This software subset requires OSFX11410 and OSFEURLOC410.
- IOSDEXDEV405 German X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce German X/Motif window system client

applications. This software subset is optional and requires the IOSWWXDEV405 and IOSDEX11405 software subsets.

- IOSDEXMAIL405 German DECwindows Mail Interface (Windowing Environment) – This software subset contains the German DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSDEX11405 software subsets.

F.4 Greek Support

Greek Support provides the following software subsets:

- IOSELDECW405 Greek Additional DECwindows Applications (Windowing Applications) – This software subset contains Greek resource files and UID files for the X11/DECwindows client application `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSELX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSELFONT100M405 Greek DECwindows 100dpi Mandatory Fonts (Windowing Environment) – This software subset contains workstation Greek 100dpi mandatory font files. This software subset is mandatory for systems using either the VR160 15-inch monitor or a higher resolution graphics monitor. This software subset is optional for systems using a low resolution graphics monitor.
- IOSELFONT100P405 Greek DECwindows 100dpi Optional Fonts (Windowing Environment) – This optional software subset contains workstation Greek 100dpi optional font files.
- IOSELFONT75M405 Greek DECwindows 75dpi Mandatory Fonts (Windowing Environment) – This software subset contains workstation Greek 75dpi mandatory font files. This software subset is mandatory for systems using a low resolution graphics monitor and is optional for systems using either the VR160 15- inch monitor or a higher resolution graphics monitor.
- IOSELFONT75P405 Greek DECwindows 75dpi Optional Fonts (Windowing Environment) – This optional software subset contains workstation Greek 75dpi optional font files.
- IOSELOLDDECW405 Greek Old Additional DECwindows Applications (Windows Applications) – This software subset contains Greek resource files and UID files for the X11/DECwindows client application `dxnotepad`, which will be retired in the future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSELX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.

- IOSELUCSBASE405 Greek Unicode Support (Operating System) – This software subset contains Greek Unicode locale. This software subset is mandatory and requires the IOSWWUCSBASE405 software subset.
- IOSELX11405 Greek Basic X Environment (Windowing Environment) – This software subset contains Greek X11/DECwindows required programs and shared libraries. It also provides Greek resource files and UID files. It is mandatory and requires the OSFX11410 and OSFEURLOC410 software subsets.
- IOSELXMAIL405 Greek DECwindows Mail Interface (Windowing Environment) – This software subset contains the Greek DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSELX11405 software subsets.
- IOSELOLFONT405 Greek Outline Fonts (Outline Fonts) – This software subset contains Greek outline font files and it is optional. This software subset requires the OSFAFM410 software subset.

F.5 Spanish Support

Spanish Support contains the following software subsets:

- IOSESCDEAPPS405 Spanish CDE Additional Applications (Windowing Applications) – This software subset contains Spanish resource files and message catalogues for the Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSESCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.
- IOSESCDEDEV405 Spanish CDE Software Development (Software Development) – This software subset contains Spanish Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSESCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSESCDEDT405 Spanish CDE Desktop Environment (Windowing Environment) – This software subset contains Spanish resource files and message catalogues for the Common Desktop Environment. This software subset requires the OSFCDEDT410 and IOSESCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSESCDEHLP405 Spanish CDE Online Help (Windowing Environment) – This software subset contains Spanish online help files of Common Desktop Environment. This software subset is optional and requires the IOSESCDEDT405 software subset.

- IOSESCDEMAIL405 Spanish CDE Mail Interface (Mail Applications) – This software subset contains Spanish resource files and message catalogues of the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSESCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEMAIN410 software subset is installed.
- IOSESCDEMIN405 Spanish CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Spanish resource files and message catalogues for Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSESX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSESDECW405 Spanish Additional DECwindows Applications (Windowing Applications) – This software subset contains Spanish resource files and UID files for the X11/DECwindows client applications `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSESX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSESOLDDECW405 Spanish Old Additional DECwindows Applications (Windows Applications) – This software subset contains Spanish resource files and UID files for X11/DECwindows client application `dxnotepad`, which will be retired in the future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSESX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSESOLDX11405 Spanish Old X Environment (Windowing Environment) – This software subset contains Spanish resource files and UID files for the X window applications: `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSESX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSESX11405 Spanish Basic X Environment (Windowing Environment) – This software subset contains Spanish X11/DECwindows required programs and shared libraries. It also provides Spanish resource files and UID files. This software subset is mandatory and requires the OSFX11410 and OSFEURLOC410 software subsets.
- IOSESXDEV405 Spanish X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Spanish X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSESX11405 software subsets.

- IOSESXMAIL405 Spanish DECwindows Mail Interface (Windowing Environment) – This software subset contains the Spanish DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSESX11405 software subsets.

F.6 French Support

French Support contains the following software subsets:

- IOSFRCDEAPPS405 French CDE Additional Applications (Windowing Applications) – This software subset contains French resource files and message catalogues of the Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSFRCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.
- IOSFRCDEDEV405 French CDE Software Development (Software Development) – This software subset contains the French Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSFRCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSFRCDEDT405 French CDE Desktop Environment (Windowing Environment) – This software subset contains French resource files and message catalogues for the Common Desktop Environment. This software subset requires the OSFCDEDT410 and IOSFRCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSFRCDEHLP405 French CDE Online Help (Windowing Environment) – This software subset contains French online help files of Common Desktop Environment. This software subset is optional and requires the IOSFRCDEDT405 software subset.
- IOSFRCDEMAIL405 French CDE Mail Interface (Mail Applications) – This software subset contains French resource files and message catalogues for the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSFRCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEMAIL410 software subset is installed.
- IOSFRCDEMIN405 French CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains French resource files and message catalogues for the Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSFRX11405 software subsets.

This software subset is mandatory if the OSFCDEMIN410 software subset is installed.

- IOSFRDECW405 French Additional DECwindows Applications (Windowing Applications) – This software subset contains French resource files and UID files for the X11/DECwindows client applications `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSFRX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSFROLDDECW405 French Old Additional DECwindows Applications (Windows Applications) – This software subset contains French resource files and UID files for the X11/DECwindows client application `dxnotepad`, which will be retired in the future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSFRX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSFROLDX11405 French Old X Environment (Windowing Environment) – This software subset contains French resource files and UID files for the X window applications `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSFRX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSFRX11405 French Basic X Environment (Windowing Environment) – This software subset contains French X11/DECwindows required programs and shared libraries. It also provides French resource files and UID files. It is mandatory and requires the OSFX11410 and OSFEURLOC410 software subsets.
- IOSFRXDEV405 French X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce French X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSFRX11405 software subsets.
- IOSFRXMAIL405 French DECwindows Mail Interface (Windowing Environment) – This software subset contains the French DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSFRX11405 software subsets.

F.7 Hungarian Support

Hungarian Support contains the following software subsets:

- IOSHUCDEAPPS405 Hungarian CDE Additional Applications (Windowing Applications) – This software subset contains Hungarian resource files and message catalogues for the Common Desktop

Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSHUCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.

- IOSHUCDEDEV405 Hungarian CDE Software Development (Software Development) – This software subset contains Hungarian Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSHUCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSHUCDEDT405 Hungarian CDE Desktop Environment (Windowing Environment) – This software subset contains Hungarian resource files and message catalogues for the Common Desktop Environment. This software subset requires the OSFCDEDT410 and IOSHUCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSHUCDEMAIL405 Hungarian CDE Mail Interface (Mail Applications) – This software subset contains Hungarian resource files and message catalogues for the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSHUCDEDT405 software subsets. This software subset is mandatory if the OSFCDEMAIL410 software subset is installed.
- IOSHUCDEMIN405 Hungarian CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Hungarian resource files and message catalogues for the Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSHUX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSHUOLDDECW405 Hungarian Old Additional DECwindows Applications (Windows Applications) – This software subset contains Hungarian resource files and UID files for the X11/DECwindows client application `dxnotepad`, which will be retired in a future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSHUX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSHUOLDX11405 Hungarian Old X Environment (Windowing Environment) – This software subset contains Hungarian resource files and UID files for the X window applications: `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSHUX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.

- IOSHUUCSBASE405 Hungarian Unicode Support (Operating System) – This software subset contains the Hungarian Unicode locale. This software subset is mandatory and requires the IOSWWUCSBASE405 software subset.
- IOSHUX11405 Hungarian Basic X Environment (Windowing Environment) – This software subset contains Hungarian X11/DECwindows required programs and shared libraries. It also provides Hungarian resource files and UID files. This software subset is mandatory and requires the OSFX11410 and IOSWWBASE405 software subsets.
- IOSHUXDEV405 Hungarian X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Hungarian X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSHUX11405 software subsets.
- IOSHUXMAIL405 Hungarian DECwindows Mail Interface (Windowing Environment) – This optional software subset contains the Hungarian DECwindows mail interface and requires the OSFXMAIL410 and IOSHUX11405 software subsets.

F.8 Italian Support

Italian Support contains the following software subsets:

- IOSITCDEAPPS405 Italian CDE Additional Applications (Windowing Applications) – This software subset contains Italian resource files and message catalogues for the Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSITCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.
- IOSITCDEDEV405 Italian CDE Software Development (Software Development) – This software subset contains the Italian Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSITCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSITCDEDT405 Italian CDE Desktop Environment (Windowing Environment) – This software subset contains Italian resource files and message catalogues for the Common Desktop Environment. This software subset requires the OSFCDEDT410 and IOSITCDEMIN405 software subset. This software subset is mandatory if the OSFCDEDT410 software subset is installed.

- IOSITCDEHLP405 Italian CDE Online Help (Windowing Environment) – This software subset contains Italian online help files for the Common Desktop Environment. This software subset is optional and requires the IOSITCDEDT405 software subset.
- IOSITCDEMAIL405 Italian CDE Mail Interface (Mail Applications) – This software subset contains Italian resource files and message catalogues for the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSITCDEDT405 software subsets. This software subset is mandatory if the OSFCDEMAIL410 software subset is installed.
- IOSITCDEMIN405 Italian CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Italian resource files and message catalogues for Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSITX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSITDECW405 Italian Additional DECwindows Applications (Windowing Applications) – This software subset contains Italian resource files and UID files for the X11/DECwindows client applications `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSITX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSITOLDDECW405 Italian Old Additional DECwindows Applications (Windows Applications) – This software subset contains Italian resource files and UID files for X11/DECwindows client application `dxnotepad`, which will be retired in a future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSITX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSITOLDX11405 Italian Old X Environment (Windowing Environment) – This software subset contains Italian resource files and UID files for the X window applications `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSITX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSITX11405 Italian Basic X Environment (Windowing Environment) – This software subset contains Italian X11/DECwindows required programs and shared libraries. It also provides Italian resource files and UID files. It is mandatory and requires the OSFX11410 and OSFEURLOC410 software subsets.

- IOSITXDEV405 Italian X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Italian X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSITX11405 software subsets.
- IOSITXMAIL405 Italian DECwindows Mail Interface (Windowing Environment) – This software subset contains the Italian DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSITX11405 software subsets.

F.9 Hebrew Support

Hebrew Support contains the following software subsets:

- IOSIWBASE405 Hebrew Base System (Operating System) – This software subset contains the Hebrew locale `iw_IL.ISO8859-8`. This software subset is mandatory and requires the IOSWWBASE405 software subset.
- IOSIWCDEDT405 Hebrew CDE Desktop Environment (Windowing Environment) – This software subset contains Hebrew resource files and message catalogues for the user interface of the Common Desktop Environment. This software subset requires the OSFCDEDT410 and IOSIWCDEMIN405 software subset. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSIWCDEMIN405 Hebrew CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Hebrew resource files and message catalogues for the Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSIWX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSIWFONT100M405 Hebrew DECwindows 100dpi Mandatory Fonts (Windowing Environment) – This software subset contains workstation Hebrew 100dpi mandatory font files. This software subset is mandatory for systems using either a VR160 15-inch monitor or higher resolution graphics monitor. This software subset is optional for systems using low resolution graphics monitors.
- IOSIWFONT100P405 Hebrew DECwindows 100dpi Optional Fonts (Windowing Environment) – This optional software subset contains workstation Hebrew 100dpi font files.
- IOSIWFONT75M405 Hebrew DECwindows 75dpi Mandatory Fonts (Windowing Environment) – This software subset contains workstation Hebrew 75dpi mandatory font files. This software subset is mandatory

for systems using a low resolution graphics monitor and is optional for systems using either the VR160 15-inch monitor or a higher resolution graphics monitor.

- IOSIWFONT75P405 Hebrew DECwindows 75dpi Optional Fonts – This software subset contains workstation Hebrew 75dpi optional font files.
- IOSIWOLDX11405 Hebrew Old X Environment (Windowing Environment) – This software subset contains Hebrew resource files and UID files for the X window applications `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSIWX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSIWUCSBASE405 Hebrew Unicode Support (Operating System) – This software subset contains the Hebrew Unicode locale. This software subset is mandatory and requires the IOSWWUCSBASE405 software subset.
- IOSIWX11405 Hebrew Basic X Environment (Windowing Environment) – This software subset contains Hebrew X11/DECwindows required programs and shared libraries. It also provides Hebrew resource files and UID files. It is mandatory and requires the OSFX11410 and IOSIWBASE405 software subsets.
- IOSIWXDEV405 Hebrew X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Hebrew X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSIWX11405 software subsets.
- IOSIWOLFONT405 Hebrew Outline Fonts (Outline Fonts) – This optional software subset contains Hebrew outline font files. This software subset requires the OSFAFM410 software subset.

F.10 Japanese Support

Japanese Support provides the following software subsets:

- IOSJPABASE405 Additional Japanese Software (Operating System) – This software subset contains the `jvi` binaries. This software subset is optional and requires the IOSJPBASE405 software subset.
- IOSJPAMANOS405 Japanese Reference Pages for Additional Software (Operating System) – This software subset contains the reference pages for the Japanese software in IOSJPABASE405. This software subset is optional and requires the OSFDCMT410 software subset.
- IOSJPBASE405 Japanese Base System (Operating System) – This software subset contains the Japanese-specific locales, methods, shared

libraries, and services. This software subset is mandatory and requires the IOSWWBASE405 software subset.

- IOSJPCDEAPPS405 Japanese CDE Additional Applications (Windowing Applications) – This software subset contains Japanese resource files and message catalogues of the Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSJPCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.
- IOSJPCDEDEV405 Japanese CDE Software Development (Software Development) – This software subset contains the Japanese Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSJPCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSJPCDEDT405 Japanese CDE Desktop Environment (Windowing Environment) – This software subset contains Japanese resource files and message catalogues for the Common Desktop Environment user interface. This software subset requires the OSFCDEDT410 and IOSJPCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSJPCDEHLP405 Japanese CDE Online Help (Windowing Environment) – This software subset contains Japanese online help files of the Common Desktop Environment. This software subset is optional and requires the IOSJPCDEDT410 software subset.
- IOSJPCDEHLPSJIS405 Japanese CDE Online Help (Windowing Environment) – This software subset contains Japanese online help files of the Common Desktop Environment in Shift JIS. This software subset is optional and requires the IOSJPCDEDT405 software subset.
- IOSJPCDEMAIL405 Japanese CDE Mail Interface (Mail Applications) – This software subset contains Japanese resource files and message catalogues of the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSJPCDEDT405 software subsets. This software subset is mandatory if the OSFCDEMAIL410 software subset is installed.
- IOSJPCDEMIN405 Japanese CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Japanese resource files and message catalogues for Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSJPX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.

- IOSJPDECW405 Japanese Additional DECwindows Applications (Windowing Applications) – This software subset contains Japanese resource files and UID files for the X11/DECwindows client applications `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSJPX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSJPFONT100M405 Japanese DECwindows 100dpi Mandatory Fonts (Windowing Environment) – This software subset contains workstation Japanese 100dpi mandatory font files. This software subset is mandatory for systems using either a VR160 15-inch monitor or higher resolution graphics monitor. This software subset is optional for systems using a low resolution graphics monitor.
- IOSJPFONT100P405 Japanese DECwindows 100dpi Optional Fonts (Windowing Environment) – This optional software subset contains workstation Japanese 100dpi font files.
- IOSJPFONTM405 Japanese DECwindows 75dpi Mandatory Fonts (Windowing Environment) – This software subset contains workstation Japanese mandatory font files for 75dpi and 100dpi displays.
- IOSJPFONT75M405 Japanese DECwindows 75dpi Mandatory Fonts (Windowing Environment) – This software subset contains workstation Japanese 75dpi font files. This software subset is mandatory for systems using a low resolution graphics monitor and is optional for systems using either the VR160 15-inch monitor or a higher resolution graphics monitor.
- IOSJPFONT75P405 Japanese DECwindows 75dpi Fonts – This software subset contains workstation Japanese 75dpi optional font files. This software subset is optional.
- IOSJPOLDDECW405 Japanese Old Additional DECwindows Applications (Windows Applications) – This software subset contains Japanese resource files and UID files for the X11/DECwindows client application `dxnotepad`, which will be retired in a future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSJPX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSJPOLDX11405 Japanese Old X Environment (Windowing Environment) – This software subset contains Japanese resource files and UID files for the X window applications: `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSJPX11405 software subset. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSJPLDBBASE405 Japanese Ladebug Debugger (Software Development) – This software subset contains the Japanese message

catalogues for the internationalized Ladebug Debugger. This software subset is optional. This software subset requires the IOSLDBBASE405 and IOSJPBASE405 software subsets.

- IOSJPLDBGUI405 Japanese Ladebug Debugger Window Interface (Software Development) – This software subset contains the Japanese resource files and UID files for window interface of Internationalized Ladebug Debugger. This software subset is optional. This software subset requires the IOSLDBGUI405 and IOSJPX11405 software subsets.
- IOSJPLDBSRV405 Japanese Ladebug Debugger remote server (Software Development) – This software subset contains the Japanese message catalogues of remote server of the internationalized Ladebug Debugger. This software subset is optional. This software subset requires the IOSLDBSRV405 and IOSJPBASE405 software subsets.
- IOSJPMANOS405 Japanese Reference Pages (Operating System) – This software subset contains the Japanese reference pages. This software subset is optional and requires the OSFDCMT410 software subset.
- IOSJPMANWOS405 Japanese Windows Reference Pages (Windowing Environment) – This software subset contains Japanese Windows reference pages. This software subset is optional and requires the OSFDCMT410 subset.
- IOSJPMSG405 Japanese Message Catalogs (Operating System) – This software subset contains the Japanese message catalogs for Japanese commands. This software subset is optional and requires the IOSJPBASE405 software subset.
- IOSJPMSGSJIS405 Formatted SJIS Japanese Message Catalogs (Operating System) – This software subset contains the same message catalogs as IOSJPMSG405 , but in SJIS format. This software subset is optional and requires the IOSJPBASE405 software subset.
- IOSJPNEMACS405 Japanese Nemacs (Operating System) – This software subset supports the Nemacs editor. It is optional and requires the IOSJPBASE405 software subset.
- IOSJPPGMR405 Japanese Software Development (Software Development) – This software subset contains the header files and libraries for the Japanese software in the IOSJPABASE405 software subset. This software subset is optional and requires the IOSJPBASE405 software subset.
- IOSJPUCSBASE405 Japanese Unicode Support (Operating System) – This software subset contains the Japanese Unicode locale. This software subset is mandatory and requires the IOSWWUCSBASE405 software subset.

- IOSJPWNN405 Wnn Input Method (Operating System) – This software subset supports the Wnn input method. It is optional and requires the IOSJPBASE405 software subset.
- IOSJPWNNPGMR405 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 IOSJPBASE405 software subset.
- IOSJPX11405 Japanese Basic X Environment (Windowing Environment) – This software subset contains Japanese X11/DECwindows required programs and shared libraries. It also provides Japanese resource files and UID files. This software subset is mandatory and requires the IOSWWX11405 and IOSJPBASE405 software subsets.
- IOSJPXDEV405 Japanese X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Japanese X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSJPX11405 software subsets.
- IOSJPXMAIL405 Japanese DECwindows Mail Interface (Windowing Environment) – This software subset contains the Japanese DECwindows Mail Interface. This software subset is optional and requires the OSFXMAIL410 and IOSJPX11405 software subsets.
- IOSJPNEMACSSRCS405 Japanese Nemacs Source Files (Public Domain Source) – This optional software subset contains the source files for Japanese Nemacs.
- IOSJPWNNSRC405 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.

F.11 Korean Support

Korean Support provides the following software subsets:

- IOSKOBASE405 Korean Base System (Operating System) – This software subset contains the Korean specific locales, methods, shared libraries, and services. This software subset is mandatory and requires the IOSWWBASE405 software subset.
- IOSKOCDEAPPS405 Korean CDE Additional Applications (Windowing Applications) – This software subset contains Korean resource files and message catalogues of the Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and

IOSKOCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.

- IOSKOCDEDEV405 Korean CDE Software Development (Software Development) – This software subset contains the Korean Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSKOCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSKOCDEDT405 Korean CDE Desktop Environment (Windowing Environment) – This software subset contains Korean resource files and message catalogues of user interface of Common Desktop Environment. This software subset requires the OSFCDEDT410 and IOSKOCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSKOCDEHLP405 Korean CDE Online Help (Windowing Environment) – This software subset contains Korean online help files for the Common Desktop Environment. This software subset is optional and requires the IOSKOCDEDT405 software subset.
- IOSKOCDEMAIL405 Korean CDE Mail Interface (Mail Applications) – This software subset contains Korean resource files and message catalogues for the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSKOCDEDT405 software subsets. This software subset is mandatory if the OSFCDEMAIL410 software subset is installed.
- IOSKOCDEMIN405 Korean CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Korean resource files and message catalogues for Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSKOX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSKODECW405 Korean Additional DECwindows Applications (Windowing Applications) – This software subset contains Korean resource files and UID files for the X11/DECwindows client application `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSKOX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSKOOLDDECW405 Korean Old Additional DECwindows Applications (Windows Applications) – This software subset contains Korean resource files and UID files for the X11/DECwindows client application `dxnotepad`, which will be retired in a future release of Digital UNIX. This software subset requires the OSFOLDDECW410

and IOSKOX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.

- IOSKOOLDX11405 Korean Old X Environment (Windowing Environment) – This software subset contains Korean resource files and UID files for the X window applications: `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSKOX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSKOFONTM405 Korean DECwindows Mandatory Fonts (Windowing Environment) – This software subset contains workstation Korean mandatory font files for 75dpi and 100dpi displays.
- IOSKOFONTP405 Korean DECwindows Optional Fonts (Windowing Environment) – This optional software subset contains workstation Korean optional font files for 75dpi and 100dpi displays.
- IOSKOPGMR405 Korean Software Development (Software Development) – This software subset contains the header files and libraries for Korean software development. This software subset is optional and requires the IOSKOBASE405 software subset.
- IOSKOUCSBASE405 Korean Unicode Support (Operating System) – This mandatory software subset contains the Korean Unicode locale and requires the IOSWWUCSBASE405 software subset.
- IOSKOX11405 Korean Basic X Environment (Windowing Environment) – This software subset contains programs and shared libraries required for Korean X/11 DECwindows. It also provides Korean resource files and UID files. This software subset is mandatory and requires the IOSWWX11405 and IOSKOBASE405 software subset.
- IOSKOXDEV405 Korean X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Korean X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSKOX11405 software subsets.
- IOSKOXMAIL405 Korean DECwindows Mail Interface (Windowing Environment) – This software subset contains the Korean DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSKOX11405 software subsets.
- IOSKOOLFONT405 Korean Outline Fonts (Outline Fonts) – This software subset contains the Korean outline font files. This software subset is optional. This software subset requires the OSFAFM410 software subset.

F.12 Polish Support

Polish Support provides the following software subsets:

- IOSPLCDEAPPS405 Polish CDE Additional Applications (Windowing Applications) – This software subset contains Polish resource files and message catalogues for the Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSPLCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.
- IOSPLCDEDEV405 Polish CDE Software Development (Software Development) – This software subset contains Polish Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSPLCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSPLCDEDT405 Polish CDE Desktop Environment (Windowing Environment) – This software subset contains Polish resource files and message catalogues for the Common Desktop Environment. This software subset requires the OSFCDEDT410 and IOSPLCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSPLCDEMAIL405 Polish CDE Mail Interface (Mail Applications) – This software subset contains Polish resource files and message catalogues for the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSPLCDEDT405 software subsets. This software subset is mandatory if the OSFCDEMAIL410 software subset is installed.
- IOSPLCDEMIN405 Polish CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Polish resource files and message catalogues for the Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSPLX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSPLDECW405 Polish Additional DECwindows Applications (Windowing Applications) – This software subset contains Polish resource files and UID files for the X11/DECwindows client applications `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSPLX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSPLOLDDECW405 Polish Old Additional DECwindows Applications (Windows Applications) – This software subset contains Polish resource

files and UID files for the X11/DECwindows client application dxnotepad, which will be retired in a future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSPLX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.

- IOSPLOLDX11405 Polish Old X Environment (Windowing Environment) – This software subset contains Polish resource files and UID files for the X window applications dxpause and dxsession. This software subset requires the OSFOLDX11410 and IOSPLX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSPLUCSBASE405 Polish Unicode Support (Operating System) – This software subset contains the Polish Unicode locale. This software subset is mandatory and requires the IOSWWUCSBASE405 software subset.
- IOSPLX11405 Polish Basic X Environment (Windowing Environment) – This software subset contains Polish X11/DECwindows required programs and shared libraries. It also provides Polish resource files and UID files. It is mandatory and requires the OSFX11410 and IOSWWBASE405 software subsets.
- IOSPLXDEV405 Polish X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Polish X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSPLX11405 software subsets.
- IOSPLXMAIL405 Polish DECwindows Mail Interface (Windowing Environment) – This software subset contains the Polish DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSPLX11405 software subsets.

F.13 Russian Support

Russian Support provides the following software subsets:

- IOSRUDECW405 Russian Additional DECwindows Applications (Windowing Applications) – This software subset contains Russian resource files and UID files for the X11/DECwindows client applications dxpaint and dxprint. This software subset requires the OSFDECW410 and IOSRUX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSRUOLDDECW405 Russian Old Additional DECwindows Applications (Windows Applications) – This software subset contains Russian resource files and UID files for the X11/DECwindows client application dxnotepad, which will be retired in a future release of

Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSRUX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.

- IOSRUOLDX11405 Russian Old X Environment (Windowing Environment) – This software subset contains Russian resource files and UID files for the X window applications `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSRUX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSRUUCSBASE405 Russian Unicode Support (Operating System) – This software subset contains the Russian Unicode locale. This software subset is mandatory and requires the IOSWWUCSBASE405 software subset.
- IOSRUX11405 Russian Basic X Environment (Windowing Environment) – This software subset contains Russian X11/DECwindows required programs and shared libraries. It also provides Russian resource files and UID files. It is mandatory and requires the OSFX11410 and IOSWWBASE405 software subsets.
- IOSRUXDEV405 Russian X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Russian X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSRUX11405 software subsets.
- IOSRUXMAIL405 Russian DECwindows Mail Interface (Windowing Environment) – This software subset contains the Russian DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSRUX11405 software subsets.

F.14 Slovak Support

Slovak Support provides the following software subsets:

- IOSSKCDEAPPS405 Slovak CDE Additional Applications (Windowing Applications) – This software subset contains Slovak resource files and message catalogues for the Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSSKCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.
- IOSSKCDEDEV405 Slovak CDE Software Development (Software Development) – This software subset contains the Slovak Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSSKCDEDT405 software

subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.

- IOSSKCDEDT405 Slovak CDE Desktop Environment (Windowing Environment) – This software subset contains Slovak resource files and message catalogues for the Common Desktop Environment user interface. This software subset requires the OSFCDEDT410 and IOSSKCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSSKCDEMAIL405 Slovak CDE Mail Interface (Mail Applications) – This software subset contains Slovak resource files and message catalogues for the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSSKCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSSKCDEMIN405 Slovak CDE Minimum Run-time Environment (Windowing Environment) – This software subsets contains Slovak resource files and message catalogues for the Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSSKX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSSKDECW405 Slovak Additional DECwindows Applications (Windowing Applications) – This software subset contains Slovak resource files and UID files for the X11/DECwindows client applications `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSSKX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSSKOLDDECW405 Slovak Old Additional DECwindows Applications (Windows Applications) – This software subset contains Slovak resource files and UID files for the X11/DECwindows client application `dxnotepad`, which will be retired in a future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSSKX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSSKOLDX11405 Slovak Old X Environment (Windowing Environment) – This software subset contains Slovak resource files and UID files for the X window applications: `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSSKX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSSKUCSBASE405 Slovak Unicode Support (Operating System) – This software subset contains the Slovak Unicode locale. This software

subset is mandatory and requires the IOSWWUCSBASE405 software subset.

- IOSSKX11405 Slovak Basic X Environment (Windowing Environment) – This software subset contains Slovak X11/DECwindows required programs and shared libraries. It also provides Slovak resource files and UID files. It is mandatory and requires the OSFX11410 and IOSWWBASE405 software subsets.
- IOSSKXDEV405 Slovak X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Slovak X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSSKX11405 software subsets.
- IOSSKXMAIL405 Slovak DECwindows Mail Interface (Windowing Environment) – This software subset contains libraries and data files needed to produce Slovak X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSSKX11405 software subsets.

F.15 Swedish Support

Swedish Support provides the following software subsets:

- IOSSVCDEAPPS405 Swedish CDE Additional Applications (Windowing Applications) – This software subset contains Swedish resource files and message catalogues of Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSSVCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.
- IOSSVCDEDEV405 Swedish CDE Software Development (Software Development) – This software subset contains the Swedish Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSSVCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSSVCDEDT405 Swedish CDE Desktop Environment (Windowing Environment) – This software subset contains Swedish resource files and message catalogues for the Common Desktop Environment user interface. This software subset requires the OSFCDEDT410 and IOSSVCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSSVCDEHLP405 Swedish CDE Online Help (Windowing Environment) – This software subset contains Swedish online help files

for the Common Desktop Environment. This software subset is optional and requires the IOSSVCDEDT405 software subset.

- IOSSVCDEMAIL405 Swedish CDE Mail Interface (Mail Applications) – This software subset contains Swedish resource files and message catalogues of Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSSVCDEDT405 software subsets. This software subset is mandatory if the OSFCDEMAIL410 software subset is installed.
- IOSSVCDEMIN405 Swedish CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Swedish resource files and message catalogues for Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSSVX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSSVDECW405 Swedish Additional DECwindows Applications (Windowing Applications) – This software subset contains Swedish resource files and UID files for the X11/DECwindows client applications `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSSVX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSSVOLDDECW405 Swedish Old Additional DECwindows Applications (Windows Applications) – This software subset contains Swedish resource files and UID files for the X11/DECwindows client application `dxnotepad`, which will be retired in a future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSSVX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSSVOLDX11405 Swedish Old X Environment (Windowing Environment) – This software subset contains Swedish resource files and UID files for the X window applications `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSSVX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSSVX11405 Swedish Basic X Environment (Windowing Environment) – This software subset contains Swedish X11/DECwindows required programs and shared libraries. It also provides Swedish resource files and UID files. It is mandatory and requires the OSFX11410 and OSFEURLOC410 software subsets.
- IOSSVXDEV405 Swedish X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Swedish X/Motif window system client

applications. This software subset is optional and requires the IOSWWXDEV405 and IOSSVX11405 software subsets.

- IOSSVXMAIL405 Swedish DECwindows Mail Interface (Windowing Environment) – This software subset contains the Swedish DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSSVX11405 software subsets.

F.16 Thai Support

Thai Support provides the following software subsets:

- IOSTHBASE405 Thai Base System (Operating System) – This software subset contains the Thai specific locales, methods, shared libraries, and services. This software subset is mandatory and requires the IOSWWBASE405 software subset.
- IOSTHBIN405 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 IOSWWBINCOM405 and OSFBIN410 software subsets.
- IOSTHCDEAPPS405 Thai CDE Additional Applications (Windowing Applications) – This software subset contains Thai resource files and message catalogues for the Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSTHCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.
- IOSTHCDEDEV405 Thai CDE Software Development (Software Development) – This software subset contains the Thai Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSTHCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSTHCDEDT405 Thai CDE Desktop Environment (Windowing Environment) – This software subset contains Thai resource files and message catalogues for the Common Desktop Environment user interface. This software subset requires the OSFCDEDT410 and IOSTHCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSTHCDEMAIL405 Thai CDE Mail Interface (Mail Applications) – This software subset contains Thai resource files and message catalogues for the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSTHCDEDT405 software subsets. This software subset is mandatory if the OSFCDEMAIL410 software subset is installed.

- IOSTHCDEMIN405 Thai CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Thai resource files and message catalogues for the Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSTHX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSTHDECW405 Thai Additional DECwindows Applications (Windowing Applications) – This software subset contains the Thai resource files and UID files for the X11/DECwindows client applications `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSTHX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSTHFONTM405 Thai DECwindows Mandatory Fonts (Windowing Environment) – This software subset contains workstation Thai mandatory font files for 75dpi and 100dpi displays.
- IOSTHOLDDECW405 Thai Old Additional DECwindows Applications (Windows Applications) – This software subset contains Thai resource files and UID files for the X11/DECwindows client application `dxnotepad`, which will be retired in a future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSTHX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSTHOLDX11405 Thai Old X Environment (Windowing Environment) – This software subset contains Thai resource files and UID files for the X window applications `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSTHX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSTHPGMR405 Thai Software Development (Software Development) – This software subset contains the header files and libraries for Thai software development. This software subset is optional and requires the IOSTHBASE405 software subset.
- IOSTHPRINT405 Thai Printer Support Environment (Operating System) – This software subset contains the printer filters for Thai printers. This software subset is optional and requires the IOSWWPRINT405 and IOSTHBASE405 software subsets.
- IOSTHUCSBASE405 Thai Unicode Support (Operating System) – This software subset contains the Thai Unicode locale. This software subset is mandatory and requires the IOSWWUCSBASE405 software subset.
- IOSTHX11405 Thai Basic X Environment (Windowing Environment) – This software subset contains Thai X11/DECwindows required

programs and shared libraries. It also provides Thai resource files and UID files. It is mandatory and requires the IOSWWX11405 and IOSTHBASE405 software subsets.

- IOSTHXDEV405 Thai X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Thai X/Motif window client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSTHX11405 software subsets.
- IOSTHXMAIL405 Thai DECwindows Mail Interface (Windowing Environment) – This software subset contains the Thai DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSTHX11405 software subsets.
- IOSTHOLFONT405 Thai Outline Fonts (Outline Fonts) – This software subset contains the optional Thai outline font files. This software subset requires the OSFAFM410 software subset.

F.17 Turkish Support

Turkish Support provides the following software subsets:

- IOSTROLDDECW405 Turkish Old Additional DECwindows Applications (Windows Applications) – This software subset contains Turkish resource files and UID files for the X11/DECwindows client application `dxnotepad`, which will be retired in a future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSTRX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSTRFONT100M405 Turkish DECwindows 100dpi Mandatory Fonts (Windowing Environment) – This software subset contains workstation Turkish 100dpi mandatory font files. This software subset is mandatory for systems using either the VR160 15-inch monitor or a higher resolution graphics monitor. This software subset is optional for systems using a low resolution graphics monitor.
- IOSTRFONT100P405 Turkish DECwindows 100dpi Optional Fonts (Windowing Environment) – This software subset contains workstation Turkish 100dpi optional font files. This software subset is optional.
- IOSTRFONT75M405 Turkish DECwindows 75dpi Mandatory Fonts (Windowing Environment) – This software subset contains workstation Turkish mandatory 75dpi font files. This software subset is mandatory for systems using a low resolution graphics monitor and is optional for systems using either the VR160 15- inch monitor or a higher resolution graphics monitor.

- IOSTRFONT75P405 Turkish DECwindows 75dpi Optional Fonts (Windowing Environment) – This software subset contains workstation Turkish 75dpi optional font files.
- IOSTRUCSBASE405 Turkish Unicode Support (Operating System) – This software subset contains the Turkish Unicode locale. This software subset is mandatory and requires the IOSWWUCSBASE405 software subset.
- IOSTRX11405 Turkish Basic X Environment (Windowing Environment) – This software subset contains Turkish X11/DECwindows required programs and shared libraries. It also provides Turkish resource files and UID files. It is mandatory and requires the OSFX11410 and OSFEURLOC410 software subsets.
- IOSTRXMAIL405 Turkish DECwindows Mail Interface (Windowing Environment) – This software subset contains the Turkish DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSTRX11405 software subsets.
- IOSTROLFONT405 Turkish Outline Fonts (Outline Fonts) – This software subset contains the optional Turkish outline font files. This software subset requires the OSFAFM410 software subset.

F.18 Chinese Support

Chinese Support provides the following software subsets:

- IOSZHBASE405 Chinese Base System (Operating System) – This software subset contains the asort (Asian sort) binary which is used for sorting Traditional Chinese and Simplified Chinese data. It is mandatory and requires the IOSWWBASE405 software subset.
- IOSZHBIG5405 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 IOSZHBASE405 software subset.
- IOSZHCNBASE405 Chinese Base System for China (Operating System) – This software subset contains the China specific locales and methods shared libraries. This software subset is mandatory and requires the IOSZHBASE405 software subset.
- IOSZHCNCDEAPPS405 Simplified Chinese CDE Additional Applications (Windowing Applications) – This software subset contains Simplified Chinese resource files and message catalogues for the Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSZHCNCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.

- IOSZHCNCDEDEV405 Simplified Chinese CDE Software Development (Software Development) – This software subset contains Simplified Chinese Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSZHCNCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSZHCNCDEDT405 Simplified Chinese CDE Desktop Environment (Windowing Environment) – This software subset contains Simplified Chinese resource files and message catalogues for the Common Desktop Environment user interface. This software subset requires the OSFCDEDT410 and IOSZHCNCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSZHCNCDEHLP405 Simplified Chinese CDE Online Help (Windowing Environment) – This software subset contains Simplified Chinese online help files of Common Desktop Environment. This software subset is optional and requires the IOSZHCNCDEDT405 software subset.
- IOSZHCNCDEMAIL405 Simplified Chinese CDE Mail Interface (Mail Applications) – This software subset contains Simplified Chinese resource files and message catalogues for the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSZHCNCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSZHCNCDEMIN405 Simplified Chinese CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Simplified Chinese resource files and message catalogues for the Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSZHSX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSZHCNLOC405 Additional Chinese Locales for China (Operating System) – This software subset contains the @ variant locales that have different collating rules. This software subset is optional and requires the IOSZHCNBASE405 software subset.
- IOSZHCNUCSBASE405 Chinese Unicode Support for China (Operating System) – This software subset contains the Chinese Unicode locale for China. This software subset is mandatory and requires the IOSZHUCSBASE405 software subset.
- IOSZHCONV405 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 IOSZHBASE405 software subset.

- IOSZHEUCTW405 Taiwanese EUC Character Set Support (Operating System) – This software subset contains methods, shared libraries and services for the Taiwanese EUC character set. It is optional and requires the IOSZHTWBASE405 software subset.
- IOSZHHANYU405 DEC Hanyu Character Set Support (Operating System) – This software subset contains methods, shared libraries and services for the DEC Hanyu character set. It is optional and requires the IOSZHTWBASE405 software subset.
- IOSZHHANZI405 DEC Hanzi Character Set Support (Operating System) – This software subset contains methods and shared libraries for the DEC Hanzi character set. This software subset is optional and requires the IOSZHBASE405 software subset.
- IOSZHHKBASE405 Chinese Base System for Hong Kong (Operating System) – This software subset contains specific locales, methods, shared libraries, messages catalogs and services for Hong Kong. This software subset is mandatory and requires the IOSZHBASE405 software subset.
- IOSZHHKUCSBASE405 Chinese Unicode Support for Hong Kong (Operating System) – This software subset contains the Chinese Unicode locale for Hong Kong. This software subset is mandatory and requires the IOSZHUCSBASE405 software subset.
- IOSZHPGMR405 Chinese Software Development (Software Development) – This software subset contains the header files and libraries for the Chinese software development. This software subset is optional and requires the IOSZHBASE405 software subset.
- IOSZHSDECW405 Simplified Chinese Additional DECwindows Applications (Windowing Applications) – This software subset contains Simplified Chinese resource files and UID files for the X11/DECwindows client applications `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSZHSX11405 software subsets. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSZHSFONTM405 Simplified Chinese DECwindows Mandatory Fonts (Windowing Environment) – This software subset contains workstation Simplified Chinese mandatory font files for 75dpi and 100dpi displays. This software subset is mandatory.
- IOSZHSFONTP405 Simplified Chinese DECwindows Optional Fonts (Windowing Environment) – This optional software subset contains

workstation Simplified Chinese screen optional font files for 75dpi and 100dpi displays.

- IOSZHSOLDDECW405 Simplified Chinese Old Additional DECwindows Applications (Windows Applications) – This software subset contains Simplified Chinese resource files and UID files for the X11/DECwindows client application `dxnotepad`, which will be retired in a future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSZHSX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSZHSOLDX11405 Simplified Chinese Old X Environment (Windowing Environment) – This software subset contains Simplified Chinese resource files and UID files for the X window applications `dxpause` and `dxsession` . This software subset requires the OSFOLDX11410 and IOSZHSX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSZHSX11405 Simplified Chinese Basic X Environment (Windowing Environment) – This software subset contains Simplified Chinese X11/DECwindows required programs and shared libraries. It also provides Simplified Chinese resource files and UID files. This software subset is mandatory and requires the IOSZHX11405 software subset.
- IOSZHSXDEV405 Simplified Chinese X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Simplified Chinese X/Motif window system client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSZHSX11405 software subsets.
- IOSZHSXMAIL405 Simplified Chinese DECwindows Mail Interface (Windowing Environment) – This software subset contains the Simplified Chinese DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSZHSX11405 software subsets.
- IOSZHTDECW405 Traditional Chinese Additional DECwindows Applications (Windowing Applications) – This software subset contains Traditional Chinese resource files and UID files for the X11/DECwindows client applications `dxpaint` and `dxprint`. This software subset requires the OSFDECW410 and IOSZHTX11405 subset. This software subset is mandatory if the OSFDECW410 software subset is installed.
- IOSZHTOLDDECW405 Traditional Chinese Old Additional DECwindows Applications (Windows Applications) – This software subset contains Traditional Chinese resource files and UID files for the X11/DECwindows client application `dxnotepad` which will be retired in a future release of Digital UNIX. This software subset requires the

OSFOLDDECW410 and IOSZHTX11405 software subsets. This software subset is mandatory if the OSFOLDDECW410 software subset is installed.

- IOSZHTOLDX11405 Traditional Chinese Old X Environment (Windowing Environment) – This software subset contains Traditional Chinese resource files and UID files for the X window applications `dxpause` and `dxsession`. This software subset requires the OSFOLDX11410 and IOSZHTX11405 software subsets. This software subset is mandatory if the OSFOLDX11410 software subset is installed.
- IOSZHTELEX405 Telecode Character Set Support (Operating System) – This software subset contains all Telecode related methods and terminal drivers. This software subset is optional and requires the IOSZHTWBASE405 software subset.
- IOSZHTFONTM405 Traditional Chinese DECwindows Fonts – This software subset contains workstation Traditional Chinese mandatory font files for 75dpi and 100dpi displays. This software subset is mandatory.
- IOSZHTFONTP405 Traditional Chinese DECwindows Fonts – This optional software subset contains workstation Traditional Chinese optional font files for 75dpi and 100dpi displays.
- IOSZHTWBASE405 Chinese Base System for Taiwan (Operating System) – This software subset contains the Taiwan specific locales, methods libraries, messages catalogs and collating tables for Asian sorting. This software subset is mandatory and requires OSFBASE410.
- IOSZHTWCDEAPPS405 Traditional Chinese CDE Additional Applications (Windowing Applications) – This software subset contains Traditional Chinese resource files and message catalogues for the Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSZHTWCDEDT405 software subsets. This software subset is mandatory if the OSFCDEAPPS410 software subset is installed.
- IOSZHTWCDEDEV405 Traditional Chinese CDE Software Development (Software Development) – This software subset contains Traditional Chinese Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSZHTWCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSZHTWCDEHLP405 Traditional Chinese CDE Online Help (Windowing Environment) – This software subset contains Traditional Chinese online help files for the Common Desktop Environment. This

software subset is optional and requires the IOSZHTWCDEDT405 software subset.

- IOSZHTWCDEDT405 Traditional Chinese CDE Desktop Environment (Windowing Environment) – This software subset contains Traditional Chinese resource files and message catalogues for the Common Desktop Environment user interface. This software subset requires the OSFCDEDT410 and IOSZHTWCDEMIN405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSZHTWCDEMAIL405 Traditional Chinese CDE Mail Interface (Mail Applications) – This software subset contains Traditional Chinese resource files and message catalogues for the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSZHTWCDEDT405 software subsets. This software subset is mandatory if the OSFCDEDT410 software subset is installed.
- IOSZHTWCDEMIN405 Traditional Chinese CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Traditional Chinese resource files and message catalogues for the Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSZHTX11405 software subsets. This software subset is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSZHTWLOC405 Additional Chinese Locales for Taiwan (Operating System) – This software subset contains the @ variant locales which have different collating rules. This software subset is optional and requires the IOSZHTWBASE405 software subset.
- IOSZHTWUCSBASE405 Chinese Unicode Support for Taiwan (Operating System) – This software subset contains Chinese Unicode locale for Taiwan. This software subset is mandatory and requires the IOSZHUCSBASE405 software subset.
- IOSZHTX11405 Traditional Chinese Basic X Environment (Windowing Environment) – This software subset contains Traditional Chinese X11/DECwindows required programs and shared libraries. It also provides Hanyu resource files and UID files. This software subset is mandatory and requires the IOSZHX11405 software subset.
- IOSZHTXDEV405 Traditional Chinese X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Traditional Chinese X/Motif window client applications. This software subset is optional and requires the IOSWWXDEV405 and IOSZHTX11405 software subsets.

- IOSZHTXMAIL405 Traditional Chinese DECwindows Mail Interface (Windowing Environment) – This software subset contains the Traditional Chinese DECwindows mail interface. This software subset is optional and requires the OSFXMAIL410 and IOSZHTX11405 software subsets.
- IOSZHUCSBASE405 Common Chinese Unicode Support (Operating System) – This software subset contains method libraries which are common for all Chinese Unicode locales. This software subset is mandatory and requires the IOSWWUCSBASE405 software subset.
- IOSZHX11405 Base Chinese X Environment (Windowing Environment) – This software subset contains required programs that are common to both Traditional Chinese/DECwindows and Simplified Chinese/DECwindows. It also provides Chinese input methods. This software subset is mandatory and requires the IOSWWX11405 and IOSZHBASE405 software subsets.
- IOSZHSOLFONT405 Simplified Chinese Outline Fonts (Outline Fonts) – This optional software subset contains the Simplified Chinese outline font files. This software subset requires the OSFAFM410 software subset.
- IOSZHTOLFONT405 Traditional Chinese Outline Fonts (Outline Fonts) – This software subset contains the Traditional Chinese outline font files. This software subset is optional. This software subset requires the OSFAFM410 software subset.

F.19 Catalan Support

Catalan Support provides the following software subsets:

- IOSCACDEAPPS405 Catalan CDE Additional Applications (Windowing Applications) – This software subset contains Catalan resource files and message catalogues for the Common Desktop Environment additional applications. This software subset requires the OSFCDEAPPS410 and IOSCACDEDT405 software subsets, and it is mandatory if the OSFCDEAPPS410 software subset is installed.
- IOSCACDEDEV405 Catalan CDE Software Development (Software Development) – This software subset contains the Catalan Common Desktop Environment software development examples. This software subset requires the OSFCDEDEV410 and IOSCACDEDT405 software subsets, and it is mandatory if the OSFCDEDEV410 software subset is installed.
- IOSCACDEDT405 Catalan CDE Desktop Environment (Windowing Environment) – This software subset contains Catalan resource files and message catalogues for the Common Desktop Environment. This

software subset requires the OSFCDEDT410 and IOSCACDEMIN405 software subsets, and it is mandatory if the OSFCDEDT410 software subset is installed.

- IOSCACDEMAIL405 Catalan CDE Mail Interface (Mail Applications) – This software subset contains Catalan resource files and message catalogues for the Common Desktop Environment mail system. This software subset requires the OSFCDEMAIL410 and IOSCACDEDT405 software subsets, and it is mandatory if the OSFCDEMAIL410 software subset is installed.
- IOSCACDEMIN405 Catalan CDE Minimum Run-time Environment (Windowing Environment) – This software subset contains Catalan resource files and message catalogues for the Common Desktop Environment minimum run-time environment. This software subset requires the OSFCDEMIN410 and IOSCAX11405 software subsets, and it is mandatory if the OSFCDEMIN410 software subset is installed.
- IOSCADECW405 Catalan Additional DECwindows Applications (Windowing Applications) – This software subset contains Catalan resource files and UID files for the X11/DECwindows client application `dxprint`. This software subset requires the OSFDECW410 and IOSCAX11405 software subsets, and it is mandatory if the OSFDECW410 software subset is installed.
- IOSCAOLDDECW405 Catalan Old Additional DECwindows Applications (Windows Applications) – This software subset contains Catalan resource files and UID files for the X11/DECwindows client application `dxdiff`, which will be retired in a future release of Digital UNIX. This software subset requires the OSFOLDDECW410 and IOSCAX11405 software subsets, and it is mandatory if the OSFOLDDECW410 software subset is installed.
- IOSCAX11405 Catalan Basic X Environment (Windowing Environment) – This software subset contains Catalan X11/DECwindows required programs and shared libraries. It is mandatory and requires the OSFX11410 and IOSWWBASE405 software subsets.
- IOSCAXDEV405 Catalan X Window Software Development (Windowing Environment) – This software subset contains libraries and data files needed to produce Catalan X/Motif window system client applications.. This software subset is optional and requires the IOSWWXDEV405 and IOSCAX11405 software subsets.

F.20 Lithuanian Support

Lithuanian Support provides the following software subsets:

- IOSLTX11405 Lithuanian Basic X Environment (Windowing Environment) – This software subset contains Lithuanian X11/DECwindows required keymaps, programs, and shared libraries. This software subset is mandatory and requires the OSFX11410 and IOSWWBASE405 software subsets.

F.21 Slovene Support

Slovene Support provides the following software subsets:

- IOSSLX11405 Slovene Basic X Environment (Windowing Environment) – This software subset contains Slovene X11/DECwindows required keymaps, programs, and shared libraries. This software subset is mandatory and requires the OSFX11410 and IOSWWBASE405 software subsets.

G

Software Subset Sizes

This appendix provides the sizes of all Digital UNIX software subsets for full, update, and RIS installations. Space requirements for the online documentation are also included in this appendix.

G.1 Disk Space Required for Software Subsets

Table G–1 shows disk space as the number of 512-byte blocks required in the `root`, `/usr`, and `/var` file systems to install each Digital UNIX software subset. The figures for each group of files within a subset have been rounded up to the next higher 512-byte increment; this means that the total space requirements listed are slightly greater than the space actually required.

To determine the subset size in megabytes (MB), divide the size in blocks by 2048.

For information on the contents of each subset, refer to Appendix D and Appendix E. If you want to add optional subsets after you install Digital UNIX Version 4.0B, use the `df` command to determine free disk space in blocks.

Table G–1: Digital UNIX Software Subset Sizes

Digital UNIX V4.0B Operating System

Subset	root	/usr	/var	Total
OSFACCT410	9.67	1077.52	91.03	1178.22
OSFADVFS410	4135.00	5862.36	—	9997.36
OSFADVFSBIN410	2260.16	3.06	—	2263.22
OSFADVFSBINOBJECT410	—	3701.39	—	3701.39
OSFAFM410	—	2160.73	—	2160.73
OSFATMBASE410	208.06	575.00	—	783.06
OSFATMBIN410	3689.66	12.22	—	3701.88
OSFATMBINCOM410	—	382.79	—	382.79
OSFATMBINOBJECT410	—	10296.30	—	10296.30

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX V4.0B Operating System

Subset	root	/usr	/var	Total
OSFBASE410	22346.60	71612.20	796.31	94755.11
OSFBIN410	13444.30	1360.27	—	14804.57
OSFBINCOM410	48.50	26088.20	—	26136.70
OSFBINOBJECT410	—	20543.30	—	20543.30
OSFC2SEC410	860.55	1346.48	84.00	2291.03
OSFCDAPGMR410	—	3309.51	—	3309.51
OSFCDEAPPS410	—	11300.70	—	11300.70
OSFCDEDEV410	—	25955.40	—	25955.40
OSFCDEDT410	—	53146.50	—	53146.50
OSFCDEMAIL410	—	3354.43	—	3354.43
OSFCDEMANOP410	—	2132.51	—	2132.51
OSFCDEMANOS410	—	1588.99	—	1588.99
OSFCDEMIN410	—	14119.90	76.00	14195.90
OSFCLINET410	753.26	13337.50	41.00	14131.76
OSFCMPLRS410	—	27854.20	—	27854.20
OSFCTABLOC410	34.25	359.30	—	393.55
OSFDCMT410	—	1091.81	—	1091.81
OSFDCMTEXT410	—	4368.44	—	4368.44
OSFDECW410	—	1781.11	47.20	1828.31
OSFDMS410	—	87.09	73.00	160.09
OSFDOSTOOLS410	—	1005.00	—	1005.00
OSFDPSFONT410	—	5161.47	—	5161.47
OSFEMACS410	—	39719.50	—	39719.50
OSFENVMON410	41.75	238.49	—	280.24
OSFEURLOC410	—	1664.22	—	1664.22
OSFEXAMPLES410	—	1393.27	—	1393.27
OSFEXER410	—	3387.00	—	3387.00
OSFFONT15410	—	3160.99	—	3160.99
OSFFONT410	—	2432.85	—	2432.85

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX V4.0B Operating System

Subset	root	/usr	/var	Total
OSFHWBASE410	19399.60	2936.55	34.40	22370.55
OSFHWBIN410	18688.00	1984.69	—	20672.69
OSFHWBINCOM410	—	2364.31	—	2364.31
OSFHWBINOBJECT410	—	18012.90	—	18012.90
OSFINCLUDE410	—	5145.25	—	5145.25
OSFINET410	527.84	6629.52	482.18	7639.53
OSFKBDLK201410	—	361.70	—	361.70
OSFKBDLK401410	—	248.44	—	248.44
OSFKBDLK411410	—	134.33	—	134.33
OSFKBDLK421410	—	16.42	—	16.42
OSFKBDLK444410	—	126.52	—	126.52
OSFKBDPCXAL410	—	273.12	—	273.12
OSFKTOOLS410	—	933.55	7941.71	8875.26
OSFLAT410	535.69	923.71	7.82	1467.22
OSFLDBBASE410	—	16417.50	—	16417.50
OSFLDBDOC410	—	40.66	—	40.66
OSFLDBGUI410	—	9354.12	—	9354.12
OSFLDBSRV410	—	163.72	—	163.72
OSFLEARN410	—	3097.86	—	3097.86
OSFLIBA410	—	7432.32	—	7432.32
OSFLSMBASE410	5152.67	3053.97	48.21	8254.85
OSFLSMBIN410	556.79	3.05	—	559.84
OSFLSMBINCOM410	—	461.96	—	461.96
OSFLSMBINOBJECT410	—	608.28	—	608.28
OSFLSMX11410	—	2246.59	47.90	2294.49
OSFLVM410	—	2933.42	—	2933.42
OSFMANOP410	—	17316.60	—	17316.60
OSFMANOS410	—	13076.30	—	13076.30
OSFMANWOP410	—	10771.70	—	10771.70

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX V4.0B Operating System

Subset	root	/usr	/var	Total
OSFMANWOS410	—	1643.57	—	1643.57
OSFMH410	—	4368.18	—	4368.18
OSFMITFONT410	—	18937.20	104.01	19041.21
OSFMOTIF11410	—	12847.10	—	12847.10
OSFNETCONF410	—	2303.64	—	2303.64
OSFNETSCAPE410	—	18419.50	—	18419.50
OSFNFS410	50.21	1164.45	—	1214.66
OSFNFSCONF410	—	337.90	—	337.90
OSFOBSOLETE410	—	1943.00	—	1943.00
OSFOLDDECW410	—	14977.30	—	14977.30
OSFOLDX11410	—	1394.37	—	1394.37
OSFPGMR410	—	9308.38	—	9308.38
OSFPRINT410	83.68	8011.23	19.00	8113.91
OSFRCS410	—	1853.84	—	1853.84
OSFRIS410	—	147.64	143.00	290.64
OSFSCCS410	—	8680.66	—	8680.66
OSFSDE410	—	15451.30	—	15451.30
OSFSDECDE410	—	284.69	—	284.69
OSFSER3D410	—	12130.00	—	12130.00
OSFSER410	—	14479.40	66.32	14545.72
OSFSERPC410	—	3509.00	—	3509.00
OSFSERTC410	—	694.00	—	694.00
OSFSVID2410	31.59	703.69	—	735.28
OSFSYSMAN410	8.56	4833.46	—	4842.02
OSFTCLBASE410	—	2808.22	—	2808.22
OSFTERM410	—	3669.57	—	3669.57
OSFTKBASE410	—	3705.68	—	3705.68
OSFUUCP410	101.73	10328.00	266.00	10695.73
OSFX11410	22.70	45853.50	692.48	46568.68

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX V4.0B Operating System

Subset	root	/usr	/var	Total
OSFXADMIN410	—	7189.70	73.19	7262.89
OSFXC2SEC410	—	1272.02	—	1272.02
OSFXCDADEV410	—	524.99	—	524.99
OSFXDEMOS410	—	2240.21	—	2240.21
OSFXDEV410	—	3369.42	—	3369.42
OSFXEXAMPLES410	—	9132.35	—	9132.35
OSFXIEDOC410	—	1478.88	—	1478.88
OSFXINCLUDE410	—	8301.93	—	8301.93
OSFXLIBA410	—	17048.20	—	17048.20
OSFXMAIL410	—	1186.56	—	1186.56
OSFXMIT410	—	9312.66	—	9312.66
OSFXNEST410	—	374.00	10.11	384.11
OSFXOEM410	—	—	965.87	965.87
OSFXPRINT410	—	336.31	—	336.31
OSFXSYSMAN410	—	10367.80	128.97	10496.77
OSFXVFB410	—	230.00	10.11	240.11
Totals	**92990.81**	**791194.56**	**12249.81**	**896435.18**

Digital UNIX V4.0 CDE Instructional Video

Subset	root	/usr	/var	Total
CDEVIDEO100	—	156364.00	—	156364.00
CDEVIDPLR100	—	149.65	—	149.65
Totals	**—**	**156513.65**	**—**	**156513.65**

Alternative Development Environment Tools for Digital UNIX V4.0B

Subset	root	/usr	/var	Total
CMPDEVALT410	—	10474.90	—	10474.90
CMPDEVENH410	—	1608.88	—	1608.88
Totals	**—**	**12083.78**	**—**	**12083.78**

Table G–1: Digital UNIX Software Subset Sizes (cont.)

DEC Ada runtime library Digital UNIX V4.0				
Subset	**root**	**/usr**	**/var**	**Total**
ADALIB400	—	1105.23	—	1105.23
Totals	**—**	**1105.23**	**—**	**1105.23**
DEC C++ Class Libraries Version 4.0 for Digital UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
CXLLIBA410	—	417.90	—	417.90
CXLSHRDA410	—	300.12	—	300.12
Totals	**—**	**718.01**	**—**	**718.01**
DEC COBOL RTL V2.3-83 for Digital UNIX Systems				
Subset	**root**	**/usr**	**/var**	**Total**
DCARTL230	—	4108.50	—	4108.50
O2ABASE230	—	2901.28	—	2901.28
Totals	**—**	**7009.78**	**—**	**7009.78**
DECevent				
Subset	**root**	**/usr**	**/var**	**Total**
DIABASE230	9.13	39292.60	25.17	39326.90
Totals	**9.13**	**39292.60**	**25.17**	**39326.90**
DEC Fortran RTL				
Subset	**root**	**/usr**	**/var**	**Total**
DFARTL369	—	4959.12	—	4959.12
Totals	**—**	**4959.12**	**—**	**4959.12**
DEC Pascal RTL V5.4-18 for Digital UNIX Systems				
Subset	**root**	**/usr**	**/var**	**Total**
DPORTL541	—	1890.15	—	1890.15
Totals	**—**	**1890.15**	**—**	**1890.15**

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Sort Runtime Library

Subset	root	/usr	/var	Total
SORLIB300	—	717.85	—	717.85
Totals	**—**	**717.85**	**—**	**717.85**

DECtalk Runtime Kit V4.2A

Subset	root	/usr	/var	Total
DTKDFCRT420	—	18793.50	—	18793.50
DTKEMSRT420	—	1641.53	—	1641.53
DTKRT420	—	5845.04	—	5845.04
DTKRTCDE420	—	252.06	—	252.06
DTKRTDOC420	—	4661.71	—	4661.71
DTKRTRELNOT420	—	220.75	—	220.75
Totals	**—**	**31414.59**	**—**	**31414.59**

Free Software Foundation GNU Source for Digital UNIX

Subset	root	/usr	/var	Total
FSFEMACSSRC410	—	55742.80	—	55742.80
FSFGAWKSRC410	—	1220.38	—	1220.38
FSFGZIPSRC410	—	1894.38	—	1894.38
FSFINDENTSRC410	—	1244.45	—	1244.45
FSFRCSSRC410	—	1907.18	—	1907.18
Totals	**—**	**62009.19**	**—**	**62009.19**

Multimedia Services V2.2 for Digital UNIX

Subset	root	/usr	/var	Total
MMEDOC220	—	4701.01	—	4701.01
MMEDOCHW220	—	3685.72	—	3685.72
MMEDRVAV201220	76.07	875.85	—	951.92
MMEDRVAV300220	84.90	2214.22	—	2299.12
MMEDRVAV3X1220	70.95	1520.77	—	1591.72
MMEDRVBBA220	—	303.84	—	303.84
MMEDRVMSB220	72.98	844.34	—	917.32

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Multimedia Services V2.2 for Digital UNIX

Subset	root	/usr	/var	Total
MMEMANRT220	—	316.79	—	316.79
MMERELNOTES220	—	1006.84	—	1006.84
MMERT220	32.74	16084.40	—	16117.14
MMERTCDE220	—	467.70	—	467.70
MMERTSMPLDAT220	—	12385.80	—	12385.80
Totals	**337.65**	**44407.28**	**—**	**44744.92**

POLYCENTER NetWorker Save, Restore, and Archive for Digital UNIX

Subset	root	/usr	/var	Total
BRXCKIT421	—	78903.00	—	78903.00
BRXRNOTES421	—	12631.90	—	12631.90
BRXSMAN421	—	1445.14	—	1445.14
BRXSOAKIT421	6.35	92106.40	—	92112.75
Totals	**6.35**	**185086.44**	**—**	**185092.79**

Digital UNIX 4.0 X Window System PanoramiX Extension ADK

Subset	root	/usr	/var	Total
PRXADK200	—	16460.00	—	16460.00
Totals	**—**	**16460.00**	**—**	**16460.00**

Performance Manager for Digital UNIX

Subset	root	/usr	/var	Total
PMGRAPP410	—	421.89	—	421.89
PMGRBASE410	107.62	4495.89	—	4603.51
PMGRCLUSTERS410	490.45	900.78	—	1391.24
PMGRGUI410	—	32608.70	—	32608.70
PMGRMAN410	—	75.22	—	75.22
PMGRUTIL410	1534.89	19.09	—	1553.98
Totals	**2132.96**	**38521.58**	**—**	**40654.54**

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital Porting Assistant V2.0-0 for Digital UNIX

Subset	root	/usr	/var	Total
PRTBASE200	—	50977.10	—	50977.10
PRTMAN200	—	13.72	—	13.72
Totals	**—**	**50990.82**	**—**	**50990.82**

POLYCENTER Advanced File System Advanced Utilities

Subset	root	/usr	/var	Total
AFAADVANCED402	—	591.46	—	591.46
AFAADVDAEMON402	67.71	1752.97	—	1820.68
AFAADVGUI402	66.43	13770.50	—	13836.93
AFAADVMAN402	—	75.60	—	75.60
Totals	**134.14**	**16190.53**	**—**	**16324.67**

System V Environment

Subset	root	/usr	/var	Total
SVEADM410	442.78	62281.20	—	62723.98
SVEBCP410	84.63	20191.60	—	20276.23
SVEDEV410	54.49	29566.20	—	29620.69
SVEENV410	40.19	19.16	—	59.35
SVEMAN410	—	8276.17	—	8276.17
SVEPRINT410	259.06	42157.30	—	42416.36
Totals	**881.15**	**162491.63**	**—**	**163372.78**

TruCluster Available Server Software V1.4

Subset	root	/usr	/var	Total
TCRASE140	2034.00	18590.00	—	20624.00
TCRCMS140	156.88	11967.80	—	12124.68
TCRCOMMON140	70.79	1545.81	—	1616.60
TCRCONF140	—	50.31	—	50.31
TCRDSVC140	2451.69	9810.55	—	12262.24
TCRMAN140	—	1305.51	—	1305.51

Table G–1: Digital UNIX Software Subset Sizes (cont.)

TruCluster Available Server Software V1.4				
Subset	**root**	**/usr**	**/var**	**Total**
TCRMCA140	—	3978.53	—	3978.53
Totals	**4713.36**	**47248.51**	**—**	**51961.87**

Digital UNIX Worldwide Language Support V4.0A				
Subset	**root**	**/usr**	**/var**	**Total**
IOSAACMENU405	—	—	—	—
IOSCACDEAPPS405	—	222.45	—	222.45
IOSCACDEDEV405	—	172.05	—	172.05
IOSCACDEDT405	—	1049.97	—	1049.97
IOSCACDEMAIL405	—	84.04	—	84.04
IOSCACDEMIN405	—	3968.55	—	3968.55
IOSCADECW405	—	150.65	—	150.65
IOSCAOLDDECW405	—	27.00	—	27.00
IOSCAX11405	—	337.33	—	337.33
IOSCAXDEV405	—	92.79	—	92.79
IOSCSCDEAPPS405	—	215.37	—	215.37
IOSCSCDEDEV405	—	152.68	—	152.68
IOSCSCDEDT405	—	1207.61	—	1207.61
IOSCSCDEMAIL405	—	78.31	—	78.31
IOSCSCDEMIN405	—	474.07	—	474.07
IOSCSDECW405	—	704.62	—	704.62
IOSCSOLDDECW405	—	3976.19	—	3976.19
IOSCSOLDX11405	—	863.35	—	863.35
IOSCSUCSBASE405	—	124.20	—	124.20
IOSCSX11405	—	6619.21	—	6619.21
IOSCSXDEV405	—	92.66	—	92.66
IOSCSXMAIL405	—	334.78	—	334.78
IOSDECDEAPPS405	—	221.40	—	221.40
IOSDECDEDEV405	—	161.81	—	161.81

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX Worldwide Language Support V4.0A

Subset	root	/usr	/var	Total
IOSDECDEDT405	—	1049.98	—	1049.98
IOSDECDEHLP405	—	18237.30	—	18237.30
IOSDECDEMAIL405	—	86.75	—	86.75
IOSDECDEMIN405	—	486.33	—	486.33
IOSDEDECW405	—	705.84	—	705.84
IOSDEOLDDECW405	—	4004.22	—	4004.22
IOSDEOLDX11405	—	877.02	—	877.02
IOSDEX11405	—	6302.62	—	6302.62
IOSDEXDEV405	—	92.77	—	92.77
IOSDEXMAIL405	—	391.34	—	391.34
IOSELFONT100M405	—	1076.80	—	1076.80
IOSELFONT100P405	—	1080.35	—	1080.35
IOSELFONT75M405	—	918.43	—	918.43
IOSELFONT75P405	—	926.76	—	926.76
IOSELOLDDECW405	—	552.52	—	552.52
IOSELOLFONT405	—	1976.36	—	1976.36
IOSELUCSBASE405	—	102.09	—	102.09
IOSELX11405	—	355.61	—	355.61
IOSELXMAIL405	—	68.59	—	68.59
IOSESCDEAPPS405	—	217.63	—	217.63
IOSESCDEDEV405	—	160.00	—	160.00
IOSESCDEDT405	—	1061.50	—	1061.50
IOSESCDEHLP405	—	22239.00	—	22239.00
IOSESCDEMAIL405	—	85.09	—	85.09
IOSESCDEMIN405	—	498.11	—	498.11
IOSESDECW405	—	687.50	—	687.50
IOSESOLDDECW405	—	4031.10	—	4031.10
IOSESOLDX11405	—	886.37	—	886.37
IOSESX11405	—	6272.58	—	6272.58

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX Worldwide Language Support V4.0A

Subset	root	/usr	/var	Total
IOSESXDEV405	—	92.82	—	92.82
IOSESXMAIL405	—	348.40	—	348.40
IOSFRCDEAPPS405	—	226.64	—	226.64
IOSFRCDEDEV405	—	153.72	—	153.72
IOSFRCDEDT405	—	1044.86	—	1044.86
IOSFRCDEHLP405	—	18698.60	—	18698.60
IOSFRCDEMAIL405	—	88.34	—	88.34
IOSFRCDEMIN405	—	499.11	—	499.11
IOSFRDECW405	—	679.20	—	679.20
IOSFROLDDECW405	—	3990.56	—	3990.56
IOSFROLDX11405	—	870.65	—	870.65
IOSFRX11405	—	6298.06	—	6298.06
IOSFRXDEV405	—	92.91	—	92.91
IOSFRXMAIL405	—	365.20	—	365.20
IOSHUCDEAPPS405	—	217.01	—	217.01
IOSHUCDEDEV405	—	169.14	—	169.14
IOSHUCDEDT405	—	1196.93	—	1196.93
IOSHUCDEMAIL405	—	80.75	—	80.75
IOSHUCDEMIN405	—	3989.26	—	3989.26
IOSHUDECW405	—	676.65	—	676.65
IOSHUOLDDECW405	—	3981.59	—	3981.59
IOSHUOLDX11405	—	855.98	—	855.98
IOSHUUCSBASE405	—	108.20	—	108.20
IOSHUX11405	—	6472.63	—	6472.63
IOSHUXDEV405	—	92.76	—	92.76
IOSHUXMAIL405	—	342.43	—	342.43
IOSITCDEAPPS405	—	213.17	—	213.17
IOSITCDEDEV405	—	159.80	—	159.80
IOSITCDEDT405	—	1048.04	—	1048.04

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX Worldwide Language Support V4.0A

Subset	root	/usr	/var	Total
IOSITCDEHLP405	—	14603.40	—	14603.40
IOSITCDEMAIL405	—	88.63	—	88.63
IOSITCDEMIN405	—	504.20	—	504.20
IOSITDECW405	—	682.54	—	682.54
IOSITOLDDECW405	—	4033.67	—	4033.67
IOSITOLDX11405	—	891.73	—	891.73
IOSITX11405	—	6357.72	—	6357.72
IOSITXDEV405	—	92.84	—	92.84
IOSITXMAIL405	—	365.25	—	365.25
IOSIWBASE405	—	119.63	—	119.63
IOSIWCDEDT405	—	264.77	—	264.77
IOSIWCDEMIN405	—	106.00	—	106.00
IOSIWDECW405	—	65.12	—	65.12
IOSIWFONT100M405	—	594.96	—	594.96
IOSIWFONT100P405	—	2157.05	—	2157.05
IOSIWFONT75M405	—	371.72	—	371.72
IOSIWFONT75P405	—	1901.38	—	1901.38
IOSIWOLDX11405	—	11.77	—	11.77
IOSIWOLFONT405	—	3003.34	—	3003.34
IOSIWUCSBASE405	—	92.20	—	92.20
IOSIWX11405	—	1698.04	—	1698.04
IOSIWXDEV405	—	875.86	—	875.86
IOSJPABASE405	—	3546.82	—	3546.82
IOSJPAMANOS405	—	35.76	—	35.76
IOSJPBASE405	608.95	13317.20	6.10	13932.25
IOSJPCDEAPPS405	—	475.68	—	475.68
IOSJPCDEDEV405	—	1212.54	—	1212.54
IOSJPCDEDT405	—	4207.16	—	4207.16
IOSJPCDEHLP405	—	32843.40	—	32843.40

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX Worldwide Language Support V4.0A

Subset	root	/usr	/var	Total
IOSJPCDEHLPSJIS405	—	32839.40	—	32839.40
IOSJPCDEMAIL405	—	307.84	—	307.84
IOSJPCDEMIN405	—	1836.59	—	1836.59
IOSJPDECW405	—	789.45	—	789.45
IOSJPFONT100M405	—	11994.10	—	11994.10
IOSJPFONT100P405	—	11912.50	—	11912.50
IOSJPFONT75M405	—	8380.05	—	8380.05
IOSJPFONT75P405	—	8310.46	—	8310.46
IOSJPFONTM405	—	13552.70	—	13552.70
IOSJPLDBBASE405	—	929.53	—	929.53
IOSJPLDBGUI405	—	5681.31	—	5681.31
IOSJPMANOS405	—	6674.98	—	6674.98
IOSJPMANWOS405	—	223.13	—	223.13
IOSJPMSG405	—	1593.90	—	1593.90
IOSJPMSGSJIS405	—	531.26	—	531.26
IOSJPNEMACS405	76.00	23369.70	—	23445.70
IOSJPNEMACSSRC405	—	10261.80	—	10261.80
IOSJPOLDDECW405	—	6138.83	—	6138.83
IOSJPOLDX11405	12.39	956.94	—	969.33
IOSJPPGMR405	—	2065.42	—	2065.42
IOSJPUCSBASE405	—	7753.77	—	7753.77
IOSJPWNN405	104.97	20149.00	—	20253.97
IOSJPWNNPGMR405	—	1225.36	—	1225.36
IOSJPWNNSRC405	—	10791.00	—	10791.00
IOSJPX11405	—	6822.54	—	6822.54
IOSJPXDEV405	—	130.50	—	130.50
IOSJPXMAIL405	—	753.29	—	753.29
IOSKOBASE405	—	1796.00	—	1796.00
IOSKOCDEAPPS405	—	185.78	—	185.78

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX Worldwide Language Support V4.0A

Subset	root	/usr	/var	Total
IOSKOCDEDEV405	—	158.27	—	158.27
IOSKOCDEDT405	—	1427.97	—	1427.97
IOSKOCDEHLP405	—	21954.20	—	21954.20
IOSKOCDEMAIL405	—	130.05	—	130.05
IOSKOCDEMIN405	—	758.07	—	758.07
IOSKODECW405	—	146.13	—	146.13
IOSKOFONTM405	—	3762.47	—	3762.47
IOSKOFONTP405	—	9568.90	—	9568.90
IOSKOOLDDECW405	—	2146.14	—	2146.14
IOSKOOLDX11405	—	433.60	—	433.60
IOSKOOLFONT405	—	6159.31	—	6159.31
IOSKOPGMR405	—	168.50	—	168.50
IOSKOUCSBASE405	—	2122.66	—	2122.66
IOSKOX11405	—	4753.58	—	4753.58
IOSKOXDEV405	—	101.00	—	101.00
IOSKOXMAIL405	—	76.40	—	76.40
IOSLDBBASE405	—	20265.40	—	20265.40
IOSLDBDOC405	—	38.99	—	38.99
IOSLDBGUI405	—	9631.88	—	9631.88
IOSLDBSRV405	—	166.79	—	166.79
IOSLTX11405	—	37.93	—	37.93
IOSPLCDEAPPS405	—	199.49	—	199.49
IOSPLCDEDEV405	—	167.97	—	167.97
IOSPLCDEDT405	—	1194.06	—	1194.06
IOSPLCDEMAIL405	—	117.98	—	117.98
IOSPLCDEMIN405	—	3998.58	—	3998.58
IOSPLDECW405	—	694.93	—	694.93
IOSPLOLDDECW405	—	3972.02	—	3972.02
IOSPLOLDX11405	—	870.47	—	870.47

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX Worldwide Language Support V4.0A

Subset	root	/usr	/var	Total
IOSPLUCSBASE405	—	124.20	—	124.20
IOSPLX11405	—	6709.61	—	6709.61
IOSPLXDEV405	—	92.79	—	92.79
IOSPLXMAIL405	—	353.84	—	353.84
IOSRUDECW405	—	687.34	—	687.34
IOSRUOLDDECW405	—	4150.13	—	4150.13
IOSRUOLDX11405	—	876.66	—	876.66
IOSRUUCSBASE405	—	108.20	—	108.20
IOSRUX11405	—	6645.37	—	6645.37
IOSRUXDEV405	—	92.91	—	92.91
IOSRUXMAIL405	—	336.74	—	336.74
IOSSKCDEAPPS405	—	207.22	—	207.22
IOSSKCDEDEV405	—	276.39	—	276.39
IOSSKCDEDT405	—	1222.71	—	1222.71
IOSSKCDEMAIL405	—	80.67	—	80.67
IOSSKCDEMIN405	—	3994.71	—	3994.71
IOSSKDECW405	—	664.03	—	664.03
IOSSKOLDDECW405	—	3934.27	—	3934.27
IOSSKOLDX11405	—	846.86	—	846.86
IOSSKUCSBASE405	—	124.20	—	124.20
IOSSKX11405	—	6094.18	—	6094.18
IOSSKXDEV405	—	92.63	—	92.63
IOSSKXMAIL405	—	326.06	—	326.06
IOSSLX11405	—	49.23	—	49.23
IOSSVCDEAPPS405	—	215.22	—	215.22
IOSSVCDEDEV405	—	155.36	—	155.36
IOSSVCDEDT405	—	1020.82	—	1020.82
IOSSVCDEHLP405	—	12779.50	—	12779.50
IOSSVCDEMAIL405	—	73.28	—	73.28

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX Worldwide Language Support V4.0A

Subset	root	/usr	/var	Total
IOSSVCDEMIN405	—	443.43	—	443.43
IOSSVDECW405	—	663.32	—	663.32
IOSSVOLDDECW405	—	3759.16	—	3759.16
IOSSVOLDX11405	—	835.55	—	835.55
IOSSVX11405	—	5938.46	—	5938.46
IOSSVXDEV405	—	92.63	—	92.63
IOSSVXMAIL405	—	326.23	—	326.23
IOSTHBASE405	—	783.48	—	783.48
IOSTHBIN405	451.41	12.20	6.10	469.71
IOSTHCDEAPPS405	—	138.79	—	138.79
IOSTHCDEDEV405	—	256.52	—	256.52
IOSTHCDEDT405	—	1180.90	—	1180.90
IOSTHCDEMAIL405	—	67.13	—	67.13
IOSTHCDEMIN405	—	485.98	—	485.98
IOSTHDECW405	—	145.56	—	145.56
IOSTHFONTM405	—	105.02	—	105.02
IOSTHOLDDECW405	—	1991.29	—	1991.29
IOSTHOLDX11405	—	434.15	—	434.15
IOSTHOLFONT405	—	7347.15	—	7347.15
IOSTHPGMR405	—	124.49	—	124.49
IOSTHPRINT405	—	172.89	—	172.89
IOSTHX11405	—	2782.18	—	2782.18
IOSTHXDEV405	—	109.73	—	109.73
IOSTHXMAIL405	—	74.33	—	74.33
IOSTRFONT100M405	—	1080.75	—	1080.75
IOSTRFONT100P405	—	4113.84	—	4113.84
IOSTRFONT75M405	—	929.03	—	929.03
IOSTRFONT75P405	—	3468.61	—	3468.61
IOSTROLDDECW405	—	130.10	—	130.10

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX Worldwide Language Support V4.0A

Subset	root	/usr	/var	Total
IOSTROLFONT405	—	5420.68	—	5420.68
IOSTRUCSBASE405	—	102.09	—	102.09
IOSTRX11405	—	420.52	—	420.52
IOSTRXMAIL405	—	68.58	—	68.58
IOSULUCSBASE405	—	3608.36	—	3608.36
IOSWWBASE405	185.46	1269.57	—	1455.03
IOSWWBIN405	986.55	91.38	12.20	1090.13
IOSWWBINCOM405	38.11	417.44	—	455.56
IOSWWCDEDT405	—	893.13	—	893.13
IOSWWFONTM405	—	933.64	—	933.64
IOSWWLAT2FONT100M405	—	1161.37	—	1161.37
IOSWWLAT2FONT100P405	—	4363.31	—	4363.31
IOSWWLAT2FONT75M405	—	989.44	—	989.44
IOSWWLAT2FONT75P405	—	3677.32	—	3677.32
IOSWWLAT2OLFONT405	—	5538.47	—	5538.47
IOSWWLAT4FONT100M405	—	1148.55	—	1148.55
IOSWWLAT4FONT100P405	—	4386.89	—	4386.89
IOSWWLAT4FONT75M405	—	981.27	—	981.27
IOSWWLAT4FONT75P405	—	3699.16	—	3699.16
IOSWWLATCFONT100M405	—	1144.07	—	1144.07
IOSWWLATCFONT100P405	—	2424.95	—	2424.95
IOSWWLATCFONT75M405	—	970.88	—	970.88
IOSWWLATCFONT75P405	—	2030.64	—	2030.64
IOSWWLATCOLFONT405	—	3644.37	—	3644.37
IOSWWMOTIF11405	—	9837.15	—	9837.15
IOSWWMULE405	—	94519.80	—	94519.80
IOSWWMULESRC405	—	26961.80	—	26961.80
IOSWWOLDBKR405	—	5632.69	—	5632.69
IOSWWOLDDECW405	—	401.85	—	401.85

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX Worldwide Language Support V4.0A

Subset	root	/usr	/var	Total
IOSWWPGMR405	—	263.72	—	263.72
IOSWWPHRASE405	413.47	1610.22	6.10	2029.79
IOSWWPRINT405	63.33	962.22	—	1025.55
IOSWWSVEDEV405	—	286.31	—	286.31
IOSWWSYSMAN405	—	350.63	4.78	355.41
IOSWWUCSBASE405	—	1938.27	—	1938.27
IOSWWUDCOS405	427.59	2293.19	6.10	2726.88
IOSWWUDCWOS405	—	122.60	—	122.60
IOSWWX11405	—	4092.13	—	4092.13
IOSWWXDEV405	—	2250.93	—	2250.93
IOSWWXFR405	—	1186.21	3.49	1189.70
IOSZHBASE405	—	255.21	—	255.21
IOSZHBIG5405	189.08	1517.37	3.05	1709.50
IOSZHCNBASE405	—	414.43	—	414.43
IOSZHCNCDEAPPS405	—	123.36	—	123.36
IOSZHCNCDEDEV405	—	154.42	—	154.42
IOSZHCNCDEDT405	—	1170.30	—	1170.30
IOSZHCNCDEHLP405	—	14529.00	—	14529.00
IOSZHCNCDEMAIL405	—	72.92	—	72.92
IOSZHCNCDEMIN405	—	447.16	—	447.16
IOSZHCNLOC405	—	1122.28	—	1122.28
IOSZHCNUCSBASE405	—	3342.51	—	3342.51
IOSZHCONV405	87.12	259.66	3.05	349.83
IOSZHEUCTW405	—	814.20	—	814.20
IOSZHHANYU405	—	878.05	—	878.05
IOSZHHANZI405	—	750.41	—	750.41
IOSZHHKBASE405	—	3627.33	—	3627.33
IOSZHHKUCSBASE405	—	2802.26	—	2802.26
IOSZHPGMR405	—	2451.46	—	2451.46

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX Worldwide Language Support V4.0A

Subset	root	/usr	/var	Total
IOSZHSDECW405	—	146.38	—	146.38
IOSZHSFONTM405	—	3322.40	—	3322.40
IOSZHSFONTP405	—	27595.30	—	27595.30
IOSZHSOLDDECW405	—	2050.17	—	2050.17
IOSZHSOLDX11405	—	425.72	—	425.72
IOSZHSOLFONT405	—	15014.50	—	15014.50
IOSZHSX11405	—	3138.28	—	3138.28
IOSZHSXDEV405	—	204.77	—	204.77
IOSZHSXMAIL405	—	75.07	—	75.07
IOSZHTDECW405	—	439.60	—	439.60
IOSZHTELEX405	154.39	2170.68	3.05	2328.12
IOSZHTFONTM405	—	8960.66	—	8960.66
IOSZHTFONTP405	—	25532.30	—	25532.30
IOSZHTOLDDECW405	—	6043.84	—	6043.84
IOSZHTOLDX11405	—	1284.83	—	1284.83
IOSZHTOLFONT405	—	28075.70	—	28075.70
IOSZHTWBASE405	—	3334.67	—	3334.67
IOSZHTWCDEAPPS405	—	367.62	—	367.62
IOSZHTWCDEDEV405	—	458.43	—	458.43
IOSZHTWCDEDT405	—	3672.87	—	3672.87
IOSZHTWCDEHLP405	—	18677.40	—	18677.40
IOSZHTWCDEMAIL405	—	196.19	—	196.19
IOSZHTWCDEMIN405	—	1325.51	—	1325.51
IOSZHTWLOC405	—	9750.79	—	9750.79
IOSZHTWUCSBASE405	—	8374.88	—	8374.88
IOSZHTX11405	—	7822.78	—	7822.78
IOSZHTXDEV405	—	965.39	—	965.39
IOSZHTXMAIL405	—	233.12	—	233.12
IOSZHUCSBASE405	—	7363.66	—	7363.66

Table G–1: Digital UNIX Software Subset Sizes (cont.)

Digital UNIX Worldwide Language Support V4.0A				
Subset	**root**	**/usr**	**/var**	**Total**
IOSZHX11405	—	6464.00	—	6464.00
Totals	**3798.82**	**1058159.98**	**54.01**	**1062012.81**
Grand Totals	**root**	**/usr**	**/var**	**Total**
	105004.37	**2728465.28**	**12328.99**	**2845798.63**

G.2 Disk Space Required for Update Installations

For update installations, the `installupdate` script automatically computes and reports the difference between the amount of disk space used and the amount of disk space required.

Depending on the software currently installed on the system and how the disk partitions are defined, the update installation of your system from Digital UNIX Version 4.0 or 4.0A to Digital UNIX Version 4.0B requires the following minimum amounts of additional disk space (in 512-byte blocks, rounded upward).

Systems with more software subsets installed than those installed by a default installation but fewer software subsets than a custom installation require varying amounts of additional disk space for an update installation.

Note

The following numbers have been compiled from typical update installations from Digital UNIX Version 4.0 or 4.0A to Digital UNIX Version 4.0B. The numbers in the Additional Space Needed column represent the typical amount of space needed per file system by the update installation procedure during the course of an update. These values take into account the additional processing space for temporary files that the update installation requires and will vary depending on your specific hardware configuration and file system type. These values have been determined before the use of the Update Administration Utility.

- Disk space needed to update the Digital UNIX Version 4.0 mandatory software subsets to Digital UNIX Version 4.0B:

File System	File System Type	V4.0 Mandatory Subsets ONLY	V4.0B Mandatory Subsets ONLY	Additional Space Needed
root (/)	ufs	39.59	41.42	4.77
/usr	ufs	164.02	171.57	10.42

- Disk space needed to update all mandatory and optional Digital UNIX Version 4.0 software subsets to Digital UNIX Version 4.0B:

File System	File System Type	V4.0 All Subsets	V4.0B All Subsets	Additional Space Needed
root (/)	ufs	48.11	49.93	5.12
/usr	ufs	326.46	332.19	10.66
/var	ufs	5.84	5.62	1.38
root (/)	AdvFS	49.58	51.35	6.54
/usr	AdvFS	326.26	331.91	22.35
/var	AdvFS	6.09	6.41	2.23

- Disk space needed to update the Digital UNIX Version 4.0A mandatory software subsets to Digital UNIX Version 4.0B:

File System	File System Type	V4.0A Mandatory Subsets ONLY	V4.0B Mandatory Subsets ONLY	Additional Space Needed
root (/)	ufs	40.32	41.43	4.05
/usr	ufs	164.58	171.58	9.84

- Disk space needed to update all mandatory and optional Digital UNIX Version 4.0A software subsets to Digital UNIX Version 4.0B:

File System	File System Type	V4.0A All Subsets	V4.0B All Subsets	Additional Space Needed
root (/)	ufs	48.81	49.95	4.40
/usr	ufs	324.89	331.88	10.70
/var	ufs	5.84	5.62	1.38
root (/)	AdvFS	50.25	51.35	5.86

File System	File System Type	V4.0A All Subsets	V4.0B All Subsets	Additional Space Needed
/usr	AdvFS	324.66	331.60	23.69
/var	AdvFS	6.10	6.41	2.23

G.3 Disk Space Required for RIS Areas

The RIS area for Digital UNIX Version 4.0B requires approximately 931.7 MB of disk space. The space requirements are broken down as follows:

Product Area	512-Byte Blocks
./ALPHA/BASE	958770
./ALPHA/CDE_Video	137522
./ALPHA/COMPILERS	7354
./ALPHA/DEC_Ada_RTL	544
./ALPHA/DEC_C++_RTL	328
./ALPHA/DEC_Cobol_RTL	2850
./ALPHA/DEC_EVENT	10994
./ALPHA/DEC_Fortran_RTL	2408
./ALPHA/DEC_Pascal_RTL	806
./ALPHA/DEC_Sort_RTL	364
./ALPHA/DECtalk_Runtime	9272
./ALPHA/GNUSRC	23566
./ALPHA/Multimedia_Services	39894
./ALPHA/Netscape_FastTrack_Server	79328
./ALPHA/NetWorker_SingleServer	83230
./ALPHA/PanoramiX_ADK	9352
./ALPHA/Performance_Manager	14616
./ALPHA/Porting_Assistant	20404
./ALPHA/WORLDWIDE	642400
./AFA	9970
./SVE	86162

./TCR	22712
Total	2162846

G.4 Disk Space Required for Documentation

The files for the Digital UNIX documentation set and the Worldwide support documentation are contained on the CD–ROM labeled *Digital UNIX V4.0B Documentation Volume 1*. These files require the following amounts of disk space if moved from the CD–ROM onto a local disk:

- Digital UNIX operating system documentation – 92.5 MB
- Worldwide support documentation – 9.5 MB

H

Default Disk Partitions

This appendix provides the default disk partitions for the supported Digital Storage Architecture (DSA) and Small Computer System Interface (SCSI) disk drives. This information will help you complete the worksheets in Chapter 3.

Refer to Section H.1 for a list of the supported DSA disk drives. Refer to Section H.2 for a list of the supported SCSI disk drives.

H.1 DSA Disk Drives

This section provides default partition information for each of the following supported `ra` disks:

- RA60
- RA71, RA72, RA73
- RA81, RA82
- RA90, RA92

RA60 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	40959	40960	20	c
b	40960	82927	41968	20	c
c	0	400175	400176	195	a, b, d, e, f, g, h
d	242928	295343	52416	26	c, h
e	295344	347759	52416	26	c, h
f	347760	400175	52416	26	c, h
g	82928	242927	160000	78	c
h	242928	400175	157248	77	c, d, e, f

RA71 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	1367309	1367310	668	a, b, d, e, f, g, h
d	393216	717913	324698	159	c, g
e	717914	1042611	324698	159	c, g
f	1042612	1367309	324698	159	c, g, h
g	393216	1212415	819200	400	c, d, e, f
h	1212416	1367309	154894	76	c, f

RA72 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	1953299	1953300	954	a, b, d, e, f, g, h
d	393216	913243	520028	254	c, g
e	913244	1433271	520028	254	c, g, h
f	1433272	1953299	520028	254	c, h
g	393216	1212415	819200	400	c, d, e
h	1212416	1953299	740884	362	c, e, f

RA73 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	3920489	3920490	1914	a, b, d, e, f, g, h
d	393216	1568767	1175552	574	c, g, h
e	1568768	2744319	1175552	574	c, h
f	2744320	3920489	1176170	574	c, h
g	393216	1212415	819200	400	c, d
h	1212416	3920489	2708074	1322	c, d, e, f

RA81 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	81919	81920	40	c
b	81920	344063	262144	128	c
c	0	891071	891072	435	a, b, d, e, f, g
d	344064	526399	182336	89	c, g
e	526400	708735	182336	89	c, g
f	708736	891071	182336	89	c, g
g	344064	891071	547008	267	c, d, e, f
h	0	0	0	0	

RA82 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	1216664	1216665	594	a, b, d, e, f, g
d	393216	667698	274483	134	c, g
e	667699	942181	274483	134	c, g
f	942182	1216664	274483	134	c, g
g	393216	1216664	823449	402	c, d, e, f
h	0	0	0	0	

RA90 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	2376152	2376153	1160	a, b, d, e, f, g, h
d	393216	1054194	660979	323	c, g
e	1054195	1715173	660979	323	c, g, h
f	1715174	2376152	660979	323	c, h
g	393216	1212415	819200	400	c, d, e
h	1212416	2376152	1163737	568	c, e, f

RA92 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	2940950	2940951	1436	a, b, d, e, f, g, h
d	393216	1054194	660979	323	c, g
e	1054195	1715173	660979	323	c, g, h
f	1715174	2376152	660979	323	c, h
g	393216	1212415	819200	400	c, d, e
h	1212416	2940950	1728535	844	c, e, f

H.2 SCSI Disk Drives

This section provides default partition information for each of the following supported `rz` disks:

- RZ24L
- RZ25, RZ25F, RZ25L, RZ25M
- RZ26, RZ26F, RZ26L, RZ26N
- RZ28, RZ28B, RZ28D, RZ28L, RZ28M
- RZ29B
- RZ55, RZ56, RZ58
- RZ73, RZ74
- HSZ10, HSZ40

RZ24L Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	40959	40960	20	c
b	40960	163839	122880	60	c
c	0	479349	479350	234	a, b, d, e, f, g
d	163840	269009	105170	51	c, g
e	269010	374179	105170	51	c, g
f	374180	479349	105170	51	c, g
g	163840	479349	315510	154	c, d, e, f
h	0	0	0	0	

RZ25 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	832526	832527	407	a, b, d, e, f, g
d	393216	539652	146437	72	c, g
e	539653	686089	146437	72	c, g
f	686090	832526	146437	72	c, g
g	393216	832526	439311	215	c, d, e, f
h	0	0	0	0	

RZ25F, RZ25L, and RZ25M Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	1046205	1046205	510	a, b, d, e, f, g
d	393216	610878	217663	106	c, g
e	610879	828541	217663	106	c, g
f	828542	1046205	146437	72	c, g
g	393216	1046205	439311	215	c, d, e, f
h	0	0	0	0	

RZ26, RZ26F, RZ26J, RZ26L, and RZ26N Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	2050859	2050860	1001	a, b, d, e, f, g, h
d	393216	945763	552548	270	c, g
e	945764	1498311	552548	270	c, g, h
f	1498312	2050859	552548	270	c, h
g	393216	1212415	819200	400	c, d, e
h	1212416	2050859	838444	409	c, e, f

RZ28, RZ28B, RZ28D, RZ28J, RZ28L, and RZ28M Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	532479	401408	196	c
c	0	4110480	4110480	2007	a, b, d, e, f, g, h
d	532480	1724415	1191936	581	c, g
e	1724416	2916351	1191936	581	c, g, h
f	2916352	4110480	1194129	583	c, h
g	532480	2320383	1787904	873	c, d, e
h	2320384	4110480	1790097	874	c, ,e, f

RZ29B Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	532479	401408	196	c
c	0	8380080	8380080	4091	a, b, d, e, f, g, h
d	532480	3155967	2623488	1281	c, g
e	3155968	5779455	2623488	1281	c, g, h
f	5779456	8380080	2600625	1269	c, h
g	532480	4468735	3936255	1922	c, d, e
h	4468736	8380080	3911345	1909	c, e, f

RZ55 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	649039	649040	317	a, b, g
d	0	0	0	0	
e	0	0	0	0	
f	0	0	0	0	
g	393216	649039	255824	125	c
h	0	0	0	0	

RZ56 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	1299173	1299174	634	a, b, d, e, f, g, h
d	393216	695201	301986	147	c, g
e	695202	997187	301986	147	c, g
f	997188	1299173	301986	147	c, g, h
g	393216	1212415	819200	400	c, d, e, f
h	1212416	1299173	86758	42	c, f

RZ58 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	2698060	2698061	1317	a, b, d, e, f, g, h
d	393216	1161496	768281	375	c, g
e	1161497	1929778	768282	375	c, g, h
f	1929779	2698060	768282	375	c, h
g	393216	1212415	819200	400	c, d, e
h	1212416	2698060	1485645	725	c, e, f

RZ73 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	393215	262144	128	c
c	0	3907910	3907911	1908	a, b, d, e, f, g, h
d	393216	1564780	1171565	572	c, g, h
e	1564781	2736345	1171565	572	c, h
f	2736346	3907910	1171565	572	c, h
g	393216	1212415	819200	400	c, d
h	1212416	3907910	2695495	1316	c, d, e, f

RZ74 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	c
b	131072	524287	393216	192	c
c	0	6976374	6976375	3406	a, b, d, e, f, g, h
d	524288	2674687	2150400	1050	c, g
e	2674688	4825087	2150400	1050	c, g, h
f	4285088	6976374	2691287	1414	c,h
g	524287	3749887	3225600	1575	c, d, e
h	3749888	6976374	3226486	1575	c, e, f

HSZ10 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	n/a
b	131072	393215	262144	128	n/a
c	0	end of media	n/a	n/a	a, b, g
d	0	0	n/a	n/a	n/a
e	0	0	n/a	n/a	n/a
f	0	0	n/a	n/a	n/a
g	393216	end of media	n/a	n/a	n/a
h	0	0	n/a	n/a	n/a

HSZ40 Partitions

Partition	Start	End	Block Size	MB	Overlap
a	0	131071	131072	64	n/a
b	131072	393215	262144	128	n/a
c	0	end of media	n/a	n/a	a, b, g
d	0	0	n/a	n/a	n/a
e	0	0	n/a	n/a	n/a
f	0	0	n/a	n/a	n/a
g	393216	end of media	n/a	n/a	n/a
h	0	0	n/a	n/a	n/a

HSZ10 and HSZ40 are SCSI disk arrays employing RAID technology. The default disk partition on a disk attached to an EISA RAID (SWXCR-En) or PCI RAID (SWXCR-Pn) disk controller is correct for the `re` disk. Disk partition sizes depend on the number of disk devices in the array and how they have been configured.

Installation Error Messages

This appendix explains the error messages you might see if there is a problem during an installation. The messages are sorted in alphabetical order.

<dev>: unknown device

The installation procedure detected that the distribution media to install from is not a supported installation device. Installation devices include Remote Installation Services (RIS) servers or `rz*` (SCSI) disks and CD-ROMs.

<string>: unknown machine type

The program used to determine the type of machine being installed has not found the expected Alpha architecture. The value of *`string`* is the value returned from the program. The system installation cannot continue and you must contact your field service representative.

A previous installation has left the system in a state that will not allow a restart.

Please halt and then reboot to install this system.

This message may be displayed when `restart` is entered from the UNIX Shell. This message means that the installation has determined that a restart is not possible due to the current state of the system. You must first halt the system by entering the `halt` command and then reboot the system from the distribution media to start the installation procedure again.

Cannot find <CLIENT> in risdb file. Check with the system manager of your RIS server.

This message displays during a RIS installation. The name assigned to this system (`CLIENT`) during the installation does not have an entry in the `risdb` file on the RIS server. When this occurs, the problem is usually related to the use of a fully qualified hostname versus a non-fully qualified hostname, for example, `abcxyz.com` instead of `abcxyz`. This error is often caused by the particular name service configured on the network and can usually be resolved by modifying the entry in the `risdb` file so that it matches `CLIENT`.

Cannot find the name for $CLIENT using bin/getname. Check with the system manager of your RIS server.

During a RIS installation, the RIS server was unable to inform the client of its host name. The system being installed requests that the RIS server send its host name based on the IP address. The RIS server does this by executing the `~ris/bin/getname` command. The error occurs when the `getname` command could not return the host name. Generally, this is due to a problem with the particular name service configured on the network. This can often be resolved by adding an entry to the `/etc/hosts` file (on the RIS server) for the system being installed.

Could not successfully write 'showboot' file.
When the system halts, please enter your default boot disk as follows:

>>> set BOOTDEF_DEV <boot_default>

This message indicates that the installation process could not successfully ascertain the default boot information from the console firmware and suggests that the console firmware variable `BOOTDEF_DEV` be set to the name of the disk that contains the newly-installed `root` file system. After setting this variable, reboot the system by issuing the `boot` command.

Error copying MAKEDEV to /mnt.

This message is displayed when of the installation process fails to copy the `MAKEDEV` script from the memory file system (`/dev`) to the `dev` directory on the newly created `root` file system which is currently mounted on `/mnt` (`/mnt/dev`). This is a fatal error for the installation. Invoke the installation again. If it fails, contact your Digital field service representative.

If the X server was started as part of the installation and repeated attempts to restart the installation fail, enter: restart nogui

This message may be seen if the graphical user interface encountered an error or if you intentionally selected the `UNIX Shell` option. If an error occurred before the installation graphical user interface was started, there may be a problem starting the X environment for the installation. In this case, you can invoke the installation procedure with the text-based interface by entering the `restart nogui` command.

No valid device is found. Contact a DIGITAL field service representative.

There are no disks on the system that are supported for the purpose of storing the `root` file system.

Consult the Software Product Description (SPD) and Appendix H for a list of supported disks.

If you have disks that are listed as supported for use as system disks connected to your system, use the following steps to check the cables:
1. Turn off the system and all connected expansion cabinets.
2. Check the cabling to all disks and expansion cabinets. 3. Turn on all expansion cabinets. 4. Turn on the system. 5. Start the installation again by booting from the distribution media.

Please change directory to / before restarting.

This message displays if you have exited the installation setup process, accessed the `UNIX Shell` option and then entered `restart` to start the installation process again. This message appears only if you have changed (`cd`) out of the `root` (`/`) directory. You must change directory to `/` by using the `cd` command before entering `restart`.

Please inspect the file /var/tmp/install.FS.log to identify the source of the failure.

This message displays when the installation procedure encounters a file system error. Use the `cat /var/tmp.install.FS.log` command to view the contents of the `/var/tmp/install.FS.log` file to identify the source of the failure. The `/var/tmp/install.FS.log` file is written in the memory file system and will exist only until the system is booted.

Digital UNIX provides the ability to view (or inspect) files by using various commands and utilities such as: `vi(ew)`, `ed`, `cat`, `head`, and `tail`. Each of these commands and utilities is available to you at the UNIX shell prompt.

restart: not found

This message may display if you have exited the installation setup procedure, accessed the UNIX Shell option, started another shell, and then entered `restart` to start the installation procedure again. You must exit the second shell before you can enter `restart` at the UNIX Shell to start the installation setup procedure again.

Tape devices are not supported for installation.

The installation procedure detected that the distribution media selected to install from is a tape device. Tape devices are not supported. The installation cannot continue. Select another device.

The disk name "rz8" was not found on this system when attempting to validate the following filesystem(s): root usr

This error is the result of a disk name validation error that occurred during a cloned installation. The disk name, `rz8`, specified in the

configuration description file (CDF) for the `root` and `usr` file systems was not found on your system. If you want to continue the cloned installation, ask the RIS server administrator to register your system for a different CDF. Then, restart the installation procedure.

The installation procedure cannot prepare the system disk for new boot blocks.

<Text of disklabel diagnostic>

This message is displayed when the installation procedure fails while writing a default disk label (with new boot blocks) to the disk selected for the `root` file system.

The corrective action depends on the error message from the `disklabel` command. In general, you should confirm that the system disk is properly connected, powered up, and so on. If it is not, fix it and restart the installation. If the disk is properly set up, restart the installation and select a different disk for the `root` file system. Contact your Digital field service representative to determine the problem with the original disk.

The installation procedure cannot restore the system disk label and cannot update boot blocks.

<Text of disklabel diagnostic>

This message is displayed when the installation procedure fails to restore the saved disklabel while updating the boot blocks on the disk selected for the `root` file system.

The corrective action depends on the error message from the `disklabel` command. In general, you should confirm that the system disk is properly connected, powered up, and so on. If it is not, fix it and restart the installation. If the disk is properly set up, restart the installation and select a different disk for the `root` file system. Contact your Digital field service representative to determine the problem with original disk.

The installation procedure failed attempting to write a default disklabel to device <disk>.

This message is displayed when the installation procedure tries to write a default disk label to the disk specified. An attempt to apply the default label results in the installation procedure not being able to read a valid label on the specified disk. This failure most likely indicates a corrupt disk. Contact your Digital field service representative.

The installation procedure failed or was intentionally exited. To restart the installation, halt and reboot the system or enter: restart

This message is seen if the installation interface (text-based or graphical) encountered an error or if you intentionally selected the `UNIX Shell` option. Enter the `restart` command or reboot your system from the distribution media to begin the installation procedure again.

The installation procedure successfully installed the mandatory software subsets. Some optional subsets did not install correctly.

Would you like to try again to install these subsets? (y/n)[]:

This message indicates that the `setld` command successfully installed the mandatory software subsets required for your system. However, it encountered a failure during the loading of one or more optional software subsets. Possible reasons could include a corrupt distribution media (CD-ROM or RIS), network errors (RIS), or a failing target disk device. You have the opportunity to reattempt the installation of the optional software subsets.

The installation procedure was not able to correctly install the mandatory software subsets.

This message indicates that the `setld` command was not able to install one or more of the mandatory software subsets required for your system. Possible reasons could include a corrupt distribution media (CD-ROM or RIS), network errors (RIS), or a failing target disk device. When this message is displayed, the installation procedure attempts to load software subsets again.

The installation process has failed to determine the configured disk devices for this system.

This message indicates that the utility used to identify configured disk devices on the target (client) system exited due to an error. Possible reasons include no devices found on the system, or the inability to write the list of devices found.

The installation process has failed when attempting to open the file (/tmp/finder.data) containing the configured disk devices.

This message indicates that the file containing the list of configured device on the target (client) could not be opened. This failure may indicate a memory failure because the `/tmp/finder.data` file exists in the memory file system. Restart the installation. If the installation fails again, contact your Digital field service representative.

The MAKEDEV command could not make the special files on device <device name> This error causes the installation procedure to stop. One possible cause for the error is a corrupt system disk. You may want to replace or use another system disk, and begin the installation again. If this error message appears a second time, contact a DIGITAL representative.

The system is unable to create the device special file for the load device. The in-memory file system might not be mounted read-write. The `MAKEDEV` command might not understand how to create special files for the device. Verify that the file system is read-write by using the `mount` command. Restart the installation by pressing Ctrl/d. If the problem persists, contact your Digital field service representative.

The "rz25" disk type specified in the Configuration Description File does not match the name/type found on this system for the following device(s): "rz3/rz26"

This error is the result of a disk type validation error that occurred during a cloned installation. The disk type in the configuration description file does not match the disk type on your system. In the example, the configuration description file (CDF) contains a disk type of `rz25` for the device name `rz3`. However, on your system, device `rz3` has a disk type `rz26`. If you want to continue the cloned installation, ask the RIS server administrator to register your system for a different CDF. Then, restart the installation procedure.

This error causes the installation procedure to stop. One possible cause for the error is a corrupt system disk. You may want to replace the current disk or use another system disk, and begin the installation again. If this error message appears a second time, contact a Digital representative.

This message is displayed when a fatal error has been detected during either a full or cloned installation. During a full installation, this message indicates a disk or file system error during file system creation. During a cloned installation, this error may indicate a Configuration Description File (CDF) validation error. A more descriptive message relating to the actual cause of the failure will precede this message.

X Timed Out! Switching to Char Cell mode

An attempt to start the X environment in order to run the graphical user interface to the installation timed out. The installation automatically switches to the text-based interface to the installation.

vm_swap_init: warning /sbin/swapdefault swap device not found
vm_swap_init: in swap over commitment mode

These messages are displayed during a reboot and can be ignored.

J

Sample Text-Based Installations

This appendix contains samples of the text-based default and custom installations.

J.1 Sample Text-Based Default Installation

This section shows a sample text-based default installation from a a remote installation services (RIS) server. Use this sample to follow the progress of your own default installation.

```
*** Performing RIS Installation from kramer

Loading installation process and scanning system hardware.

       Welcome to the Digital UNIX Installation Procedure

This procedure installs Digital 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

There are two types of installations:

o  The Default Installation installs a mandatory set of
   software subsets on a predetermined file system layout.

o  The Custom Installation installs a mandatory set of
   software subsets plus optional software subsets that you
   select.  You can customize the file system layout.

The UNIX Shell option puts your system in single-user mode with
superuser privileges.  This option is provided for experienced
UNIX system administrators who want to perform file system or
disk maintenance tasks before the installation.

The Installation Guide contains more information about installing
Digital UNIX.

1) Default Installation
2) Custom Installation
3) UNIX Shell

Enter your choice: 1

Hostname "george" has been assigned to this system.


Enter a password to use as the root (superuser) password.
```

```
Be sure to remember this password, because it is needed to
log in as the user "root" following installation.

Enter root password:

Retype root password:

Location and time zone have been set from server: US/Eastern

System clock has been set via network: Fri Dec 13 22:48:56 GMT 1996


** Scanning system for disk devices.  Please wait ...

Choose a disk to be the system disk where the Digital UNIX
software will be installed using the default layout:

  * root file system on the "a" partition, type UFS
  * /usr file system on the "g" partition, type UFS
  * /var as part of /usr
  * first swapping area (swap1) on the "b" partition
  * no second swapping area (swap2)

This table lists the disks connected to your system.

      Disk       Device     Device   Controller   Controller
      Type        Name      Number      Name        Number
1)    RZ26        rz1          1        SCSI           0
2)    RZ26        rz3          3        SCSI           0

Enter your choice: ?

The disk which holds the root file system ("/") is called
the system disk.  The root file system is always in the "a"
partition of the system disk.  If you use the default file
system layout, the other file systems will be placed in other
partitions on this same disk.  This question requires you to
choose which of your disks will be the system disk.

Choose a disk to be the system disk where the Digital UNIX
software will be installed using the default layout:

  * root file system on the "a" partition, type UFS
  * /usr file system on the "g" partition, type UFS
  * /var as part of /usr
  * first swapping area (swap1) on the "b" partition
  * no second swapping area (swap2)

This table lists the disks connected to your system.

      Disk       Device     Device   Controller   Controller
      Type        Name      Number      Name        Number
1)    RZ26        rz1          1        SCSI           0
2)    RZ26        rz3          3        SCSI           0

Enter your choice:  1

Using default partitions for device rz1

root will use file system type UFS.

/usr will be on partition g of disk rz1

/usr will use file system type UFS.
```

```
swap1 will be on partition b of disk rz1

Because this is the default disk layout, no secondary
swap area (swap2) will be created.

Because this is the default disk layout, /var will be on /usr.

** Reviewing available software subsets.  Please wait ...


Because this is a Default installation, only the mandatory
software subsets will be loaded.  These are:

  * Adobe Fonts
  * Base System
  * Base System - Hardware Support
  * Base System Management Applications and Utilities
  * Basic Networking Configuration Applications
  * Basic Networking Services
  * Basic X Environment
  * CDE Desktop Environment
  * CDE Mail Interface
  * CDE Minimum Runtime Environment
  * Compiler Back End
  * DECwindows 100dpi Fonts
  * Graphical Base System Management Utilities
  * Graphical Print Configuration Application
  * Graphical System Administration Utilities
  * Hardware Kernel Header and Common Files
  * Hardware Kernel Modules
  * Kernel Header and Common Files
  * LK401 Keyboard Support
  * Local Printer Support
  * NFS(tm) Configuration Application
  * NFS(tm) Utilities
  * Netscape Navigator Gold V3.0
  * Old X Environment
  * Standard Kernel Modules
  * Tcl Commands
  * Tk Toolkit Commands
  * X Fonts
  * X Servers Base
  * X Servers for TurboChannel



You have now answered all questions needed to install
Digital 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:



Continuing installation...

 *** Creating the root file system on device rz1a ***


 *** Creating the usr file system on device rz1g ***


 *** Creating the swap1 file system on device rz1b ***
```

```
 *** Loading the operating system software subsets ***

 The installation procedure will now load the software on your
 disk partitions.  This process will take from 45 to 120 minutes
 to complete depending on your distribution media and processor type.

Checking file system space required to install specified subsets:
 Working....Fri Dec 13 17:51:36 EST 1996

File system space checked OK.

30 subset(s) will be installed.

Loading 1 of 30 subset(s)....

Base System
   Copying from kramer (inet)
 Working....Fri Dec 13 17:51:53 EST 1996
   Verifying
 Working....Fri Dec 13 17:53:55 EST 1996

Loading 2 of 30 subset(s)....

Base System - Hardware Support
   Copying from kramer (inet)
 Working....Fri Dec 13 17:54:28 EST 1996
   Verifying

Loading 3 of 30 subset(s)....

Compiler Back End
   Copying from kramer (inet)
 Working....Fri Dec 13 17:54:53 EST 1996
   Verifying

Loading 4 of 30 subset(s)....

Kernel Header and Common Files
   Copying from kramer (inet)
 Working....Fri Dec 13 17:55:20 EST 1996
   Verifying

Loading 5 of 30 subset(s)....

Standard Kernel Modules
   Copying from kramer (inet)
 Working....Fri Dec 13 17:56:29 EST 1996
   Verifying

Loading 6 of 30 subset(s)....

Hardware Kernel Header and Common Files
   Copying from kramer (inet)
   Verifying

Loading 7 of 30 subset(s)....

Hardware Kernel Modules
   Copying from kramer (inet)
 Working....Fri Dec 13 17:57:05 EST 1996
   Verifying

Loading 8 of 30 subset(s)....
```

```
Basic Networking Services
   Copying from kramer (inet)
 Working....Fri Dec 13 17:57:36 EST 1996
   Verifying

Loading 9 of 30 subset(s)....

NFS(tm) Utilities
   Copying from kramer (inet)
   Verifying

Loading 10 of 30 subset(s)....

Local Printer Support
   Copying from kramer (inet)
   Verifying

Loading 11 of 30 subset(s)....

Basic X Environment
   Copying from kramer (inet)
 Working....Fri Dec 13 17:58:15 EST 1996
   Verifying

Loading 12 of 30 subset(s)....

CDE Minimum Runtime Environment
   Copying from kramer (inet)
 Working....Fri Dec 13 17:59:16 EST 1996
   Verifying

Loading 13 of 30 subset(s)....

CDE Desktop Environment
   Copying from kramer (inet)
 Working....Fri Dec 13 17:59:42 EST 1996
   Verifying
 Working....Fri Dec 13 18:01:44 EST 1996

Loading 14 of 30 subset(s)....

LK401 Keyboard Support
   Copying from kramer (inet)
   Verifying

Loading 15 of 30 subset(s)....

X Servers Base
   Copying from kramer (inet)
 Working....Fri Dec 13 18:02:19 EST 1996
   Verifying

Loading 16 of 30 subset(s)....

X Servers for TurboChannel
   Copying from kramer (inet)
   Verifying

Loading 17 of 30 subset(s)....

X Fonts
   Copying from kramer (inet)
 Working....Fri Dec 13 18:02:43 EST 1996
```

```
   Verifying

Loading 18 of 30 subset(s)....

DECwindows 100dpi Fonts
   Copying from kramer (inet)
   Verifying

Loading 19 of 30 subset(s)....

Adobe Fonts
   Copying from kramer (inet)
   Verifying

Loading 20 of 30 subset(s)....

Old X Environment
   Copying from kramer (inet)
Broken pipe
   Verifying

Loading 21 of 30 subset(s)....

CDE Mail Interface
   Copying from kramer (inet)
   Verifying

Loading 22 of 30 subset(s)....

Tcl Commands
   Copying from kramer (inet)
Broken pipe
   Verifying

Loading 23 of 30 subset(s)....

Tk Toolkit Commands
   Copying from kramer (inet)
   Verifying

Loading 24 of 30 subset(s)....

Netscape Navigator Gold V3.0
   Copying from kramer (inet)
   Verifying

Loading 25 of 30 subset(s)....

Base System Management Applications and Utilities
   Copying from kramer (inet)
Broken pipe
   Verifying

Loading 26 of 30 subset(s)....

Basic Networking Configuration Applications
   Copying from kramer (inet)
   Verifying

Loading 27 of 30 subset(s)....

NFS(tm) Configuration Application
   Copying from kramer (inet)
   Verifying
```

```
Loading 28 of 30 subset(s)....

Graphical Base System Management Utilities
   Copying from kramer (inet)
 Working....Fri Dec 13 18:05:05 EST 1996
   Verifying

Loading 29 of 30 subset(s)....

Graphical System Administration Utilities
   Copying from kramer (inet)
   Verifying

Loading 30 of 30 subset(s)....

Graphical Print Configuration Application
   Copying from kramer (inet)
   Verifying

30 of 30 subset(s) installed successfully.


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


The above message is also recorded in /etc/motd for your
future reference.


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 DKA100
 >>> boot

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


?05 HLT INSTR
  PC= FFFFFC00.004014F0 PSL= 00000000.00000005

 >>> set boot_osflags A

BOOT_OSFLAGS = A
 >>> set bootdef_dev DKA100

BOOTDEF_DEV = DKA100
 >>> boot
```

System initialization messages display as the system boots from the newly-installed system. Software configuration begins next:

```
*** SYSTEM CONFIGURATION ***

Configuring "Base System " (OSFBASE410)

Configuring "Base System - Hardware Support " (OSFHWBASE410)

Configuring "Compiler Back End " (OSFCMPLRS410)

Configuring "Kernel Header and Common Files " (OSFBINCOM410)

Configuring "Standard Kernel Modules " (OSFBIN410)

Configuring "Hardware Kernel Header and Common Files" (OSFHWBINCOM410)

Configuring "Hardware Kernel Modules " (OSFHWBIN410)

Configuring "Basic Networking Services " (OSFCLINET410)

Configuring "NFS(tm) Utilities " (OSFNFS410)

Configuring "Local Printer Support " (OSFPRINT410)

Configuring "Basic X Environment " (OSFX11410)

Configuring "CDE Minimum Runtime Environment " (OSFCDEMIN410)

Configuring "CDE Desktop Environment " (OSFCDEDT410)

Configuring "LK401 Keyboard Support " (OSFKBDLK401410)

Configuring "X Servers Base " (OSFSER410)

Configuring "X Servers for TurboChannel " (OSFSERTC410)

Configuring "X Fonts " (OSFMITFONT410)

Configuring "DECwindows 100dpi Fonts " (OSFFONT15410)

Configuring "Adobe Fonts " (OSFDPSFONT410)

Configuring "Old X Environment " (OSFOLDX11410)

Configuring "CDE Mail Interface " (OSFCDEMAIL410)

Configuring "Tcl Commands " (OSFTCLBASE410)

Configuring "Tk Toolkit Commands " (OSFTKBASE410)

Configuring "Netscape Navigator Gold V3.0 " (OSFNETSCAPE410)

Configuring "Base System Management Applications and Utilities"
(OSFSYSMAN410)

Configuring "Basic Networking Configuration Applications" (OSFNETCONF410)

Configuring "NFS(tm) Configuration Application " (OSFNFSCONF410)

Configuring "Graphical Base System Management Utilities" (OSFXSYSMAN410)

Configuring "Graphical System Administration Utilities" (OSFXADMIN410)

Configuring "Graphical Print Configuration Application" (OSFXPRINT410)
```

```
The system name assigned to your machine is 'george'.

       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 13 09:32:02 EST 1996
 Working....Fri Dec 13 09:34:04 EST 1996
 Working....Fri Dec 13 09:36:05 EST 1996

syncing disks... done
rebooting.... (transferring to monitor)
```

J.2 Sample Text-Based Custom Installation

This section shows a sample text-based custom installation from a a remote installation services (RIS) server. Use this sample to follow the progress of your own custom installation.

```
*** Performing RIS Installation from kramer

Loading installation process and scanning system hardware.

       Welcome to the Digital UNIX Installation Procedure

This procedure installs Digital 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

There are two types of installations:

o  The Default Installation installs a mandatory set of
   software subsets on a predetermined file system layout.

o  The Custom Installation installs a mandatory set of
   software subsets plus optional software subsets that you
   select.  You can customize the file system layout.

The UNIX Shell option puts your system in single-user mode with
superuser privileges.  This option is provided for experienced
UNIX system administrators who want to perform file system or
disk maintenance tasks before the installation.

The Installation Guide contains more information about installing
Digital UNIX.

1) Default Installation
2) Custom Installation
3) UNIX Shell
```

```
Enter your choice: 2

Hostname "george" has been assigned to this system.


Enter a password to use as the root (superuser) password.
Be sure to remember this password, because it is needed to
log in as the user "root" following installation.

Enter root password:

Retype root password:

Location and time zone have been set from server: US/Eastern

System clock has been set via network: Fri Dec 13 22:24:09 GMT 1996


** Scanning system for disk devices.  Please wait ...

Select a disk for Digital UNIX installation.  The root file
system will be placed on the "a" partition of this disk.

      Disk       Device     Device   Controller   Controller
      Type        Name      Number      Name        Number
1)    RZ26        rz1          1        SCSI           0
2)    RZ26        rz3          3        SCSI           0
3)    RZ26L       rz9          9        SCSI           1
4)    RZ29B       rz10        10        SCSI           1

Enter your choice: 4


The default disk layout is:

  * root file system on the "a" partition, type UFS
  * /usr file system on the "g" partition, type UFS
  * /var as part of /usr
  * first swapping area (swap1) on the "b" partition
  * no second swapping area (swap2)

Use this default disk layout (y/n) ? n

Select the file system type for the root file system.

1) UFS -- UNIX file system
2) AdvFS -- advanced file system

Enter your choice: 1


Select the disk where the /usr file system will reside.

      Disk       Device     Device   Controller   Controller
      Type        Name      Number      Name        Number
1)    RZ26        rz1          1        SCSI           0
2)    RZ26        rz3          3        SCSI           0
3)    RZ26L       rz9          9        SCSI           1
4)    RZ29B       rz10        10        SCSI           1

Enter your choice: 4
```

```
Select the rz10 partition where the /usr file system
will reside.

   Partition   Start     Size       End     Overlaps
1)       b     131072    401408    532479   c
2)       d     532480   2623488   3155967   c g
3)       e    3155968   2623488   5779455   c g h
4)       f    5779456   2600624   8380079   c h
5)       g     532480   3936256   4468735   c d e
6)       h    4468736   3911344   8380079   c e f

Enter your choice: h

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

1) UFS -- UNIX file system
2) AdvFS -- advanced file system

Enter your choice: 1


Select the disk where the first swapping area (swap1) will reside.

      Disk       Device     Device   Controller   Controller
      Type        Name      Number      Name        Number
1)    RZ26        rz1          1        SCSI           0
2)    RZ26        rz3          3        SCSI           0
3)    RZ26L       rz9          9        SCSI           1
4)    RZ29B       rz10        10        SCSI           1

Enter your choice: 4


Select the rz10 partition where the first swapping area (swap1)
will reside.

   Partition   Start     Size       End     Overlaps
1)       b     131072    401408    532479   c
2)       d     532480   2623488   3155967   c g
3)       g     532480   3936256   4468735   c d e

Enter your choice: g


You may choose to have a second swapping area (swap2).
Do you want a second swapping area (y/n) ? y


Select the disk where the second swapping area (swap2) will reside.

      Disk       Device     Device   Controller   Controller
      Type        Name      Number      Name        Number
1)    RZ26        rz1          1        SCSI           0
2)    RZ26        rz3          3        SCSI           0
3)    RZ26L       rz9          9        SCSI           1
4)    RZ29B       rz10        10        SCSI           1

Enter your choice: 4

swap2 will be on the "b" partition of disk rz10 because all of its
other partitions are already in use.


You can make /var a separate file system, or you can have it
```

```
share space on the /usr file system.
Should /var be a separate file system (y/n) ? y


Select the disk where the /var file system will reside.

      Disk       Device     Device   Controller   Controller
      Type        Name      Number      Name        Number
1)    RZ26        rz1          1        SCSI           0
2)    RZ26        rz3          3        SCSI           0
3)    RZ26L       rz9          9        SCSI           1

Enter your choice: 1


Select the rz1 partition where the /var file system
will reside.

   Partition   Start     Size       End     Overlaps
1)       a          0    131072    131071   c
2)       b     131072    262144    393215   c
3)       c          0   2050860   2050859   a b d e f g h
4)       d     393216    552548    945763   c g
5)       e     945764    552548   1498311   c g h
6)       f    1498312    552548   2050859   c h
7)       g     393216    819200   1212415   c d e
8)       h    1212416    838444   2050859   c e f

Enter your choice: 2

Select the file system type for the /var file system.

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 rz10a, type UFS
  * /usr file system on rz10h, type UFS
  * /var file system on rz1b, type UFS
  * first swapping area (swap1) will be on rz10g
  * second swapping area (swap2) will be on rz10b

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

** Reviewing available software subsets.  Please wait ...

The following subsets are mandatory and will be installed
automatically unless you choose to exit without installing
any subsets:

  * Adobe Fonts
  * Base System
  * Base System - Hardware Support
  * Base System Management Applications and Utilities
  * Basic Networking Configuration Applications
  * Basic Networking Services
  * Basic X Environment
  * CDE Desktop Environment
  * CDE Mail Interface
  * CDE Minimum Runtime Environment
```

```
  * Compiler Back End
  * DECwindows 100dpi Fonts
  * Graphical Base System Management Utilities
  * Graphical Print Configuration Application
  * Graphical System Administration Utilities
  * Hardware Kernel Header and Common Files
  * Hardware Kernel Modules
  * Kernel Header and Common Files
  * LK401 Keyboard Support
  * Local Printer Support
  * NFS(tm) Configuration Application
  * NFS(tm) Utilities
  * Netscape Navigator Gold V3.0
  * Old X Environment
  * Standard Kernel Modules
  * Tcl Commands
  * Tk Toolkit Commands
  * X Fonts
  * X Servers Base
  * X Servers for TurboChannel

Free space remaining after mandatory subsets (root/usr/var):
30.4 MB/1.7 GB/127 MB
```

J.2.1 Optional Software Subsets for a Custom Installation

This section lists the optional software subsets that are available for a custom installation regardless of the interface (text-based or graphical) you are using.

```
Optional subsets are listed below.  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) GNU Emacs
 5) Local Area Transport (LAT)
 6) UNIX(tm) SVID2 Compatibility
 7) UNIX(tm) to UNIX(tm) Copy Facility

 - Kernel Build Environment:
 8) ATM Kernel Header and Common Files
 9) ATM Kernel Modules
10) Logical Storage Manager Kernel Header and Common Files
11) Logical Storage Manager Kernel Modules
12) POLYCTR advfs Kernel Modules

 - 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

 - Reference Pages:
20) Ref Pages: Admin/User
21) Ref Pages: CDE Admin/User
22) Ref Pages: CDE Development
23) Ref Pages: Programming
24) Ref Pages: Realtime
25) Ref Pages: Windows Admin/User
26) Ref Pages: Windows Programming

 - Software Development:
27) CDA(tm) Software Development
28) CDA(tm) for X/Motif Development
29) CDE Software Development
30) GNU Revision Control System
31) Ladebug Debugger Version 4.0-11
32) Ladebug Debugger Version 4.0-11 Release Notes
33) Ladebug Debugger Window Interface
34) Ladebug Debugger remote server
35) Programming Examples
36) Realtime Software Development
37) Software Development Desktop Environment
38) Software Development Tools and Utilities
39) Source Code Control System
40) Standard Header Files
41) Standard Programmer Commands
42) Static Libraries
43) X Window and X/Motif Header Files
44) X Window and X/Motif Programming Examples
45) X Window and X/Motif Software Development
46) X Window and X/Motif Static Libraries

 - Supplemental Documentation:
47) XIE Version 5 Online Documentation

 - System Administration:
48) C2-Security
49) C2-Security GUI
50) Kernel Debugging Tools
51) Logical Storage Manager
52) Logical Storage Manager GUI
53) Logical Volume Manager
54) Obsolete Commands and Utilities
55) Obsolete Locale databases
56) POLYCTR advfs
57) Single-Byte European Locales
58) System Accounting Utilities
59) System Exercisers

 - Text Processing:
60) Doc. Preparation Tools
61) Doc. Preparation Tools Extensions

 - Windowing Environment:
62) DECwindows 75dpi Fonts
63) LK201 Keyboard Support
64) LK411 Keyboard Support
65) LK421 Keyboard Support
66) LK444 Keyboard Support
67) PCXAL Keyboard Support
68) X Customizations for OEM
```

```
69) X Servers for Open3D
70) X Servers for PCbus
71) X/Motif 1.1

 - Windows Applications:
72) Additional DECwindows Applications
73) Additional X Applications
74) CDE Additional Applications
75) Demo X Applications
76) Nested X Server
77) Old Additional DECwindows Applications
78) Virtual X Frame Buffer

The following choices override your previous selections:
79) ALL mandatory and all optional subsets
80) MANDATORY subsets only
81) CANCEL selections and redisplay menus

Add to your choices, or press RETURN to confirm previous choices.
Free space remaining (root/usr/var): 30.4 MB/1.7 GB/127 MB
Choices (for example, 1 2 4-6):  79

The following subsets will be loaded:

  * System Accounting Utilities
  * POLYCTR advfs
  * POLYCTR advfs Kernel Modules
  * Adobe Font Metric Files
  * ATM Commands
  * ATM Kernel Modules
  * ATM Kernel Header and Common Files
  * Base System
  * Standard Kernel Modules
  * Kernel Header and Common Files
  * C2-Security
  * CDA(tm) Software Development
  * CDE Additional Applications
  * CDE Software Development
  * CDE Desktop Environment
  * CDE Mail Interface
  * Ref Pages: CDE Development
  * Ref Pages: CDE Admin/User
  * CDE Minimum Runtime Environment
  * Basic Networking Services
  * Compiler Back End
  * Obsolete Locale databases
  * Doc. Preparation Tools
  * Doc. Preparation Tools Extensions
  * Additional DECwindows Applications
  * Dataless Management Services
  * DOS tools
  * Adobe Fonts
  * GNU Emacs
  * Single-Byte European Locales
  * Programming Examples
  * System Exercisers
  * DECwindows 100dpi Fonts
  * DECwindows 75dpi Fonts
  * Base System - Hardware Support
  * Hardware Kernel Modules
  * Hardware Kernel Header and Common Files
  * Standard Header Files
  * Additional Networking Services
  * LK201 Keyboard Support
```

```
* LK401 Keyboard Support
* LK411 Keyboard Support
* LK421 Keyboard Support
* LK444 Keyboard Support
* PCXAL Keyboard Support
* Kernel Debugging Tools
* Local Area Transport (LAT)
* Ladebug Debugger Version 4.0-11
* Ladebug Debugger Version 4.0-11 Release Notes
* Ladebug Debugger Window Interface
* Ladebug Debugger remote server
* Computer Aided System Tutor
* Static Libraries
* Logical Storage Manager
* Logical Storage Manager Kernel Modules
* Logical Storage Manager Kernel Header and Common Files
* Logical Storage Manager GUI
* Logical Volume Manager
* Ref Pages: Programming
* Ref Pages: Admin/User
* Ref Pages: Realtime
* Ref Pages: Windows Programming
* Ref Pages: Windows Admin/User
* RAND Corp. Mail Handler (MH)
* X Fonts
* X/Motif 1.1
* Basic Networking Configuration Applications
* Netscape Navigator Gold V3.0
* NFS(tm) Utilities
* NFS(tm) Configuration Application
* Obsolete Commands and Utilities
* Old Additional DECwindows Applications
* Old X Environment
* Standard Programmer Commands
* Local Printer Support
* GNU Revision Control System
* Remote Installation Service
* Realtime Software Development
* Source Code Control System
* Software Development Tools and Utilities
* Software Development Desktop Environment
* X Servers for Open3D
* X Servers Base
* X Servers for PCbus
* X Servers for TurboChannel
* UNIX(tm) SVID2 Compatibility
* Base System Management Applications and Utilities
* Tcl Commands
* Additional Terminfo databases
* Tk Toolkit Commands
* UNIX(tm) to UNIX(tm) Copy Facility
* Basic X Environment
* Graphical System Administration Utilities
* C2-Security GUI
* CDA(tm) for X/Motif Development
* Demo X Applications
* X Window and X/Motif Software Development
* X Window and X/Motif Programming Examples
* XIE Version 5 Online Documentation
* X Window and X/Motif Header Files
* X Window and X/Motif Static Libraries
* DECwindows Mail Interface
* Additional X Applications
* Nested X Server
```

```
  * X Customizations for OEM
  * Graphical Print Configuration Application
  * Graphical Base System Management Utilities
  * Virtual X Frame Buffer

Are these the subsets that should be loaded (y/n) ? y
```

J.2.2 File System Creation and Software Subset Load

This section shows file system creation and software subset loading.

```
You have now answered all questions needed to install
Digital 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:

Continuing installation...

 *** Creating the root file system on device rz10a ***


 *** Creating the usr file system on device rz10h ***


 *** Creating the var file system on device rz1b ***


 *** Creating the swap1 file system on device rz10g ***


 *** Creating the swap2 file system on device rz10b ***


 *** Loading the operating system software subsets ***

 The installation procedure will now load the software on your
 disk partitions.  This process will take from 45 to 120 minutes
 to complete depending on your distribution media and processor type.

Checking file system space required to install specified subsets:
 Working....Fri Dec 13 17:30:27 EST 1996

File system space checked OK.

108 subset(s) will be installed.

Loading 1 of 108 subset(s)....

Base System
   Copying from kramer (inet)
 Working....Fri Dec 13 17:31:23 EST 1996
   Verifying
 Working....Fri Dec 13 17:33:07 EST 1996

Loading 2 of 108 subset(s)....

Base System - Hardware Support
   Copying from kramer (inet)
 Working....Fri Dec 13 17:33:34 EST 1996
   Verifying

Loading 3 of 108 subset(s)....
```

```
Compiler Back End
   Copying from kramer (inet)
 Working....Fri Dec 13 17:33:58 EST 1996
   Verifying

Loading 4 of 108 subset(s)....

Kernel Header and Common Files
   Copying from kramer (inet)
 Working....Fri Dec 13 17:34:28 EST 1996
   Verifying

Loading 5 of 108 subset(s)....

Standard Kernel Modules
   Copying from kramer (inet)
 Working....Fri Dec 13 17:35:30 EST 1996
   Verifying

Loading 6 of 108 subset(s)....

Hardware Kernel Header and Common Files
   Copying from kramer (inet)
   Verifying

Loading 7 of 108 subset(s)....

Hardware Kernel Modules
   Copying from kramer (inet)
 Working....Fri Dec 13 17:35:58 EST 1996
   Verifying

Loading 8 of 108 subset(s)....

ATM Kernel Header and Common Files
   Copying from kramer (inet)
   Verifying

Loading 9 of 108 subset(s)....

ATM Kernel Modules
   Copying from kramer (inet)
   Verifying

Loading 10 of 108 subset(s)....

Logical Storage Manager Kernel Header and Common Files
   Copying from kramer (inet)
   Verifying

Loading 11 of 108 subset(s)....

Logical Storage Manager Kernel Modules
   Copying from kramer (inet)
   Verifying

Loading 12 of 108 subset(s)....

POLYCTR advfs Kernel Modules
   Copying from kramer (inet)
   Verifying

Loading 13 of 108 subset(s)....
```

```
Basic Networking Services
   Copying from kramer (inet)
 Working....Fri Dec 13 17:36:57 EST 1996
   Verifying

Loading 14 of 108 subset(s)....

Additional Networking Services
   Copying from kramer (inet)
   Verifying

Loading 15 of 108 subset(s)....

ATM Commands
   Copying from kramer (inet)
   Verifying

Loading 16 of 108 subset(s)....

NFS(tm) Utilities
   Copying from kramer (inet)
   Verifying

Loading 17 of 108 subset(s)....

Remote Installation Service
   Copying from kramer (inet)
   Verifying

Loading 18 of 108 subset(s)....

Dataless Management Services
   Copying from kramer (inet)
   Verifying

Loading 19 of 108 subset(s)....

Local Printer Support
   Copying from kramer (inet)
   Verifying

Loading 20 of 108 subset(s)....

Adobe Font Metric Files
   Copying from kramer (inet)
Broken pipe
   Verifying

Loading 21 of 108 subset(s)....

Doc. Preparation Tools
   Copying from kramer (inet)
   Verifying

Loading 22 of 108 subset(s)....

Doc. Preparation Tools Extensions
   Copying from kramer (inet)
   Verifying

Loading 23 of 108 subset(s)....

Basic X Environment
```

```
   Copying from kramer (inet)
 Working....Fri Dec 13 17:38:20 EST 1996
   Verifying

Loading 24 of 108 subset(s)....

CDE Minimum Runtime Environment
   Copying from kramer (inet)
 Working....Fri Dec 13 17:39:14 EST 1996
   Verifying

Loading 25 of 108 subset(s)....

CDE Desktop Environment
   Copying from kramer (inet)
 Working....Fri Dec 13 17:39:36 EST 1996
   Verifying
 Working....Fri Dec 13 17:41:11 EST 1996

Loading 26 of 108 subset(s)....

LK201 Keyboard Support
   Copying from kramer (inet)
   Verifying

Loading 27 of 108 subset(s)....

LK401 Keyboard Support
   Copying from kramer (inet)
   Verifying

Loading 28 of 108 subset(s)....

LK411 Keyboard Support
   Copying from kramer (inet)
   Verifying

Loading 29 of 108 subset(s)....

LK421 Keyboard Support
   Copying from kramer (inet)
   Verifying

Loading 30 of 108 subset(s)....

LK444 Keyboard Support
   Copying from kramer (inet)
   Verifying

Loading 31 of 108 subset(s)....

PCXAL Keyboard Support
   Copying from kramer (inet)
   Verifying

Loading 32 of 108 subset(s)....

X Servers Base
   Copying from kramer (inet)
 Working....Fri Dec 13 17:42:06 EST 1996
   Verifying

Loading 33 of 108 subset(s)....
```

```
X Servers for PCbus
   Copying from kramer (inet)
   Verifying

Loading 34 of 108 subset(s)....

X Servers for TurboChannel
   Copying from kramer (inet)
   Verifying

Loading 35 of 108 subset(s)....

X Servers for Open3D
   Copying from kramer (inet)
 Working....Fri Dec 13 17:42:40 EST 1996
Broken pipe
   Verifying

Loading 36 of 108 subset(s)....

X Fonts
   Copying from kramer (inet)
 Working....Fri Dec 13 17:42:56 EST 1996
   Verifying

Loading 37 of 108 subset(s)....

DECwindows 100dpi Fonts
   Copying from kramer (inet)
   Verifying

Loading 38 of 108 subset(s)....

DECwindows 75dpi Fonts
   Copying from kramer (inet)
   Verifying

Loading 39 of 108 subset(s)....

Adobe Fonts
   Copying from kramer (inet)
   Verifying

Loading 40 of 108 subset(s)....

X Customizations for OEM
   Copying from kramer (inet)
Broken pipe
   Verifying

Loading 41 of 108 subset(s)....

Old X Environment
   Copying from kramer (inet)
   Verifying

Loading 42 of 108 subset(s)....

RAND Corp. Mail Handler (MH)
   Copying from kramer (inet)
   Verifying

Loading 43 of 108 subset(s)....
```

```
CDE Mail Interface
   Copying from kramer (inet)
   Verifying

Loading 44 of 108 subset(s)....

DECwindows Mail Interface
   Copying from kramer (inet)
   Verifying

Loading 45 of 108 subset(s)....

UNIX(tm) SVID2 Compatibility
   Copying from kramer (inet)
   Verifying

Loading 46 of 108 subset(s)....

DOS tools
   Copying from kramer (inet)
Broken pipe
   Verifying

Loading 47 of 108 subset(s)....

Local Area Transport (LAT)
   Copying from kramer (inet)
   Verifying

Loading 48 of 108 subset(s)....

UNIX(tm) to UNIX(tm) Copy Facility
   Copying from kramer (inet)
 Working....Fri Dec 13 17:44:53 EST 1996
   Verifying

Loading 49 of 108 subset(s)....

Computer Aided System Tutor
   Copying from kramer (inet)
 Working....Fri Dec 13 17:45:09 EST 1996
   Verifying

Loading 50 of 108 subset(s)....

Additional Terminfo databases
   Copying from kramer (inet)
 Working....Fri Dec 13 17:45:30 EST 1996
   Verifying

Loading 51 of 108 subset(s)....

GNU Emacs
   Copying from kramer (inet)
 Working....Fri Dec 13 17:45:53 EST 1996
   Verifying

Loading 52 of 108 subset(s)....

Tcl Commands
   Copying from kramer (inet)
   Verifying

Loading 53 of 108 subset(s)....
```

```
Tk Toolkit Commands
   Copying from kramer (inet)
   Verifying

Loading 54 of 108 subset(s)....

Additional X Applications
   Copying from kramer (inet)
 Working....Fri Dec 13 17:47:04 EST 1996
Broken pipe
   Verifying

Loading 55 of 108 subset(s)....

Nested X Server
   Copying from kramer (inet)
   Verifying

Loading 56 of 108 subset(s)....

Virtual X Frame Buffer
   Copying from kramer (inet)
   Verifying

Loading 57 of 108 subset(s)....

Demo X Applications
   Copying from kramer (inet)
   Verifying

Loading 58 of 108 subset(s)....

CDE Additional Applications
   Copying from kramer (inet)
 Working....Fri Dec 13 17:47:37 EST 1996
   Verifying

Loading 59 of 108 subset(s)....

Additional DECwindows Applications
   Copying from kramer (inet)
   Verifying

Loading 60 of 108 subset(s)....

Netscape Navigator Gold V3.0
   Copying from kramer (inet)
   Verifying

Loading 61 of 108 subset(s)....

Old Additional DECwindows Applications
   Copying from kramer (inet)
 Working....Fri Dec 13 17:48:13 EST 1996
   Verifying

Loading 62 of 108 subset(s)....

System Accounting Utilities
   Copying from kramer (inet)
   Verifying

Loading 63 of 108 subset(s)....
```

```
Logical Storage Manager
   Copying from kramer (inet)
   Verifying

Loading 64 of 108 subset(s)....

POLYCTR advfs
   Copying from kramer (inet)
   Verifying

Loading 65 of 108 subset(s)....

Logical Volume Manager
   Copying from kramer (inet)
   Verifying

Loading 66 of 108 subset(s)....

System Exercisers
   Copying from kramer (inet)
Broken pipe
   Verifying

Loading 67 of 108 subset(s)....

Single-Byte European Locales
   Copying from kramer (inet)
   Verifying

Loading 68 of 108 subset(s)....

C2-Security
   Copying from kramer (inet)
   Verifying

Loading 69 of 108 subset(s)....

Kernel Debugging Tools
   Copying from kramer (inet)
Broken pipe
   Verifying

Loading 70 of 108 subset(s)....

Base System Management Applications and Utilities
   Copying from kramer (inet)
   Verifying

Loading 71 of 108 subset(s)....

Basic Networking Configuration Applications
   Copying from kramer (inet)
   Verifying

Loading 72 of 108 subset(s)....

NFS(tm) Configuration Application
   Copying from kramer (inet)
   Verifying

Loading 73 of 108 subset(s)....

Graphical Base System Management Utilities
```

```
   Copying from kramer (inet)
 Working....Fri Dec 13 17:50:14 EST 1996
   Verifying

Loading 74 of 108 subset(s)....

Graphical System Administration Utilities
   Copying from kramer (inet)
   Verifying

Loading 75 of 108 subset(s)....

Graphical Print Configuration Application
   Copying from kramer (inet)
   Verifying

Loading 76 of 108 subset(s)....

C2-Security GUI
   Copying from kramer (inet)
   Verifying

Loading 77 of 108 subset(s)....

Logical Storage Manager GUI
   Copying from kramer (inet)
   Verifying

Loading 78 of 108 subset(s)....

GNU Revision Control System
   Copying from kramer (inet)
   Verifying

Loading 79 of 108 subset(s)....

Source Code Control System
   Copying from kramer (inet)
   Verifying

Loading 80 of 108 subset(s)....

Software Development Tools and Utilities
   Copying from kramer (inet)
 Working....Fri Dec 13 17:51:30 EST 1996
   Verifying

Loading 81 of 108 subset(s)....

Standard Programmer Commands
   Copying from kramer (inet)
   Verifying

Loading 82 of 108 subset(s)....

Standard Header Files
   Copying from kramer (inet)
   Verifying

Loading 83 of 108 subset(s)....

Static Libraries
   Copying from kramer (inet)
   Verifying
```

```
Loading 84 of 108 subset(s)....

X Window and X/Motif Software Development
   Copying from kramer (inet)
   Verifying

Loading 85 of 108 subset(s)....

X Window and X/Motif Header Files
   Copying from kramer (inet)
   Verifying

Loading 86 of 108 subset(s)....

X Window and X/Motif Static Libraries
   Copying from kramer (inet)
 Working....Fri Dec 13 17:52:54 EST 1996
Broken pipe
   Verifying

Loading 87 of 108 subset(s)....

CDE Software Development
   Copying from kramer (inet)
 Working....Fri Dec 13 17:53:16 EST 1996
   Verifying

Loading 88 of 108 subset(s)....

CDA(tm) Software Development
   Copying from kramer (inet)
   Verifying

Loading 89 of 108 subset(s)....

CDA(tm) for X/Motif Development
   Copying from kramer (inet)
   Verifying

Loading 90 of 108 subset(s)....

Realtime Software Development
   Copying from kramer (inet)
Broken pipe
   Verifying

Loading 91 of 108 subset(s)....

Software Development Desktop Environment
   Copying from kramer (inet)
   Verifying

Loading 92 of 108 subset(s)....

Ladebug Debugger Version 4.0-11
   Copying from kramer (inet)
 Working....Fri Dec 13 17:54:15 EST 1996
   Verifying

Loading 93 of 108 subset(s)....

Ladebug Debugger Window Interface
   Copying from kramer (inet)
```

```
   Verifying

Loading 94 of 108 subset(s)....

Ladebug Debugger remote server
   Copying from kramer (inet)
Broken pipe
   Verifying

Loading 95 of 108 subset(s)....

Ladebug Debugger Version 4.0-11 Release Notes
   Copying from kramer (inet)
   Verifying

Loading 96 of 108 subset(s)....

Programming Examples
   Copying from kramer (inet)
   Verifying

Loading 97 of 108 subset(s)....

X Window and X/Motif Programming Examples
   Copying from kramer (inet)
 Working....Fri Dec 13 17:55:06 EST 1996
   Verifying

Loading 98 of 108 subset(s)....

Obsolete Locale databases
   Copying from kramer (inet)
   Verifying

Loading 99 of 108 subset(s)....

Obsolete Commands and Utilities
   Copying from kramer (inet)
Broken pipe
   Verifying

Loading 100 of 108 subset(s)....

X/Motif 1.1
   Copying from kramer (inet)
 Working....Fri Dec 13 17:55:39 EST 1996
Broken pipe
   Verifying

Loading 101 of 108 subset(s)....

Ref Pages: Admin/User
   Copying from kramer (inet)
 Working....Fri Dec 13 17:55:56 EST 1996
   Verifying

Loading 102 of 108 subset(s)....

Ref Pages: Windows Admin/User
   Copying from kramer (inet)
   Verifying

Loading 103 of 108 subset(s)....
```

```
Ref Pages: Realtime
   Copying from kramer (inet)
   Verifying

Loading 104 of 108 subset(s)....

Ref Pages: Programming
   Copying from kramer (inet)
 Working....Fri Dec 13 17:57:05 EST 1996
   Verifying

Loading 105 of 108 subset(s)....

Ref Pages: Windows Programming
   Copying from kramer (inet)
 Working....Fri Dec 13 17:58:02 EST 1996
   Verifying

Loading 106 of 108 subset(s)....

Ref Pages: CDE Development
   Copying from kramer (inet)
   Verifying

Loading 107 of 108 subset(s)....

Ref Pages: CDE Admin/User
   Copying from kramer (inet)
   Verifying

Loading 108 of 108 subset(s)....

XIE Version 5 Online Documentation
   Copying from kramer (inet)
Broken pipe
   Verifying

108 of 108 subset(s) installed successfully.



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


The above message is also recorded in /etc/motd for your
future reference.


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 DKB200
 >>> boot
```

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


?05 HLT INSTR
  PC= FFFFFC00.004008F0 PSL= 00000000.00000005

 >>> set boot_osflags A

BOOT_OSFLAGS = A
 >>> set bootdef_dev DKB200

BOOTDEF_DEV = DKB200
 >>> boot
```

System initialization messages display as the system boots from the newly-installed system. Software configuration begins next:

```
*** SYSTEM CONFIGURATION ***


Configuring "Base System " (OSFBASE410)

Configuring "Base System - Hardware Support " (OSFHWBASE410)

Configuring "Compiler Back End " (OSFCMPLRS410)

Configuring "Kernel Header and Common Files " (OSFBINCOM410)

Configuring "Standard Kernel Modules " (OSFBIN410)

Configuring "Hardware Kernel Header and Common Files" (OSFHWBINCOM410)

Configuring "Hardware Kernel Modules " (OSFHWBIN410)

Configuring "ATM Kernel Header and Common Files " (OSFATMBINCOM410)

Configuring "ATM Kernel Modules " (OSFATMBIN410)

Configuring "Logical Storage Manager Kernel Header and
Common Files" (OSFLSMBINCOM410)

Configuring "Logical Storage Manager Kernel Modules" (OSFLSMBIN410)

Configuring "POLYCTR advfs Kernel Modules " (OSFADVFSBIN410)

Configuring "Basic Networking Services " (OSFCLINET410)

Configuring "Additional Networking Services " (OSFINET410)

Configuring "ATM Commands " (OSFATMBASE410)

Configuring "NFS(tm) Utilities " (OSFNFS410)

Configuring "Remote Installation Service " (OSFRIS410)

Configuring "Dataless Management Services " (OSFDMS410)

Configuring "Local Printer Support " (OSFPRINT410)

Configuring "Adobe Font Metric Files " (OSFAFM410)

Configuring "Doc. Preparation Tools " (OSFDCMT410)
```

```
Configuring "Doc. Preparation Tools Extensions " (OSFDCMTEXT410)
Configuring "Basic X Environment " (OSFX11410)
Configuring "CDE Minimum Runtime Environment " (OSFCDEMIN410)
Configuring "CDE Desktop Environment " (OSFCDEDT410)
Configuring "LK201 Keyboard Support " (OSFKBDLK201410)
Configuring "LK401 Keyboard Support " (OSFKBDLK401410)
Configuring "LK411 Keyboard Support " (OSFKBDLK411410)
Configuring "LK421 Keyboard Support " (OSFKBDLK421410)
Configuring "LK444 Keyboard Support " (OSFKBDLK444410)
Configuring "PCXAL Keyboard Support " (OSFKBDPCXAL410)
Configuring "X Servers Base " (OSFSER410)
Configuring "X Servers for PCbus " (OSFSERPC410)
Configuring "X Servers for TurboChannel " (OSFSERTC410)
Configuring "X Servers for Open3D " (OSFSER3D410)
Configuring "X Fonts " (OSFMITFONT410)
Configuring "DECwindows 100dpi Fonts " (OSFFONT15410)
Configuring "DECwindows 75dpi Fonts " (OSFFONT410)
Configuring "Adobe Fonts " (OSFDPSFONT410)
Configuring "X Customizations for OEM " (OSFXOEM410)
Configuring "Old X Environment " (OSFOLDX11410)
Configuring "RAND Corp. Mail Handler (MH) " (OSFMH410)
Configuring "CDE Mail Interface " (OSFCDEMAIL410)
Configuring "DECwindows Mail Interface " (OSFXMAIL410)
Configuring "UNIX(tm) SVID2 Compatibility " (OSFSVID2410)
Configuring "DOS tools " (OSFDOSTOOLS410)
Configuring "Local Area Transport (LAT) " (OSFLAT410)
Configuring "UNIX(tm) to UNIX(tm) Copy Facility " (OSFUUCP410)
Configuring "Computer Aided System Tutor " (OSFLEARN410)
Configuring "Additional Terminfo databases " (OSFTERM410)
Configuring "GNU Emacs " (OSFEMACS410)
Configuring "Tcl Commands " (OSFTCLBASE410)
Configuring "Tk Toolkit Commands " (OSFTKBASE410)
```

```
Configuring "Additional X Applications " (OSFXMIT410)

Configuring "Nested X Server " (OSFXNEST410)

Configuring "Virtual X Frame Buffer " (OSFXVFB410)

Configuring "Demo X Applications " (OSFXDEMOS410)

Configuring "CDE Additional Applications " (OSFCDEAPPS410)

Configuring "Additional DECwindows Applications " (OSFDECW410)

Configuring "Netscape Navigator Gold V3.0 " (OSFNETSCAPE410)

Configuring "Old Additional DECwindows Applications" (OSFOLDDECW410)

Configuring "System Accounting Utilities " (OSFACCT410)

Configuring "Logical Storage Manager " (OSFLSMBASE410)

Configuring "POLYCTR advfs " (OSFADVFS410)

Configuring "Logical Volume Manager " (OSFLVM410)

Configuring "System Exercisers " (OSFEXER410)

Configuring "Single-Byte European Locales " (OSFEURLOC410)

Configuring "C2-Security " (OSFC2SEC410)

Configuring "Kernel Debugging Tools " (OSFKTOOLS410)

Configuring "Base System Management Applications and Utilities"
(OSFSYSMAN410)

Configuring "Basic Networking Configuration Applications" (OSFNETCONF410)

Configuring "NFS(tm) Configuration Application " (OSFNFSCONF410)

Configuring "Graphical Base System Management Utilities" (OSFXSYSMAN410)

Configuring "Graphical System Administration Utilities" (OSFXADMIN410)

Configuring "Graphical Print Configuration Application" (OSFXPRINT410)

Configuring "C2-Security GUI " (OSFXC2SEC410)

Configuring "Logical Storage Manager GUI " (OSFLSMX11410)

Configuring "GNU Revision Control System " (OSFRCS410)

Configuring "Source Code Control System " (OSFSCCS410)

Configuring "Software Development Tools and Utilities" (OSFSDE410)

Configuring "Standard Programmer Commands " (OSFPGMR410)

Configuring "Standard Header Files " (OSFINCLUDE410)

Configuring "Static Libraries " (OSFLIBA410)

Configuring "X Window and X/Motif Software Development" (OSFXDEV410)
```

```
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Configuring "X Window and X/Motif Static Libraries" (OSFXLIBA410)

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The system name assigned to your machine is 'george'.
```

J.2.3 Kernel Build Procedure

This section shows the kernel build procedure.

```
*** KERNEL CONFIGURATION AND BUILD PROCEDURE ***

*** KERNEL OPTION SELECTION ***

    Selection   Kernel Option
-------------------------------------------------------------
```

```
 1 System V Devices
 2 Logical Volume Manager (LVM)
 3 NTP V3 Kernel Phase Lock Loop (NTP_TIME)
 4 Kernel Breakpoint Debugger (KDEBUG)
 5 Packetfilter driver (PACKETFILTER)
 6 Point-to-Point Protocol (PPP)
 7 STREAMS pckt module (PCKT)
 8 X/Open Transport Interface (XTISO, TIMOD, TIRDWR)
 9 File on File File System (FFM)
 10 ISO 9660 Compact Disc File System (CDFS)
 11 Audit Subsystem
 12 ACL Subsystem
 13 Logical Storage Manager (LSM)
 14 LAN Emulation over ATM (LANE)
 15 Classical IP over ATM (ATMIP)
 16 ATM UNI 3.0/3.1 Signalling for SVCs
 17 Asynchronous Transfer Mode (ATM)
 18 Advanced File System (ADVFS)

--- MORE TO FOLLOW ---

 19 All of the above
 20 None of the above
 21 Help
 22 Display all options again
------------------------------------------------------------

Enter the selection number for each kernel option you want.
For example, 1 3 [20]: 19


You selected the following kernel options:

 System V Devices
 Logical Volume Manager (LVM)
 NTP V3 Kernel Phase Lock Loop (NTP_TIME)
 Kernel Breakpoint Debugger (KDEBUG)
 Packetfilter driver (PACKETFILTER)
 Point-to-Point Protocol (PPP)
 STREAMS pckt module (PCKT)
 X/Open Transport Interface (XTISO, TIMOD, TIRDWR)
 File on File File System (FFM)
 ISO 9660 Compact Disc File System (CDFS)
 Audit Subsystem
 ACL Subsystem
 Logical Storage Manager (LSM)
 LAN Emulation over ATM (LANE)
 Classical IP over ATM (ATMIP)
 ATM UNI 3.0/3.1 Signalling for SVCs
 Asynchronous Transfer Mode (ATM)
 Advanced File System (ADVFS)

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

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

       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 13 08:03:58 EST 1996
 Working....Fri Dec 13 08:06:00 EST 1996
 Working....Fri Dec 13 08:08:01 EST 1996

syncing disks... done
rebooting.... (transferring to monitor)
```

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Special Characters

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